Statistical Literacy Ability of Students through Virtual Learning Environment Based on Moodle-Learning Management System

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***Abstract*—Statistical literacy skills in the era of society 5.0 are needed to overcome various problems. But interest in studying statistics is still relatively low. Thus, the learning process must be able to synergize between learning materials (content), learning methods (pedagogy), and learning media (technologi). The moodle-learning management system is one of these advances in education. If the moodle-learning management System is appropriately constructed to facilitate the usage of many platforms, users can utilize it as a learning environment with any device. This study aims to observe statistical literacy skills through the moodle-learning management system. Participants were selected from among sophomore students at the Indonesian Institute of Education: 32 people made up the control group, while 32 made up the experimental group. The results demonstrate that, at a significance level of 0.05, the experimental group's statistical literacy abilities are substantially different from those of the control group. Students in the experimental group had literacy abilities that were 90.31% greater than those in the control group, which had literacy abilities that were 67.47%. These findings suggest that students' statistical literacy skills are impacted by the Moodle learning management system.**

***Keywords*—statistical literacy, virtual learning environment, moodle-learning management system**

I. Introduction

In terms of the national education system, the national system of job training, and the national system of determining the equivalence of learning outcomes, the Indonesian National Qualifications Framework or Kerangka Kualifikasi Nasional Indonesia (KKNI) is a symbol of excellence. The KKNI specifies that there are nine levels of qualifications for effective Indonesian human resources. Undergraduates are qualified to a level 6 of proficiency. Level 6, which is in the first paragraph, includes a description of this qualification level, particularly for undergraduate mathematics education. One of the qualifications listed there is the ability to use science and technology in one's area of specialization and the capacity to adapt to situations when solving problems [1]. According to these certification levels, one of the key abilities that students must acquire as learning outcomes is their ability to: a) use mathematical principles and pedagogical ideas to perform assessments using science and technology that are focused on life skills; and b) design and carry out simple research and report and or publish the results, so that they can be used as an alternative to solving problems in the field of mathematics education.

In relation to research in the field of mathematics, statistics material is one of the courses included in the mathematics education curriculum. Statistical abilities that can be developed include statistical literacy skills. Understanding words, symbols, and concepts used in statistical language is referred to as statistical literacy. Besides, statistical literacy means the ability to interpret graphs and tables, read and understand statistics in news, media, opinion polls, etc. [2, 3].

The capacity to interpret and critically evaluate data or information that one obtains from both other individuals and formal entities like the Central Bureau of Statistics is a necessary component of statistical literacy, making it crucial to possess. The ability to read and criticize the visible phenomena of statistical information and the ability to communicate it through one's own language is part of statistical literacy.

Statistical literacy skills can help students to understand both quantitative and qualitative data so that in the process of presenting data, processing, analysis, and interpretation, there is no misinterpretation of research data. The statistical literacy skills possessed by students can help them to extract qualitative information from quantitative information so that with statistical literacy skills, students can evaluate statistical information correctly [4].

Because students have trouble defining and presenting research data in their thesis writing, their statistical literacy abilities have not produced the desired outcomes. Poor statistical literacy is a result of pupils' incapacity to apply statistics in daily life and a lack of statistical literacy abilities [5–7].

In the preliminary survey of the final exam results of the academic year 2020–2021, only 41.38% of students fulfilled the established qualifications [8]. Based on the preliminary study, some of the difficulties students faced in studying statistics included: 1) being incapable of accurately and adequately identifying issues; 2) Students do not comprehend d the basic requirements or presumptions that must be fulfilled in an example of the issue; 3) students do not understand the use of formulas; 4) errors in choosing the appropriate formula according to the situation of the problem illustration; 5) procedural errors and calculation errors; and 6)

fallacies. Based on these findings, it can be said that enhancing the quality of statistical education is equivalent to enhancing conceptual understanding, which is one sign of statistical literacy.

