



## Pedagogical competence of mathematics education lectures using LMS (*Learning Management System*) moodle in the era Covid-19

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**Abstract:** This study aimed to investigate to what extent the mathematics education lectures' pedagogical competence using LMS Moodle in the era covid-19. The researchers employed a case study research design and the participants comprised three mathematics education lecturers who used LMS Moodle IKIP PGRI Bojonegoro. As well, to collect the data, observation, questionnaire, and fieldnotes were used based on the teacher's perspective. The responses were then to be interpreted into percentages and analysed descriptively. There were three main phases to analyse the data, namely data reduction, data display, and conclusion drawing and verification. Moreover, triangulation was applied to validate and verify the data collected. The results of this study indicated that the mathematics education lectures' pedagogical competence was good as a whole of the seventh aspects discussed.

**Keywords:** pedagogical competence, LMS (Learning Management System) Moodle

### INTRODUCTION

Education becomes a crucial concern of each state in the world. It is regarded as one of the indicators state's development. Dewey views that the education is a necessity for democratic society. Being well-known for his pedagogic creed, he believes that experience, freedom, community, and "habits of mind" are key concepts of education (Dewey, 1927/1954: 25; Singer, Murphy, & Hines, 2003: 8).

Education can explicitly not be apart from the teaching and learning process. The success of education is determined by the effective and efficient teaching and learning activities. Teaching is a systematical and complex process in which applies some of the methods and strategies to transfers knowledge, cultivate potentials, and even mold the characters of the students. Impactful and meaningful teaching will affect the students' outcomes. However, qualified, integrated and meaningful teaching and learning are dealt with by teachers or educators' roles. As the subject of teaching and learning, teachers play a pivotal role in their students' achievement. Hence, they are expected to be multi-skilled ones. This is since they need to understand the background and nature of students including their experience, interest, competence, and attitude. The teachers have also to facilitate the students in

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improving their capabilities, and in gaining not only the knowledge but also the moral, cultural, and social values.

Also, to help the students to maximize their competence, lectures are demanded to create joyful and fruitful learning so that the students enables to acquire the benefits of learning. Similarly, the lectures are often supposed to motivate and inspire their students in encountering the possibility and challenges along with their daily life and the future. Yet, the students may have the responsibility and courage to solve their problems themselves. Sometimes, they are personally able to control themselves and to build up their self-control, self-esteem, and self-concept. As a result, the students are likely to be more ready to confront and even participate in the global era which cross-cultural insights, competencies, and values are easy to be accessed.

In practice, the lectures should be the capable person who is professionally to array the curriculum design, to implement the lesson plan, to manage the classroom, and even to assess and evaluate the students' outcomes. Furthermore, to be a lecture ought to be a well-prepared and competent person, not only in personal and social competence but also in pedagogical and technological competence. Pedagogical competence mainly contributes to the fruitful learning outcomes. The pedagogical competences are under three significant factors of education: educational achievement/success/efficiency, professional development, and societal change. Consequently, the teachers should be expertise in managing and upgrading their pedagogical competences; this is because of that pedagogical competence as the main requirement in creating a constructive and effective learning atmosphere.

Besides, some studies show that educational concerns shift into teaching-learning methods and students' outcomes. Teaching-learning methods and student achievement are correlated to the teaching competencies which the teachers own and implement to their classroom: those are personal competence, pedagogical competence, social competence, and professional competence. However, the pedagogical competence seems to be the key to effective and fruitful learning. Pedagogical competence is about how the teachers, and or teachers candidates to manage the classroom and to integrate the content and strategies of teaching and learning so that the students are willing to accept the content of learning and develop their potentials. On the other hand, the other studies point out that the student teachers faced some of the challenges in implementing their pedagogical competence in real classroom teaching and learning. Thus, the student-teacher or teacher candidates should establish their pedagogical competencies and carry out some practices before going to real classroom activities.

Pedagogical competence is a potential embodiment of professional standards (Suciu and Mata, 2011: 412). The pedagogical competences are by three significant factors of education: educational achievement, professional development, and societal change. Oser & Oelkers (2001) and Suciu & Mata (2011: 412) state pedagogical competence can be seen from two sides, namely the achievement of successes obtained can influence society.

In summary, education is a tool to measure the success of a nation in a country. Education cannot be separated from teaching and learning activities which place the

teacher/lecture as the main actor. As professional lectures, they need to develop their pedagogical competencies along with their personal and social competencies; moreover, they should transmit knowledge, abilities, values, and behavior in a foreign context. Based on the explanation above, this study are going to investigate to what extent mathematics education lectures' experiences and pedagogical competence using LMS Moodle during era covid-19. Therefore, mathematics education lectures' experiences and pedagogical competence must be an underlying concern to reflect and perform their pedagogical competence or the teacher education to sustainably manage their educational curriculum.

