Gerlach and Ely's Learning Model: How to Implement It to Online Learning for Statistics Course

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Abstract. Statistics is a compulsory subject that is very useful for students, so, in online learning, lecturers need to determine a suitable learning model. Lecturers can apply specific learning models that are adapted to the situation. The existence of characters in Gerlach and Ely's complete learning model can be a choice for lecturers in carrying out their learning so that even though learning is carried out online, the needs needed by students are still met. The purpose of the research is to describe the design of the Gerlach and Ely learning model, which is carried out online in the statistics course. The research method is field research with data obtained through observational studies of the learning process, interviews with students taking Statistics courses, and documentation of the learning process and the results of student assignments. The data analysis used Spradley Model. The results of this study are that students and lecturers can do online learning by maximizing some of the available applications with improvements to the media used. The media must be easily accessible to support fluency when learning. The lecturer prepares all the learning needs in the stages of Gerlach and Ely's learning activities. The advantages of this applied model are that it provides detailed stages in learning to determine learning objectives to the analysis stage of the results of the feedback provided by students. It can guide learning to achieve the objectives of the planned learning. The details of Gerlach and Ely's learning model need to be emphasized so that all stages can be carried out according to the systematics in its application.

Keywords: Gerlach and Ely Learning Model; Online Learning; Statistics

Abstrak. Statistika merupakan matakuliah wajib yang sangat berguna bagi mahasiswa, sehingga dalam pembelajaran secara daring, maka dosen perlu menentukan model pembelajaran yang tepat dosen dapat menerapkan model pembelajaran tertentu yang disesuaikan dengan keadaan. Adanya karakter dalam model pembelajaran Gerlach dan Ely yang lengkap, dapat menjadi pilihan dosen dalam melakukan pembelajarannya, sehingga walaupun pembelajaran dilakukan dengan daring, akan tetapi kebutuhan-kebutuhan yang dibutuhkan mahasiswa tetap terpenuhi. Tujuan dari penelitian yaitu mendeskripsikan desain model pembelajaran Gerlach dan Ely yang dilakukan secara daring pada mata kuliah statistika. Metode penelitian pada penelitian ini adalah penelitian lapangan dengan data diperoleh melalui pengkajian observasi proses pembelajaran, wawancara kepada mahasiswa yang mengambil matakuliah Statistika dan dokumentasi proses pembelajaran dan hasil tugas-tugas mahasiswa. Analisis data menggunakan Model Spradley. Hasil dalam penelitian ini adalah mahasiswa dan dosen dapat melakukan pembelajaran secara daring dengan memaksimalkan beberapa aplikasi yang tersedia dengan perbaikan-perbaikan pada media yang digunakan media harus mudah diakses sehingga mendukung kelancaran ketika pembelajaran. Dosen mempersiapkan keseluruhan kebutuhan dalam pembelajaran yang tertuang dalam tahapan kegiatan pembelajaran Gerlach dan Ely. Kelebihan model yang telah diterapkan ini menyajikan kerincian tahapan dalam pembelajaran menentukan tujuan pembelajaran hingga pada tahap analisa dari hasil umpan balik yang diberikan oleh mahasiswa. Hal tersebut dapat menuntun pembelajaran mencapai tujuan dari pembelajaran yang direncanakan. Kerincian dari model pembelajaran Gerlach dan Ely menjadi bagian yang perlu ditekankan sehingga dalam penerapannya semua tahapan dapat dilakukan sesuai dengan sistematikanya.

Kata kunci: Model pembelajaran Gerlach dan Ely; Pembelajaran Daring; Statistika

INTRODUCTION

The Ministry of Home Affairs (2020) has prepared health rules and protocols to minimize the transmission of the COVID-19 virus. It is necessary to establish policies. The policy is to be active and productive by staying at home. These activities and productivity include studying, working, and worshiping from home. All of this needs to be intensified (Ihsanuddin, 2020).

Especially in formal education, learning from home is new since learning is usually done in buildings (schools, madrasas, cottages, campuses). Online learning is one of the learning strategies in the current pandemic era (Waspodo, 2020). It makes education actors need to empower technological advances as an alternative to following government recommendations. The government has also begun to build cooperation with platform owners related to education by providing easy access or helping to explain the material so that online learning can be carried out.

Online learning can foster student independence by using learning applications to increase learning independence (Diva et al., 2021). Online learning makes the relationship between educators and students active interactions that discuss the learning materials prepared by educators. The interactions carried out occur in cyberspace with platforms that have been agreed to be accessed together. With online learning like this, students can still learn by following the advice given by the government to do activities at home. All learning materials are transferred online. One of them is statistical learning which is still carried out online.