However, if the learning experience is relevant, conceptual comprehension in statistical literacy abilities will be firmly ingrained. According to David Paul Ausubel, an American psychologist who was born in New York in 1918 and died in 2008, meaningful learning is the act of connecting new knowledge to pertinent concepts already present in a person's cognitive framework [8]. According to Ausubel, the ability to acquire new information and retain it effectively depends on the establishment of adequate cognitive structures as well as efficient methods of learning.

In order to encourage students to participate in meaningful learning behaviors, lecturers actively seek the link between previous and current information by modifying their methods of motivation, thus class activities are of potential significance in preparing material for student learning.

Student experience can be used to facilitate the learning process, one of which is meaningful learning . In addition, in learning statistics, you must be able to synergize between content-pedagogy-technology [9, 10]. One of the learning strategies that involves student experience and the synergy between content-pedagogy-technology is designing teaching materials based on the Learning Management System (LMS).

LMS is a piece of software used to offer, monitor, and manage training and education. LMS software includes tools for online collaboration as well as systems for keeping track of training and educational records. It may also be used to provide lecture materials online [11, 12]. Learning management systems (LMS) have features and software programs that make it simple to access and manage learning content. Moreover, it aids instructors in supplying teaching resources [13].

The purpose of this study was to monitor the growth of students' statistical literacy skills in a virtual learning environment based on the Moodle learning management system, both during the course of learning and in terms of the final evaluation of such skills.

II. Research Background

A. Statistical Literacy

The root of everything related to text begins with the word litera, namely letters. Litera requires someone to understand letters in the form of reading, and on the other hand, with the ability to understand letters, someone is also required to "create letters" in the form of writing. The key to "making letters" is none other than the ability to understand. Because of this, literacy, which initially had a narrow meaning, became broad, namely reading (understanding) and issuing opinions based on their understanding. Literacy is also related to thinking [14]. So someone with strong literacy skills will be able to read or understand information well in various aspects of life.

The capacity to comprehend and critically assess statistical findings that pervade daily life is related to statistical literacy. As people make decisions in their own lives based on data and risk analysis offered by others in society, statistical literacy is significant to each individual member of society as well as to our society as a whole [14]. Some people may interpret statistical literacy to mean having a modest (perhaps formal) understanding of fundamental statistical ideas and techniques.

Similar to how reading literacy focuses on utilizing words as evidence, statistical literacy is concerned with making judgments using data as support. Similar to reading, writing, and speaking, statistical literacy is a skill [15]. Two reading abilities, comprehension and interpretation, are necessary for statistical literacy. The inability to comprehend what is read, however, is statistical illiteracy.

People in information-rich cultures are expected to have a strong command of statistics. As a result of schooling and as a necessary component of adults' reading and numeracy, it is regularly emphasized. Having statistical skills requires being able to comprehend and use fundamental statistical concepts and techniques. The ability to recognize and analyze different data visualizations, appreciate the usage of fundamental statistical symbols, and know the meanings of basic statistical words are further criteria [16].

In an information-rich culture, persons are expected to have a number of critical skills, including statistical literacy, which is frequently referred to as an expected consequence of education and a crucial element of adult literacy and numeracy. Understanding and using the fundamental statistical terminology, A key component of statistical literacy is the ability to use fundamental statistical symbols and identify and comprehend a variety of data forms.

Statistical literacy is crucial to possess since one aspect of being statistically literate is having the capacity to comprehend and evaluate data or information that is obtained from both official entities like the Central Bureau of Statistics and from other individuals. One aspect of statistical abilities is the capacity to interpret, critique, and articulate newly emerging phenomena from statistical information.

Equipping every student to have basic skills in reading and understanding data presentation and being able to interpret data, even presenting data in tabular or graphical form is important. This ability is a basic ability that must be possessed by students as a basis for continuing to a higher level of education or even as a provision when they enter the world of work. This ability is also known as statistical literacy. That in a culture where statistics are everywhere, the capacity to enhance statistical literacy is a crucial requirement [17].

The definition that has been given leads one to the conclusion that statistical literacy is the capacity to comprehend statistics, communicate that data (either through tables or graphs), and analyse that data.