Pedagogical competence consists of three fundamental aspects or processes; those are 1) pre-teaching or planning: a) understanding the characteristics of students, b) mastering learning theory and principles of educational learning, c) developing curriculum; 2) teaching or implementing: d) conducting educative learning activities, e) developing learners' potentials, f) maintaining communication and interaction with students, and; g) post-teaching or evaluating: g) conducting assessment and evaluation.

## METHOD

This study used qualitative research. Qualitative research differs from quantitative research. Among these many characteristics, one of them is exploring data from the subject in question (Creswell, 2014: 16). In this research, the researcher carries out a qualitative study that employs some qualitative approaches or designs. According to Spencer et al. (2003), as in Kihlgren (2016) describes that qualitative research is a research that aims to provide an in-depth understanding of people's experiences and perspectives, in the context of their particular circumstances and settings; it is characterized by exploring phenomena from the perspective of those studied and of being sensitive to social context. Qualitative research applies an interpretive, naturalistic approach to the world (Denzin & Lincoln, 2005; Kihlgren, 2016).

In summary, the researcher undertakes a qualitative study in which a case study design is applied. The interpretative paradigm is taken into account in this study to obtain and verify mathematics education lectures using LMS (Learning Management System) Moodle understanding of their pedagogical competence and also establish their multiple and various meanings (i.e. belief, expectation, intention, etc) under the classroom interaction and student-teacher feedback. The study is mainly aimed to obtain an in-depth understanding and a clear description of mathematics education lecture' pedagogical competence during the era covid-19. Furthermore, the study is likely to observe and investigate the phenomenon which happens in teaching and learning process.

In this research, the researcher acted as a nonparticipant observer. It means that the researcher conducts observation and visits a site and records notes (and also fill out the observation checklist) without becoming involved in the activities of the participants. According to Creswell (2012: 214), the nonparticipant observer is an "outsider" who sits on some advantageous place (e.g., the back of the classroom) to watch and record the

phenomenon through study. Hence, the researcher observes mathematics education to evaluate their pedagogical competence (i.e. ability to plan, conduct, and evaluate the teaching practice) and also determine to what extent their pedagogical competence is.

The researcher also acted as a note-taker who is likely to obtain some information from the respondents during the observation process; those might be about how the student participation, classroom atmosphere, teacher's communication, and learning activities were. The researcher then took some important notes which were encountered in the classroom. Thus, the field note will be a fundamental source of data to support the discussion and findings section of the research that was to be presented.

On the other hand, the researcher was likely to be an evaluator. It was because the researcher needs to organize, measure, interpret, and evaluate to what extent the mathematics education lectures' pedagogical competence into particular levels during the observation process, interview, and thorough questionnaire. As well, the evaluation is cohered to the multiple findings from observation, field notes, and questionnaires.

Furthermore, the setting of the research was in Mathematics Education Department, FPMIPA, IKIP PGRI Bojonegoro. It is located in Jln. Panglima Polim No. 46 Bojonegoro. Therefore, the research was held during era covid-19; that was for two weeks where mathematics education lectures were going to practice teaching.

The research sampling used in the study is qualitative, namely purposeful sampling. Then, purposeful sampling applied to both individuals and sites. Therefore, the purposeful sampling in the research was generally aimed at mathematics education lectures so that the researcher could observe and investigate their pedagogical competence using LMS Moodle in the era covid-19.

The subject of the research was 3 (three) mathematics education lectures who had used LMS Moodle in the era covid-19. The mathematics education lectures were certified lectures to qualify for mathematics education. Furthermore, the mathematics education lectures came from the FPMIPA (Fakultas Pendidikan Matematika dan IPA) of the Mathematics Education Department at IKIP PGRI Bojonegoro (Teacher Training Institute of PGRI Bojonegoro).

For primary source, the researcher then used the result of observation, field note, and questionnaire. Moreover, the result of the questionnaire can be used as the strongest source to get the information or insight because it attempts to give the in-depth response of the interviewee so that the researchers might gain a complex understanding from the subject of the research. As well, the result of the observation was to reinforce and develop a clear description of the topic of the research since it included some significant and standard criteria or aspects to be observed. Thus, the result of observation, field notes, and questionnaires are triangulated and confirmed.

For secondary source, a secondary source is an additional or complementary source to acquire the data. The secondary data source is a preexisting source that has been gathered for a different purpose or by someone other than the researcher. In other words, the secondary source has a function to gather data for various purposes when conducting

research. Here, the secondary source is used documents. It may determine lectures's competence in a particular subject matter.