The history of human civilization has a long history of statistics. Before Christ, the technique of collecting statistical data was carried out by the Mesopotamians, China, and Egypt to obtain information about the amount of taxes imposed on the population, to know the amount of production from the agricultural sector, to measure the speed of athletes running and other matters related to data collection. In the Middle Ages, statistics were used to record the number of births, deaths, and marriages by organizations within the Church (Purwanto, 2003).

Statistics is one of the compulsory subjects which it provides students with provisions to prepare for their final project. Statistics is one of the important branches of science in everyday life (Wahyuningrum, 2020). One of the students who live on campus is studying compulsory statistics courses and writing a final project. It makes statistics important to master and study.

Online statistics learning is carried out to keep learning, even though we do not meet directly in the classroom (campus). It is not easy to implement online education in a short time, primarily when learning mathematics is taught to non-mathematical students. It makes students in learning find it difficult to do statistics learning online. Among them are too many assignments, inadequate internet quota, and student residences that are still difficult to reach internet signals (Jannah, 2020).

In order to minimize the problems that arise, educators need creativity in delivering learning materials. One of them is by using the Gerlach and Ely learning design model.

The effectiveness of Gerlach and Ely's teaching model, first introduced in 1971, has proven its worth in recent decades. Designed by Vernom S. Gerlach and Donald P. Ely, this model itself has been tested over time and faithfully serves teachers in learning to create a good classroom atmosphere. This model is compatible with a multi-media learning approach, combines the basic principles of teaching and learning, and is suitable for educational levels from grade 1 to grade 12 and for use in higher education. The central focus of Gerlach and Ely's model is on systematic planning. There is an emphasis on being able to adapt to the learning situation, defining teaching objectives, and methods for achieving each desired learning outcome. This model also uses media that is used to assist educators in conveying information (Ashoumi, 2017).

Gerlach and Ely's learning design model is very thorough in designing and implementing learning (Susilana, 2012). Although the drawback of this design is the lack of character recognition of students, it can be minimized by providing intensive materials and assignments to measure students' mastery of material skills. The problem of too many assignments will be turned into the provision of balanced materials and exercises, quotas, and signals are overcome by selecting media that are easily accessible in everyday life.

Several studies also use the Gerlach and Ely learning model. This previous research was still not a pandemic, so learning was done directly (face to face). The results of research from Setiawati show that aspects of students' mathematical communication skills with the Gerlach and Ely learning model with Islamic character values are better in helping improve than ordinary learning (Setiawati et al., 2018). While Pendi's research, the increase in learning outcomes is due to the activities carried out following Gerlach and Ely's learning model planning (Pendi, 2013). The following research results from Yusnita, the use of the Gerlach and Ely learning model of this design is recommended for other researchers and is finally able to improve learning (Yusnita et al., 2016). The research results from Daimah Gerlach and Ely's Learning Model also affect forming positive student understanding by using the Active Debate method (Daimah, 2019).

Based on the previous research studies, there is a gap exploited by the author, which is to combine some of the research results. The combination in this study uses the Gerlach and Ely learning model adapted to online learning toward the planned learning outcomes.

This research aims to obtain a Gerlach and Ely model of learning design, which can be applied in online learning. Gerlach and Ely's learning model has the advantage of thoroughness and detail in learning to achieve learning objectives and being an alternative to learning in other materials during the pandemic season and requiring online learning.

METHOD

This research is included in the field research. The data collected results from studies from observations, interviews, and documentation (Moleong, 2011). Passive participatory observation is the participation carried out by researchers when conducting this research by participating in activities. However, they are not involved in these activities (Sugiyono, 2014). Not being involved here results from the observation that there is no intervention from the researcher. Researchers did it online to students in interviews, and documentation was taken from the documentation of materials and assignments done by students. In addition, the use of data comes from learning outcomes data obtained from the implementation of the Final Semester Exams and assignments.