B. Moodle-Learning Management System

Moodle stands for modular object-oriented dynamic learning environment, which is a dynamic learning ecosystem using a web-based object-oriented development model. The existing technology in the Moodle LMS application is considered effective in providing interesting learning facilities because it is equipped with various learning features that can support lecturers and students to interact indirectly using assignment features, quizzes, chat, forums and other supporting features [18].

A software program or web-based technology called a

learning management system (LMS) is also used to organize, carry out, and evaluate certain learning activities [19]. An online learning management system often offers processes for producing and distributing information, keeping track of student engagement, and rating student success. Moreover, The LMS provides the resources required for students to use interactive features like discussion boards, video conferencing, and forums. The course management system is another name for LMS.

In addition, this system is also a software application that provides learning content features for easy access and management. In addition, it helps lecturers to provide learning materials to their students and manage student enrollment. By facilitating management, distribution, learning monitoring, testing, communication, enrollment process, and scheduling, LMS is also a platform for this kind of learning environment [13].

Each LMS package has its own distinctive elements, but some functions are shared by most LMSs, such as making class rosters (student records), keeping track of the enrollment process, and the ability to make waiting lists. Uploading and managing curriculum-related documents, submitting content or web-based interface lecture materials, frequently enabling remote participation by lecturers or students, making and publishing things like calendars, interacting with other users, and more are other features that are also common to most LMSs [20, 21].

Setting up an online learning account, defining course activities, scheduling time, and other tasks comprise the planning for this Moodle-based learning management system. A teacher needs spend additional time here deciding what resources and teaching strategies will be employed [22, 23]. In an effort to make classroom activities apparent in online learning, this tactic is crucial. For instance, with asynchronous learning, videos, PDF files, and other free instructional resources are typically produced in advance [24]. Moreover, lectures might provide Massive Open Online Courses (MOOC) to develop fresh teaching approaches on the system [25]. So, informally acquired knowledge can be brought into formal contexts by lecturers.

There are many benefits to using technology to communicate with students and learn, and these benefits may be attained in many ways. The most well-liked strategy among these is the deployment of a learning management system. The tools and modules of the learning system are not all accessible to teachers and students. Finding the most efficient approach technique for every circumstance is required, regardless of the modules that are being utilized. Moodle, one of the top open source learning management systems, includes an assessment feature. Through this study, we were able to provide important findings and learn how to use the system more effectively for students, instructors, and administrators [26, 27].

The advantage of an online learning system using the Moodle-based learning management system is that students have the opportunity to interact electronically with each other and their instructors using forums or messages where this feature will continue to hone communication skills and a sense of empathy among students even though they are in a room and different time. In addition, the benefits of online learning using this Moodle-based learning management system are: a). Allows learning interactions to occur from anywhere and at any time b). Reach participants in a wide scope. c). Facilitate the upgrading and storage of learning materials.

It is clear from the previous description that Moodle-based learning apps may be utilized to the system's and users' fullest potential (students and lecturers). Moreover, utilizing feature evaluation or assessment while enhancing the operation of the current system.

C. Virtual Environment Learning

Friendly classrooms in which teachers may give students access to instructional resources via technology or web-based platforms can be the basis for virtual learning environments. A web-based platform is a digital learning space developed using technology-based education.

Students may be inspired to learn as a result. Technology, communication, people, and material make up the majority of the virtual learning environment. While the internet, websites, digital resources, and device access are elements of information technology. Numerous academics agree that social networks, engagement, and feedback make up the virtual learning environment. Students and teachers are included in the idea of human resources. The lesson portion includes subject substance and assessment. The virtual learning environment is impacted by the internet and social media. The increased topic material, features, and utilization of ICT technologies used in learning, as well as effectively downloading information, are benefits of virtual learning environments [28].

How lectures, tutors, and students contribute to the creation of interactive digital didactic materials as well as how digital technology itself may be used to teach distance learning courses are two specific situations in which we will discuss the role of technology. The outcomes demonstrate how the two emphasized positions are connected. They changed the roles and participation of teachers and students in virtual classrooms, and "media agents" emerged in online mathematics education [29].