The researcher used observation, field notes, and questionnaires in the research to obtain the indept and holistic data. Data were analyzed used three phases, namely data reduction, data display, and conclusion drawing and verification. Finally, the researcher has to carry out conclusion drawing and verification from the data display; those involve cross-check the validity and confirmability of the data (Miles and Huberman, 1994). Consequently, triangulation would be utilized for verifying and confirming the findings by using some methods and sources of the data.

To facilitate the presentation and analysis of qualitative data, a descriptive statistic is utilized. The researcher attempts to convey the essential characteristics of the data by arranging the data into a more interpretable and by calculating numerical indexes, such as averages, percentile ranks, and measures of spread (Johnson & Christensen, 2014). A descriptive statistic (in the count noun sense) refers to a summary statistic that quantitatively describes or summarizes features of a collection of information, while descriptive statistics (in the mass noun sense) is the process of using and analyzing those statistics (Mann, 1995). In descriptive statistics, a set of data can be measured from central tendency and also variability or dispersion.

The researcher considered some steps in analyzing the data. Moreover, the researcher used descriptive statistics to analyze the results of the observation checklist and questionnaire. The findings (i.e. the frequency counts and value) were likely to be presented are tabulated and converted to mean, median, mode, or percentages so that those were easily interpretable. Reliability and validity are the two most essential parameters or properties to consider in applying a test or assessment procedure. Johnson & Christensen (2014) asserts that reliability is associated with the consistency or stability of the test scores, while validity pertains to the accuracy of the inferences or interpretations you make from the test scores. Both qualitative and quantitative research prominently require either reliability or validity so that the research conducted is going to be credible, valid, and accurate. Therefore, the instrument and or the findings were the parts that should be validated thoroughly.

To sum up, triangulation (i.e. using various methods of data collection, such as observation, questionnaire, and filed note) and member checking was applied to validate the data. To enhance the credibility and trustworthiness of the data, the results of the observation, fieldnote, and questionnaire were compared and confirmed with each other. Also, the researcher cross-checked and gave feedback to the participant so that there might be the approval understanding and conformable insights into the findings. Then, a thorough review and recommendation would bring a great contribution to evaluate the completeness of the findings. As a result, to verify the validity of the findings, triangulation, member checking, and an external audit was likely to be applied so that the findings might be credible, rich, and in-depth.

## RESULTS AND DISCUSSION

Pedagogical competence is a range of teachers' capabilities that belong to their understanding, knowledge, skill, behavior, and performance to create efficient and effective learning and teaching activities. Due to the aims of this study is to investigate mathematics education lectures' pedagogical competence using LMS Moodle in the era covid-19, the researchers observed mathematics lectures' teachinglearning activities for 100 minutes length per meeting. Then, the researchers used an observation checklist and took some field notes to analyze the pedagogical competence of mathematics educator of IKIP PGRI Bojonegoro. The observation was design into observation-scaled which was to identify and place mathematics education lectures into some level of pedagogical competence. The rating scale on observation checklist is from score 1 to 5 that indicates "poor" to "excellent" of mathematics education lectures' pedagogical competence. The rating scale of the observation checklist is as follows.

**Table 1. Rating Scale of Mathematics Education Lectures' Pedagogical Competence**

Score	Description
5	<b>Excellent:</b> Strong Evidence in the Teaching Activities
4	<b>Good :</b> Good Evidence in the Teaching Activities
3	<b>Fair :</b> Some Evidence in the Teaching Activities
2	<b>Poor :</b> Few Evidence in the Teaching Activities
1	<b>Very Poor :</b> No Evidence in the Teaching Activities

Moreover, the final score of mathematics education lectures' pedagogical competence using LMS Moodle was obtained from the average of total scores of each indicator and then taken into a percentage. To identify the improvement, the researcher compared the score or percentage of two-weeks meeting scores that EFL pre-service teachers performed. The formulation of scoring and interval score is as follows. The interval percentage of mathematics education lectures' pedagogical competence as follows Table 2.

**Table 2. Interval Percentage of Mathematics Education Lectures Pedagogical Competence**

Percentage	Predicate
0% - 20%	Vey Poor
21% - 40%	Poor
41% - 60%	Good
61% - 80%	Very Good
81% - 100%	Excellent

The percentage are from 100 % divided with 5 to classify the predicate of mathematics education lectures competence from "very poor" to "excelent" as to Likert Scale. The researcher determined some indicators of observation based on Guidelines for Implementing Teacher Performance Appraisal developed by The Ministry of National Education, Directorate

General of Quality Improvement of Educators and Education Personnel (2010). Meanwhile, the researcher categorized the aspects of pedagogical competence into three aspects which are: 1) planning belongs to the aspect (a), (b), and (c), 2) implementing belongs to the aspect (d), (e), and (f), and 3) evaluating belongs to the aspect (g).