The data analysis technique used is the Spradley model. The distribution of the data analysis process carried out by Spradley is detailed to produce accurate conclusions (Sugiyono, 2014). This Spradley model is also in harmony with Gerlach and Ely's learning design, emphasizing deep processes. The Spradley model begins with the researcher choosing the research location and then making observations. Observations were made several times until, finally, the analysis was carried out, and the findings were reported. The following is a data analysis chart of the Spradley model.
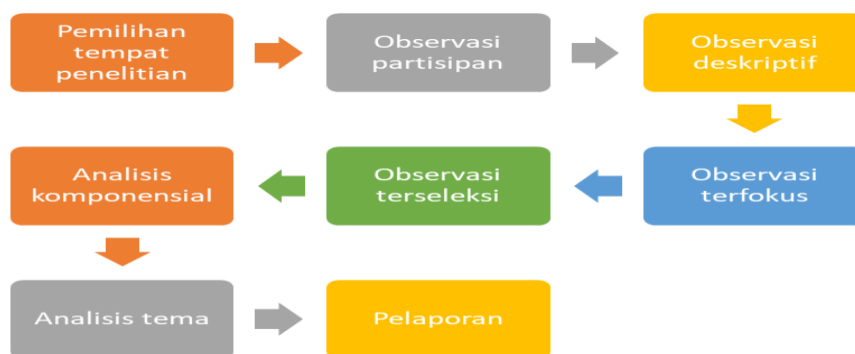

Figure 1. Data Analysis Chart of the Spradley Model

RESULTS AND DISCUSSION

Gerlach and Ely's learning model is one method of systematically planning to learn. This model does not describe in detail each component. However, it shows the overall learning flow that can be used as a guide map for the learning journey. As the name implies, Gerlach and Ely are the ones who developed this learning model. Gerlach and Ely's design of the learning model includes higher education. It makes Gerlach and Ely's model suitable for online learning. It is also suitable for all circles because, in this model, receiving the material to be delivered, there is a determination of the appropriate strategy applied by educators and students. In addition, Gerlach and Ely's model as a medium in delivering material continues to use educational technology products (Sitorus & Purba, 2017).
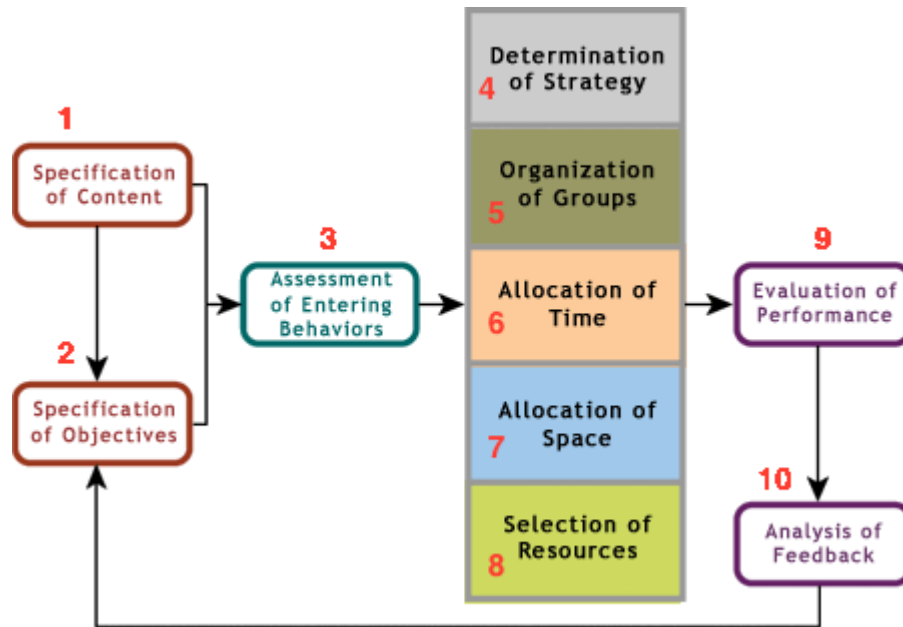
Figure 2 Gerlach and Ely Design Model

Gerlach and Ely are one type of learning model that is systematic and thorough in designing learning, but the Gerlach and Ely learning model also has weaknesses, those are taking a relatively long time, learning design that is too long in the design procedure, and the stage of introducing the characteristics of students does not exist (Nurdin, 2016).

In the following, activities related to Gerlach and Ely's learning model in online learning will be described.

Formulating Learning Objectives (Specification of Objectives)

The content determined in this study consists of 2 contents: Material Content. The material is adjusted to the curriculum, and lesson plans are prepared before starting the lecture. When implementing this research, the researcher uses the theory that is already available and provides additional sections according to the circumstances. The RPS arranged in it contains learning objectives to be achieved. Learning objectives are descriptions of behavioral expectations achieved after learning (Hamalik, 2010). The learning objectives include the categories of attitudes, skills, and knowledge. The following will describe each category.

Attitude Category

The attitude category is a character formed when studying statistics. This character is included in the material, and assignments are given during the lecture. Attitudes included in this case are responsibility and honesty. Honesty is an expression that shows a reality that is not manipulated (Ariska, 2018). At the same time, responsibility is a person's obligation to bear the results of his actions (Ariska, 2018). The responsibility given to students is to do the assignments given every

week and collected at the specified time. Honestly, the answers to these assignments based on the students' efforts are shown by the completeness of the answer documents and being able to answer when asked by the lecturer. In addition, a polite character is also included in it. This character is applied during lectures, starting from learning, during the learning process, asking/responding, and communicating with lecturers.