From the above description, it can be concluded that the virtual learning environment is learning in cyberspace that is closely related to social currents, including technological developments, the expansion of the learning environment, and changes in human behavior over time.

III. Materials and Methods

This study used a quasi-experimental research design. The study population was 423 students at the level of two and four semesters, which were divided into five study programs at the Faculty of Applied Sciences and Science, Indonesian Institute of Education. The research was conducted for one semester, namely semester four in the 2021–2022 academic year. From this population, By using cluster random selection, a sample of 32 students from two groups of one study program were chosen. 32 students participated in the experiment and learned in a virtual classroom based on the Moodle learning management system. Then the control group consisted of 32 students using ordinary learning. The samples in this study are interdependent.

In this study, the dependent variable is statistical literacy abilities, while the independent variable is the Moodle learning management system. The Moodle learning management system was used as the foundation for the virtual learning environment that served as the research tool for this study, together with observation sheets and tests of statistical literacy.

The conceptual framework in this study studies the results of learning management by developing a moodle-learning management system based learning through a virtual environment with the hope of increasing statistical literacy skills. The conceptual framework can be shown in the following figure:

Fig. 1 presents a research conceptual framework for assessing learning outcomes based on a moodle-learning management system through a virtual environment with the hope that it will improve students' statistical literacy skills.

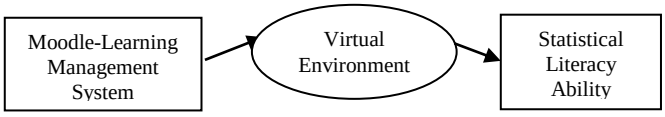

Fig. 1. Conceptional framework.

The experiment uses a moodle-learning management system based learning in a virtual environment with students who contract inferential statistics courses. The quasi-experimental research design was pre-test-post-test design shown the Fig. 2 below.

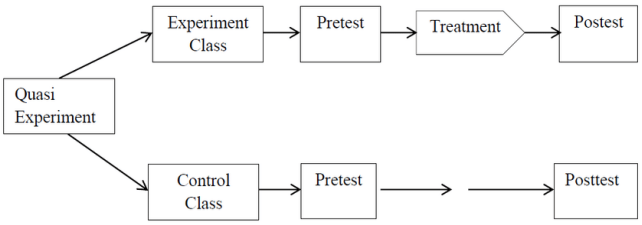

Fig. 2. Quasi-experiment flowchart.

IV. Results

Efficiency with a virtual-learning environment based on a moodle-learning management system for mathematics education students by providing assessments during and after learning. The experimental group utilized a virtual learning environment based on the Moodle learning management system, as was already described, after students completed all the material, posttest were then carried out to assess statistical literacy skills. The results about the efficiency of the virtual learning environment built on the Moodle learning management system are shown in Table 1.

Table 1. Pretest results of virtual-learning environment effectiveness analysis based on moodle-learning management system

Valuation	Minimum Score	Maximum Score	Average	Standard Deviation
Pre test	48	88	65.31	9.73
M-LMS$_1$	50	96	77.89	8.54
M-LMS$_2$	58	96	90.31	3.72

Description:

Besides from Table 1 demonstrates that the Moodle learning management system-based virtual learning environment is effective, with an average value of all the scores that students get from assignments, exercises, quizzes, work projects, or other types of formative evaluation during learning is 77.89. The average value of the of all the scores students got from their post-test, final exam, and summative evaluation or final grade of learning shows 90.31. This demonstrates that learning objectives may be met using a virtual learning environment based on a Moodle learning management system. M-LMS$_1$/ M-LMS$_2$ is a process-based model and the development of outcomes in learning media and instructional packages. The value of M-LMS$_1$ is the average value of all the scores that students get from assignments, exercises, quizzes, work projects, or other types of formative evaluation during learning. The M-LMS$_2$ score is the average of all the scores students got from their post-test, final exam, and summative evaluation or final grade of learning.