It indicated that they had performed well in conducting LMS Moodle learning activities based on their first experience in online learning and teaching classroom. In fact, pedagogical competence consists of three fundamental aspects or processes; those are 1) pre-teaching or planning: a) understanding the characteristics of students, b) mastering learning theory and principles of educational learning, c) developing curriculum; 2) teaching or implementing: d) conducting educative learning activities, e) developing learners' potentials, f) maintaining communication and interaction with students, and; g) post-teaching or evaluating: g) conducting assessment and evaluation.

Furthermore, each aspect of pedagogical competence consists of some indicators. First, understanding the characteristics of students. The lectures can 1) identify the learning characteristics of each student in his class in LMS Moodle, 2) ensure that all students get the same opportunity to actively participate in learning activities in LMS Moodle, 3) arrange classes to provide equal learning opportunities to all students with different physical and learning disabilities when using zoom or google meet integrated in LMS Moodle, 4) try to find out the cause of the deviant behavior of students to prevent the behavior from harming other students, 5) helps develop the potential and overcome the shortcomings of students, and 6) pay attention to learners with a specific physical weakness to be able to keep learning, so that students are not marginalized.

Second, mastering learning theory and principles of educational learning. Lectures can 1) allow students to master learning materials according to their age and learning abilities through the setting of a varied learning process and activities, 2) always ensure students' level of understanding of certain learning materials and adjusts subsequent learning activities based on that level of understanding, 3) explain the reasons for carrying out the activities that he does, both those that are appropriate and different from the plan, related to the success of learning, 4) use various techniques to motivate learners' willingness to learn, 5) plan learning activities that are interrelated with one another, taking into account the learning objectives and the learning process of students, and 6) pay attention to students' responses that do/ do not understand the learning material being taught and use it to improve the next learning design.

Third, developing curriculum (lesson plan). Lectures can; 1) compile a syllabus that is under the curriculum, 2) design a learning plan that is under the syllabus to discuss certain teaching materials so that students can achieve the basic competencies specified, 3) follow the sequence of learning material by paying attention to the learning objectives, and 4) chooses learning material that: (a) matches the learning objectives, (b) is appropriate and up-to-date, (c) according to the age and level of learning ability of students, (d) can be implemented in online class and (e) according to the context of learner's daily life.

Fourth, conducting educative learning activities. The lectures can 1) carry out learning activities under the design that has been prepared in full and the implementation of these activities indicates that the teacher understands the purpose, 2) carry out learning activities that aim to help the learning process of students, not to test so that makes students feel depressed, 3) communicate new information (for example additional material) according to the age and level of students' learning ability, 4) address the mistakes made by the students as the stages of the learning process, not only- the fault must be corrected. For example: by knowing in advance other students who agree/disagree with the answer, before explaining the correct answer, 5) implement learning activities appropriate curriculum content and link it with the context of the daily life of the learners, 6) carry out varied learning activities with sufficient time for learning activities that are appropriate to their age and level of learning ability and maintain the attention of students, 7) manage the class effectively without dominating or busy with his activities so that all participant's time can be used productively, 8) use audiovisual to increase students' learning motivation in achieving learning goals, in this class using "label" for playing youtube integrated in LMS Moodle. Adjust learning activities that are designed with classroom conditions, 9) provide many opportunities for students to ask questions, practice, and interact with other students, through "chat" of "discussion" menu in LMS Moodle, or via google meet also zoom integrated in LMS Moodle, 10) arrange the implementation of learning activities systematically to help the learning process of students. For example, the teacher adds new information after evaluating students' understanding of the previous material, and 11) uses teaching aids, and/ or audiovisual (youtube) integrated in LMS Moodle to increase students' learning motivation in achieving learning goals.

Fifth, developing learners' potentials. Lectures can 1) analyze learning outcomes based on all forms of assessment of each student to determine the level of progress of each student, 2) design and implement learning activities that encourage learners to learn according to their skills and learning patterns of each student, 3) design and implements learning activities to bring out the students' creativity and critical thinking skills, 4) actively help students in the learning process by giving attention to each individual, 5) correctly identify the talents, interests, potential, and learning difficulties of each student, 6) provide learning opportunities for students under their respective learning methods, and 7) focus attention on interactions with students and encourages them to understand and use the information conveyed.

Sixth, maintaining communication and interaction with students. Lectures can 1) use questions to find out understanding and maintain student participation, including giving open questions that require students to answer with their ideas and knowledge, 2) pay attention and listens to all questions and responses of students, without interrupting, unless necessary to help or clarify the question/ response, 3) respond to students' questions appropriately, correctly, and up-to-date, according to the learning objectives and curriculum content, without embarrassing them, 4) present learning activities that can foster good cooperation between students, 5) listen and gives attention to all the students' answers, both correct and considered wrong to measure the level of understanding of students, and 6) pay attention to



students' questions and responds in a complete and relevant way to eliminate confusion in students.

Seventh, conducting assessment and evaluation. Lectures can 1) prepare an assessment tool that suits the learning objectives to achieve certain competencies as written in the lesson plan, 2) carry out assessments with various techniques and types of assessment, in addition to formal assessments conducted by schools, and announce their results and implications to students, about the level of understanding of learning material that has been and will be studied, 3) analyze the results of the assessment to identify topics/ basic competencies difficult so-known strengths and weaknesses of each learner for both remedial and enrichment, 4) utilize input from students and reflects on it to improve further learning, and can prove it through notes, learning journals, learning plans, additional material, and so on, and 5) utilize the results of the assessment as material for the preparation of the learning design that will be done next.

**Table 3. Tabel Mathematics Education Lectures' Ability to Understand on Students Characteristics**

No	Mathematics Education Lectures	First Meeting		Second Meeting		Average Score	Average Percentage
		Score	Percentage	Score	Percentage		
1	MEL-1	3.00	70%	3.17	63%	3.09	66.5%
2	MEL-2	3.50	60%	3.83	70%	3.67	65%
3	MEL-3	3.17	63%	3.50	77%	3.34	70%
	Average	3.22	64.3%	3.50	70%	3.37	67.17%

Table 3 show the result of score, percentange, average score, and average score of the indicators of pedagogical competences. As well, mathematics education lectures got some various average score of each aspect of pedagogical competence, such as planning, implementing, and evaluating. First, understanding the characteristics of students, mathematics education lectures achieved 3,37 (67.17%).

Next indicators can be calculated with the same calculation. Second, the proportion of mastering learning theory and principles of educational learning was at an average score of 3,25 (65%). Furthermore, third, the mathematics education lectures' ability to developing curriculum was at an average score of 3,63 (73%). Also, fourth, they obtained an average score of 3,16 (63%) for conducting learning activities. Then, fifth, the mathematics education lectures' ability to develop learners' potentials was at an average score of 3,25 (65%). Meanwhile, sixth, they got an average score of 3,48 (70%) in maintaining communication and interaction with students. At last, seventh, the proportion of conducting assessment and evaluation was at an average score of 3,26 (65%).

Pedagogical competence must be mastered by professional lectures. It is due to well-developed pedagogical competence influences the success of the ongoing learning process

and students' outcome. As a result, pedagogical competence is sustainable competence which is likely to develop well when mathematics education lectures creates successful and meaningful learning activities and improve students' outcome or performance (in the realm of cognitive, affective, and psychomotor, knowledge, skills, values, beliefs, and attitudes). The detail description of each pedagogical competence as describe in the next paragraph.

First indicators, as could be seen at the observation results, mathematics education lectures were quite good at understanding the characteristics of students in the classroom at the first meeting. Based on the observation results, lectures were quite good at understanding the characteristics of students in the classroom at the first meeting; as well, their average scores were respectively at 3.27 (65%) and 3.37 (67%). Lectures had already performed dominantly in the classroom to ensure that all students get the same opportunity to actively participate in learning activities through menu "chat" in LMS Moodle and when discuss via google meet (4.0). Then, the mathematics education lectures' role to arrange the classroom, and attention to learners were at 3.3. It indicated that they were good enough to provide equal learning opportunities to all students with different physical and learning disabilities and keep in touch with their students.

Furthermore, the proportion of the learning characteristics' identification of each student in the classroom was at 3.2. It meant that they were so curious enough that they were initiated more to comprehend the student's characteristics and even needs of learning. Also, all of the mathematics education lectures attempted to give some assistance to their students which was to develop the potentials, i.e. students performance, emotion, and perception, and overcome the students' shortcomings (3.1). For example, they might make sure that all the students understood the materials through some questions in LMS Moodle or chatting via google meet, and even repeated their explanation for them to give more reinforcement. Meanwhile, some of athematics education lectures were still to consider hard to find out the cause of the negative behavior of students (3.0). However, they mostly had tried to avoid misbehavior students with some of the actions, such as being silent, advising, shifting to other topics, approaching them, and even getting them to do some tasks in front of the classroom.