While the results of the analysis regarding the value data resulting from learning with classic learning can be seen in Table 2.

Table 2. Pretest results of learning analysis with classic learning

Valuation	Minimum Score	Maximum Score	Average	Standard Deviation
Pre test	48	88	65.31	9.73
NI$_1$	50	86	66.13	8.94
NI$_2$	55	89	67.47	8.31

Besides from Table 2, shows that learning with classic learning shows an average value of all the scores that students get from assignments, exercises, quizzes, work projects, or other types of formative evaluation during learning is 66.13. The average value of the of all the scores students got from their post-test, final exam, and summative evaluation or final grade of learning shows 67.47. This reveals that learning with ordinary learning has an average increase of only 1.34. NI$_1$/NI$_2$ is learning with classic learning. While the results of the achievement comparison between moodle-learning management system-based learning and ordinary learning can be seen in Table 3.

Table 3. Results of comparative analysis of achievement of posttest score

Learning Management	Z	P value	Significance
M-LMS$_2$ NI$_2$	6.963	0.000	0.005

According to Table 3 above, there is a distinction between the use of learning in the virtual learning environment built on the Moodle learning management system and traditional learning based on the results of data processing using SPSS using the Wilcoxon test, which were obtained with a P value of 0.000, which is smaller than the significance level of 0.05.

The results of the comparison of the achievement of statistical literacy ability scores based on the indicators during the learning process are shown in Fig. 2.

From Fig. 3 below, it can be revealed that the value of achieving statistical literacy skills based on indicators during learning takes place in a virtual-learning environment based

on the Moodle-LMS, the percentage for indicators of understanding data is 85.23%, communicating data is 83.14%, and data interpretation of 79.04%. While the achievement of values in learning with ordinary learning on indicators of understanding data is 50.03%, communicate data is 49.11%, and data interpretation is 45.14%. But from the two learning processes, both the virtual-learning environment based on the Moodle-LMS and ordinary learning, the indicator with the highest achievement value is the indication of understanding the data, while the lowest is the data interpretation indicator.

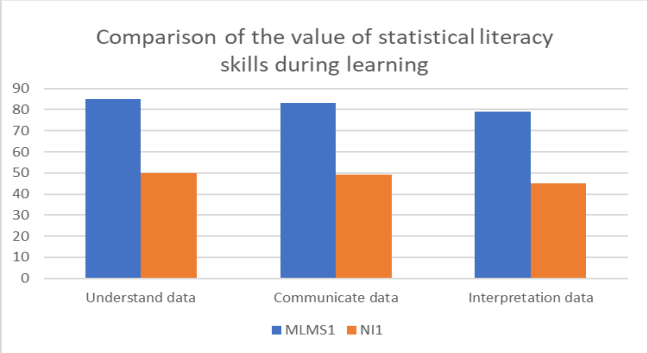

Fig. 3. Comparison of the value of statistical literacy skills during learning.

Comparison of the importance of statistical literacy skills based on the average of all student scores from assignments, exercises, quizzes, work projects, or other forms of formative assessment throughout the learning process and the average of all student scores from post-tests, final exams, and summative assessments or final grades of learning for the two types of learning of the two types of learning, as shown in the following Fig. 4.

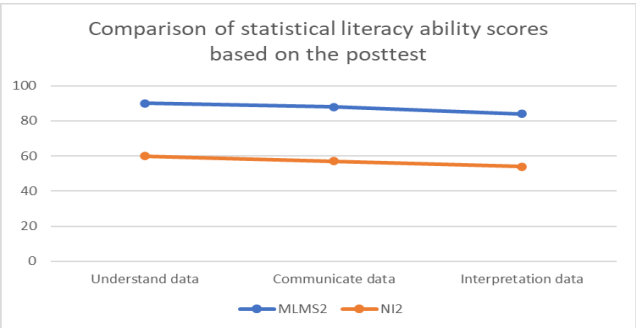

Fig. 4. Comparison of the value of statistical literacy skills based on the post-test.