In summary, all mathematics education lectures had consistently tried to comprehend the student's character by identifying their emotions, perception, and engagement during the learning process. As presented at observation findings, the athematics education lectures were quite good at understanding the students' characters (3.37 or 67.17%).

Second, from the observation, the results showed that mathematics education lectures' ability in mastering learning theory and principles of education at the quite-satisfied average score; that was respectively at 3.20 (64%) and 3.30 (66%). As well, the previous result presented that the mathematics education lectures obtained the highest score in making sure the students' level of understanding of certain learning materials and adjusting subsequent learning activities based on that level of understanding (3.9). The Emathematics education lectures adjusted to all students get equal opportunities to ask a question for misunderstanding, give their opinion on the materials, reflect their understanding, and discuss the difficult materials. As a result, some mathematics education lectures would be aware of

inactive students in the classroom, and they might do various methods in LMS Moodle to engage the students in the next class, such as applying game and telling motivation.

Meanwhile, the proportion of responding to the student's difficulties and using student's feedback was at 3.3. It implied that most mathematics education lecturers still needed to improve their attention holistically to students' responses that did not understand the learning material being taught and even some of them might use it to develop the next learning design. Also, lecturers got 3.2 on distributing students' opportunities. They mainly allowed the students to master learning materials accordingly through the setting of a varied learning process and activities in LMS Moodle, such as plotting question, correction, elaboration, opinion, and additional information to the students to each other. However, not all students could contribute to learning. It seemed due to mathematics education lecturers were still hardly managing the time to explain, give the students a chance, discuss, and do the reflection on their learning.

Moreover, some of mathematics education lecturers periodically planned to learn activities that were interrelated with one another even though a few of them did not systematically take into account the learning objectives and the learning process of students (3.1). As obtained in the observation findings, the majority of mathematics education lecturers did not explicitly explain the reasons for carrying out the activities that they did (3.0). Consequently, the students were not aware of what they should master and achieve during the learning process. Whereas, the learning objectives require to be realized by the students so that they will know and try to reach the learning target. Similarly, the use of various techniques to motivate learners' willingness to learn which was at the average score of 3.0. It meant that not all of mathematics education lecturers did well in encouraging and stimulating their students to the learning activities. Nevertheless, some of them had strived for involving the students in the mathematics education lecturers activities, such as playing a game, giving encouragement, telling a good figure story, giving rewards, etc.

In conclusion, the proportion of the mathematics education lecturers' ability in mastering learning theory and principles of education was quite good (3.25 = 65%). From the observation findings, the real classroom they had already experienced initiated them to develop class activities according to the appropriate learning methods they perceived, create a conducive classroom atmosphere, and so on.

Third, developing a curriculum is the ability to arrange a syllabus or lesson plan before conducting teaching. Based on the result, the average score of mathematics education lecturers developing curriculum, i.e. arranging lesson plan was good; it was indicated from the 1st meeting (3.55 = 71 %) and the 2nd meeting (3.70 = 74%). They mainly took into account the methods and steps of learning. Moreover, the proportion of mathematics education lecturers to compile a syllabus and to design a learning plan completed with certain teaching materials was at the same average score; that was 4.0. It meant that the ability to arrange the lesson plan related to the curriculum was good. Some of them stated that they were to review and study some available sources, i.e. students books, teacher's books, and references so that they understood what the basic specified competencies students might achieve.

As the researcher found during observation, mathematics education lectures mostly did not follow the sequence of learning material properly (3.5). They dominantly focused on explaining the materials than conveying the learning objectives clearly to the students and reflecting the lesson at the end. The most complicated thing to do was material organization since the portion was just 3.0. The mathematics education lectures were hardly struggling to holistically choose the learning materials and even systematically organize them in LMS Moodle. The learning material was expected to (a) match the learning objectives, (b) be appropriate and up-to-date, (c) according to the age and level of learning ability of students, (d) be able to be implemented in class and (e) according to the context of learner's daily life.

To conclude, the mathematics education lectures obtained a total average score of 3.63 (73%) on the ability to develop a curriculum (lesson plan). It denoted that they were quite good at arranging the lesson plan adjusting the synchronous and asynchronous conditions in online learning.

Fourth, conducting educative learning activities. The results showed that the mathematics education lectures' ability to conduct learning activities was 3.11 (62%) in the 1st meeting and 3.22 (64%) in the 2nd meeting. The proportion of students' help was at a high average score of 3.8. It indicated that the mathematics education lectures mostly emphasized the learning activities which were to assist the students during the learning process and also attempted to make students feel enjoyable and self-confident. As well, the results showed that the frequent average score was 3.4 in some aspects, such as students' mistakes clarification, content and contextual inputs, and class management. It could be concluded the results were quite good due to mathematics education lectures mostly corrected the mistakes made by the students as the stages of the learning process and some of them allowed the students to answer before explaining the correct answer.

However, mathematics education lectures still struggled to manage the online class in LMS Moodle effectively without dominating or busy with his activities so that all participant's time can be used productively (3.4). As a main resource and actor in the online class, they eventually dominated the learning activities, such as describing the material more than involving the students to understand the materials interactively.

Also, the proportion of providing students opportunities to ask questions, practice, and interact with other students was 3.4. It implied that the mathematics education lectures had attempted to set a democratic classroom atmosphere. During the observation, the researcher found that they often ensured their students to understand the materials, drilled them with some questions and practices, and even allowed them to discuss in a group. Differently, time management was slightly hard to be undertaken by mathematics education lectures (3.2). Even though they had already planned to carry out varied learning activities at a certain time, they mostly spent the time more only to explain and maintain the attention of students. Then, there was occasionally a lot of time that was not used properly, much to discuss, evaluate, and engage the students extensively.

They got 3.0 due they had not fully implemented their teaching-learning design. As well, the proportion of communicating new information was 3.0. They were likely to give a

contextual, clear, and detailed explanation. Similarly, the mathematics education lectures were quite good to arrange the implementation of learning activities systematically (3.0). Nevertheless, as a consequence of dynamic classroom situations, i.e. students' emotions, study group, classroom constraints, lectures feelings, and so on, mathematics education lectures less paid attention to conduct the learning activities following the systematic learning design. Moreover, the use of ICT which is audiovisual (including trick) media was at a high score (4.1). As the observation findings, the researcher noted that mostly conducted students centered learning which explaining the materials was as the main part of the learning process.

Fifth, developing learners' potentials. One of the main roles of teachers is to develop their students' potentials. Learning activities begin with irrational activities, then develop towards rational discovery and problem solving (Widada, 1994: as in Rusyan, et al., 2020: 162). The ability to develop learner's potentials was respectively at average score 3.06 (61%) in the 1st meeting and 3.40 (68%) in the 2nd meeting. It meant that they were quite able to identify and analyze the students' potentials through in the short time of class meetings. The proportion of providing learning opportunities for students was in the high average score (3.8). It showed that the main way to develop their students' potentials was to give such a free space for the students that they might be able to express their ideas, perform their skills, ask their curiosity, etc. Even though it was likely not to present all of the student's potentials in the classroom, several students' performances at the class would be a representation of the learning efficacy.

As well, mathematics education lectures reached an average score of 3.3 on distributing individual attention which was similar to the students' interaction attention. Meanwhile, the proportion of learning outcomes analysis was 3.2. It was slightly different in learning activities' design and implementation (3.1). As the observation, the researcher noted that mathematics education lectures applied a few forms of assessment of each student, i.e. oral or written test, remedial, enrichment, queries' reflection, etc. So, they were quite hard to determine the level of progress of each student; furthermore, to place their students into beginning, intermediate, and advanced levels. The researcher realized that it was not easy to cover all of the students with various emotions, knowledge, and skill into a one-time meeting. They were still quite hard to design and implement learning activities according to their skills and learning patterns of each student.

Moreover, mathematics education lectures obtained an average score of 3.0 in identifying the talents, interests, potentials, and learning difficulties of each student. Some mathematics education lectures got an average score of 2.9 in bringing out the students' creativity and critical thinking skills of learning activities. It implied that most of them still dominated the learning activities, especially in the main learning process, i.e. explaining the materials rather than constructive learning activity done by the students, i.e. in scientific approach (observing, questioning, exploring, associating, communicating/presenting, and creating).

In summary, mathematics education lectures' ability to develop the learner's potentials was at a quite good proportion (3.32 = 65%). Therefore, most mathematics education lectures

still struggled to foster the students' potentials; yet, they paid attention more to build a strong emotion and social relationship with the students.

Sixth, maintaining communication and interaction with students. It was respectively at 3.37 (67%) in the 1st meeting and 3.60 (72%) in the 2nd meeting. The proportion of question distribution was at a high average score (3.9). It indicated that they mostly administered some questions as a consequence of finding out understanding and maintaining student participation. As well, they usually gave open questions that required students to answer with their ideas and knowledge before explaining the materials. Also, they obtained an average score of 3.5 in question response and clarification. Some of them were well about to listen and give attention to all the students' answers. Also, they considered both correct and wrong answer to measure the level of understanding of students. So, they were to plan to administer another question.