From Fig. 4 above, it can be revealed that the achievement value of the statistical literacy ability indicators based on the post-test in the virtual learning environment based on the Moodle-LMS obtained the percentages for indicators of understanding data by 90.05%, communicating data by 88.20%, and interpretation data of 84.09%. While the achievement of post-test scores in learning with ordinary learning on indicators of understanding data is 60.33%, communicate data is 57.23%, and data interpretation is 54.27%. But from the two post-test scores, The indication with the highest accomplishment score is the indicator of comprehending the data, whereas the indicator of data interpretation has the lowest performance score in both the virtual learning environment based on Moodle and normal learning.

So based on the results of the comparison of the achievement scores of statistical literacy skills both during the learning process and post-test scores, The use of virtual learning environments built on the Moodle learning management system has enhanced learning, as can be demonstrated. Thus, the Moodle learning management system may be stated to be effective for learning.

Learning in virtual environments built on the Moodle learning management system has grown, as can be shown. We may thus say that learning with the Moodle LMS is effective.

1) Log in

Click on the browser (Mozilla, Safari, or Google Chrome), type https://lms.instituteducation.ac.id Then, on the keyboard, press the enter key.

Fig. 5. Account log in.

Besides Fig. 5, this page serves to access the e-learning account by entering a username and password for those who already have an account.

2) Select online learning integration on the dashboard

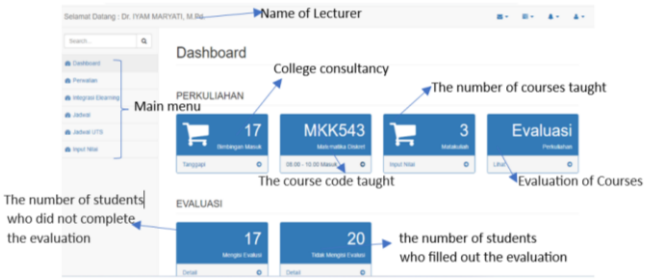

Fig. 6. Main menu of dashboard.

From Fig. 6, there are five main sections on the dashboard page that provide information about the courses taken. This course class in the Moodle LMS is known as the Course. The dashboard page is divided into three sections, namely the left, middle and right sections.

On the left there is the main menu, which can be used to enter content and navigation sections. In the middle there are two pieces of information, namely the most recently visited course and an overview of the course (course information). In the course overview, you can set the course information (current, past or future) and the display format.

On the right side there is timeline information related to the activities given by the lecturer in the next week. Underneath there is online user information which shows which users were online 5 minutes ago. Then there is a calendar that contains information on tasks or activities that you need to do one month ahead.

3) Select the year of study and course

In this section, the lecturer makes enrollment classes, in this case classes for inferential statistics courses with a total of 61

students, as much as two classes. as shown in the picture below and link address on the page https://lecturer.institutpendidikan.ac.id/lms

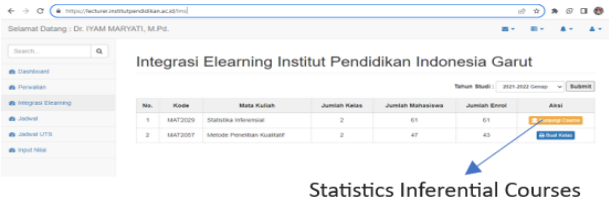

Fig. 7. Enrollment class.

Fig. 7 shows the page, the lecturer creates a class by clicking create class on the name of the course being taught. To facilitate the implementation of e-learning using Moodle, creating a class, category, or course name can be done in the following ways:

a. Login to Moodle using an admin account: "Site administration"; "Courses; "Add a category".

b. Continue "Create category.

Once the school eye is done, then proceed to make a class or course, or we analogize the space to study a lesson. Per class, per class, or per meeting. It's as follows:

1) "Site 1. "Site administration"—"Courses" "Add a new course."
   Course full name: Filled Class Name or Complete Course
   Course short name: Filled Class name or course summary
   Course category: filled category or maple
2) Click "Save and display.

to add participants, students, class parties, or curses 1). Select the class or seat that the participant will be added to, then click participants." Click the rear wheel "Enrollment Methods, 2). Will show some addition methods.