Providing a cooperative atmosphere in the classroom, the mathematics presented learning activities that might foster good cooperation among the students (3.4). Furthermore, the proportion of the level of students' question response was quite good (3.2). In summary, mathematics education were mostly quite good in stimulating and maintaining student-teacher communication and interaction (3.48 = 70%). Some of them were initiated to create a discussion group to allow their students to interact with each other. As well, they mostly posed some questions to draw the students' ideas and knowledge. To measure the student's understanding, they distributed the open question into all the students and then paid attention to their responses.

Seventh, conducting assessment and evaluation. Assessment or evaluation is the decision process since it measures the learning process and outcomes, especially the students' performance and proficiency. As an ongoing stage, the lectures evaluates the effectiveness of the learning process and outcomes and applies some information on the results of the assessment and evaluation to design remedial and enrichment programs.

The results showed that mathematics education lectures' ability to conduct assessment and evaluation was at 3.16 (63%) in the 1st meeting and 3.36 (67%) in the 2nd meeting. The mathematics education lectures obtained quite good proportion at analyzing the results of the assessment (3.5). They used the results of the assessment as material for the preparation of the learning design that will be done next (3.4). However, the proportion of mathematics education lectures' ability to prepare and design an assessment tool that suited the learning objectives were still at a low average score (3.0). It showed that they were not used to apply a standard assessment according to the learning objectives as the lesson plan recorded. Mathematics education lectures got an average score of 3.0 in applying various techniques and types of assessment. According to Sax (1980: 28), the aim of evaluation and assessment is for a) selection, b) placement, c) diagnosis and remediation, d) feedback: norm-referenced and criterion-referenced interpretation, e) motivation and guidance of learning, f. program and curriculum interpretation, g) formative and summative evaluation, and h) theory development.

In conclusion, mathematics education lectures' ability to conduct assessment and evaluation was at a quite good average score (3.26 = 65%). Due to the complexity of evaluation, i.e. to evaluate emotional, social, and academic aspects, they tended to apply oral test (direct question) over written test to measure the students' understanding. They were still weak to combine various techniques and types of assessments according to learning objectives at a lesson plan. Moreover, teacher development means a continuous process that can lead to doing a better job and to professional growth (Richards, 2002). Moreover, The success of the learning process supported by students in learning needs to be evaluated regularly and continuously during and after the learning process takes place (Sukarman, 2003: 11).

## CONCLUSION

This research aimed to examine the pedagogical competence of the mathematics education lectures using LMS Moodle in the era covid-19. This research that carries the pedagogical competence topic is related to other competency aspects. This is because four teaching competencies, namely pedagogical, personal, social, and professional are inseparable parts and go together. The researcher was very pleased to be able to research this topic, namely the pedagogical competence of the mathematical education lectures.

However, with the limited knowledge and ability of the researcher, the results and findings of this study will vary if carried out by several other studies and with different research designs. This would be a wealth of research, namely the diversity, relevance, renewal, sustainability, and credibility of research findings. Furthermore, this research briefly provides an overview of the ability to teach some courses in mathematics education department in IKIP PGRI Bojonegoro. In this discussion, it had been discussed 3 (three) aspects of them, those are a) understanding the characteristics of students, b) mastering learning theory and principles of educational learning, c) developing curriculum. The other four indicators will be discussed in the next article.

Furthermore, understanding the characteristics of students, mathematics education lectures achieved 3,32 (66%). The proportion of mastering learning theory and principles of educational learning was at an average score of 3,25 (65%). The mathematics education lectures' ability to developing curriculum was at an average score of 3,63 (73%). Also, they obtained an average score of 3,16 (63%) for conducting learning activities. Then, the mathematics education lectures' ability to develop learners' potentials was at an average score of 3,25 (65%). Meanwhile, they got an average score of 3,48 (70%) in maintaining communication and interaction with students. At last, The proportion of conducting assessment and evaluation was at an average score of 3,26 (65%).

As the observation findings, the researcher noted that mostly conducted students centered learning which explaining the materials was as the main part of the learning process using LMS Moodle in the era covid-19. Pedagogic competence ability of mathematics education lectures must be improved continuously to get better learning.

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## Appendix.

### **Open-Ended Question Aspects of Mathematics Education Lectures Using LMS (*Learning Management System*) Moodle in The Era Covid-19**

1. Learning Objectives
2. Materials' preparation, and analysis
3. Instruction's plan
4. Learning strategy and methods
5. Students' competence evaluation according to learning objectives
6. Students' participation at the classroom
7. Students' attention distribution
8. Students' performance and classroom climate
9. The best obtained moment
10. The most challenging moment