Manual enrollment: adding students manually note that previous data must be added through user registration or independent registration. Guest access: Students without enrollment can check in to see the material in the course or class. Self-enrollment (student): Students join independently. To activate it, click on the "eye icon" image.

3) Learning activity

Learning activities with a virtual-learning environment based on the Moodle-LMS are presented on the page https://lms.institutpendidikan.ac.id/course/view.php?id=308 #section-2.

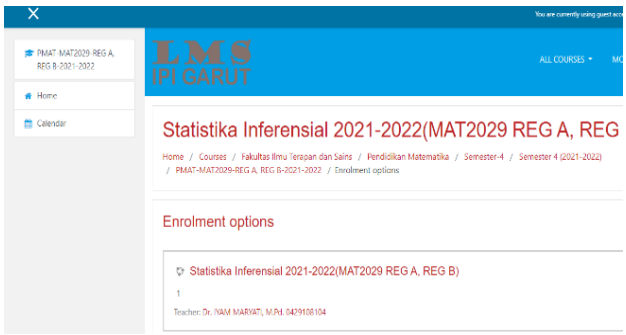

Fig. 8. Learning activities.

Besides Figure 8 above, lecturers can create multiple sessions and mark attendance status. As present, late, or change status to match needs. The advantages of making attendance lists in online learning is that lecturers can easily get the attendance list recap results during lectures.

After the course is open, click on the Gear symbol on the right. class, then click "turn editing on" (its function is to display the button). Edit or click the button to add a learning activity.

Test students' understanding of the material, created with a view to know understanding students fight owned material given by the lecturer. After the lecturer made understand test activities materials (using task). The next stage is the value input by clicking the "Grade" button on the student name line.

Fig. 9 is a picture of some of the icons used in making lecture material.

Fig. 9. Somes icon used.

From Fig. 9, the images of some of the icons used in this lecture are: 1) Chat: We can do chat (conversation) like social media. This conversation can be carried out in person; 2) File: Used to download material or read online. According to the uploaded file format, this type of module will have a different colour (pdf, ppt, doc, etc.); 3) Label: This format is used by lecturers to provide announcements or explanations of a material; 4) Page: This format displays information similar to a web page. For this material format, lecturers can provide images, audio, video or a combination of all; 5) Url: This format is used to redirect other pages. For example, it is used to refer to material related to material; 6) Quiz: Lecturers can design a set of questions, including multiple choice questions, yes/no questions, and short answer questions. These questions are stored in a question library, which can be categorized and reused; 7) Forum: In this module, you can discuss and exchange opinions on topics or threads given by lecturers; 8) Feedback: Used by lecturers to find feedback from a topic or teaching and learning activities; 9) External Tools: Offers a way for lecturers to link activities from lectures and post grades back to Moodle.

Some of the available features used in this lecture are: a). Interactive Video Component, this feature is used to create interactive content in the form of videos, animations, power points, and other interactive media available in the plugin. So that the material presented is not too monotonous, thus it can overcome student boredom in learning [30]. b). Components of the Discussion Forum, as a media for discussion interaction between students and lecturers. With the discussion forum application in this module, students have more benefits, including that students can communicate with lecturers and fellow students without being limited by space and time. Apart from students, lecturers also get more benefits from this discussion forum, including being able to save time in the teaching and learning process, reduce travel costs, save on

education costs, can reach a wider geographical area and can train students to be more independent in gaining knowledge [31].

V. Discussion

Based on these results, it can be argued that undergraduate students should be able to apply their areas of specialization, use science, technology, and/or the arts in their fields of problem solving, and be able to adapt to the situation at hand in accordance with the guiding principles in the development of the Indonesian national curriculum framework. Developing a moodle-learning management system as part of a virtual environment learning model for prospective teacher students, which is created using the ideas, concepts, and theories that improve the quality of work life. This relates to the National Job Training System and Government Regulation No. 31/2006 addressing the Manpower Law No. 13/2003, as well as other laws and regulations related to aspects of employment quality, certification and qualifications issued by ministries or other authorized institutions [1].

To satisfy the needs of students and encourage them to be adept at utilizing technology for learning, information and communications technology should also be utilized to learning management.

Moodle-learning management system-based learning can synergize statistical, pedagogical, and technological material content. For being able to construct new knowledge through the use of video conferencing, social networking, and authentic assessment. The role of the teacher as a facilitator and consultant is very important.

With respect to the statistical literacy abilities of the two groups, at an error level of 0.05, it was discovered that the post-test findings showed a significant difference between using a virtual learning environment based on the Moodle learning management system and conventional learning. Thus, a Moodle-LMS-based virtual-learning environment for students can improve statistical literacy skills. It is founded on the idea that learning through communication, cooperation, and information technology is crucial to expanding knowledge, which encourages people to share knowledge about topics they are interested in and can put to use [32, 33]. There has been substantial advancement due to the increased accessibility of information and telecommunications technologies through a variety of channels. Learners can access material via a variety of gadgets, including PCs, laptops, tablets, and cell-phones. The system must, however, support a number of platforms.

The results of the assessment show that students' statistical literacy skills using a virtual-learning environment based on the Moodle-LMS and ordinary learning have significant differences. This is in line with the study of developing the reflective abilities of prospective teacher students in a virtual learning environment [34].

Researchers also analysed statistical literacy skills based on indicators, namely 1) understanding data, 2) communicating data, and interpreting data, both during learning and at the end of each applied learning. From this study it is known that students are highly motivated to improve statistical literacy skills, in a significant difference from the use of a Moodle-LMS-based virtual-learning environment. It was discovered that there were positive signs of the adoption of a virtual learning environment based on the Moodle–LMS in addition to researching how the virtual learning environment affected students' statistical literacy skills. According to consistent study findings, interactive digital modules for applied statistics classes are appropriate for use as teaching tools during the COVID-19 pandemic [35].

A favorable effect of indicators is seen in learning activities and producing original works. This is entertaining for a virtual learning environment built on the Moodle LMS during the COVID-19 pandemic. The results demonstrate that a virtual learning environment built on the Moodle-LMS gives teachers more opportunity to build professional connections with peers, foster academic partnerships, and enhance cooperative learning abilities [36]. Students benefit greatly from this strategy when learning. It follows that it is likely that a virtual learning environment built on the Moodle-LMS will help students become more statistically literate.

VI. Conclusion and Future Work

virtual learning environment based on the Moodle-learning management system is very helpful in the classroom because it aids teachers in planning and creating semester classroom plans, managing learning materials and learning activities, assisting teachers in documenting the learning process and reporting on the learning process, and facilitating access to engaging learning with e-books, images, sound, animation, and video for teachers and students so that the learning process becomes more engaging.

With regard to statistical literacy skills, the virtual-learning environment-based learning management system encourages students to have an increase in understanding data, communicating data, and interpreting data. Thus, students have the competence to compete globally.

Learning in a virtual classroom using Moodle's learning management system can help students become more statistically literate in terms of comprehending, expressing, and analyzing statistics. In the later part of this research, we intend to include a virtual learning environment based on the Moodle learning management system to hone other statistical skills including statistical reasoning and statistical communication in this regard. Besides, we're connecting it to other software applications, one of which is R software.

Conflict of Interest

The author declares no conflict of interests.

Author Contribution

In this article, each author contributes to the completion of this article, namely, Iyam Maryati conducted research and wrote a draft of the article; Dahlia Fisher helps conduct research focused on virtual-learning environment technology based on the Moodle-LMS; Siti Ainor Mohd Yatim perform data analysis and assist in proofreading; and Ratu Mauladaniyati provide additional studies related to statistical literacy. All authors had approved the final version.

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