Skill Category

Skills are the ability to do something easily and quickly and produce the right results (Sulistyowati, 2019). There are several needs to be trained for students in the skill category. The first is about the thought process. In the material on statistics, the majority will use calculations until it reaches the conclusion stage. It requires logical and systematic thinking to solve the problems encountered. Second, decision-making skills. This skill is a series of paths in learning statistics. Decision-making is not just decided but through a series of tests based on information on the problem. Third, independent performance skills. This performance is based on giving assignments every week according to the studied material. Assignments are collected the following week so that students are responsible for their respective assignments. Fourth, collaboration or team skills. In this category, it is not given directly by the lecturer but based on the students' wishes. For example, in doing the task, there are difficulties, so they invite them to study together or ask how. It needs to be done by students because many tasks need to make efforts to lighten the task, one of which is by working together.

Knowledge Category

This category focuses more on the material presented in class. This section covers the mastery of knowledge and steps related to the material. Understand the parts of statistical functions. Can use supporting applications to make measurements easier. Explore the material by solving different cases.

Determine the Content (Specification of Content)

Learning materials are messages conveyed in learning at the end that is expected to be mastered by students (Hada et al., 2021). In this case, the research object is students who are taking the Education statistics course stage 2. This course is one of the compulsory courses for students to take and is very useful for students whose final assignment is the theme of quantitative research. In this course, material related to statistical tests will be presented with examples, solutions, and assignments. The material studied in this course is Statistical Functions, Data Scale, Data Visualization Concepts, Measures of Data Centering and Data Dispersion, The Concept of

Hypothesis Testing, Data Normality Test, One-Sample Test, Difference Test of Two Samples, Difference Test of More than Two Samples, Correlation Test, and Statistics Software.

Learning materials are also stored in the drive and then displayed on the web (blog) and youtube as an explanation. Information and discussion of each material are carried out in groups that have been created on Facebook. The choice of Fb media is because it is more accessible and easy to discuss. Besides that, it is also economical in terms of data usage.

Initial Ability Assessment (Assessment of Entering Behaviors)

The assessment is carried out according to the material presented, and the students faced. The assessment is made as simple as possible so that it is easy to explain and easy to practice. An explanation of the assessment is carried out at the beginning of the lecture, along with agreeing on several things related to the lecture. As for the practice, some percentages are divided into several aspects, which are the basis for the assessment.

An assessment of students' initial ability takes because this course has the requirements of the previous semester's courses. Past course knowledge needs to be given to remind students that the courses studied are an unbroken series of knowledge. The assessment is carried out to determine the student learning process to the learning outcomes that have been done (Resmini, 2015).

Determining Strategy (Determination of Strategy)

This section is part of the implementation of learning. Planning is an illustration of later classroom learning (Surur, 2020). Determination of this strategy uses applications that can be used to deliver materials, class coordination, and also collect assignments. The application contains the material that has been defined. Students' character and needs are also considered, such as giving assignments so that they are not excessive because students also have other assignments from different subjects.

Learning is still using online learning, so this strategy needs to accommodate students' abilities in attending lectures. The purpose of this learning strategy is that students as a whole can follow the material. In addition, students can work on and collect assignments with minimal constraints. Many things influence online learning. The lecturer must consider it so that the material entered can reach the students.

Many applications can be used in online learning. After considering, the selected media are YouTube and Facebook. Youtube is used as a medium to convey the material being studied. Students can access it anytime and anywhere. In addition, by using YouTube, videos can be paused when students want to take notes and can also be repeated if the explanation is felt too fast.

However, access time is limited by Task collection limitations. It is hoped that after looking at the material, students will immediately work on the assignments given to collect assignments on time.

While the Facebook application is used as a medium of information, information about the lectures is carried out. This media is also used as a forum for discussion if there is a material that students want to ask. That way, students can still ask questions about the material if the material given is not well understood. Indeed, this media is not as popular as in previous years because people have turned to other media like WhatsApp and Instagram. However, this media has advantages, including not as much as Instagram about posting videos or images, and it is easy to group questions and responses in one column, unlike WhatsApp, in which if we want to reply, we can do a lot of ungrouped scrolls. From selecting applications, and delivery materials, to assigning assignments. This study provides an overview of online learning carried out in statistics courses. Media selection is a priority to minimize the shortcomings in online learning. This study uses the following scheme.
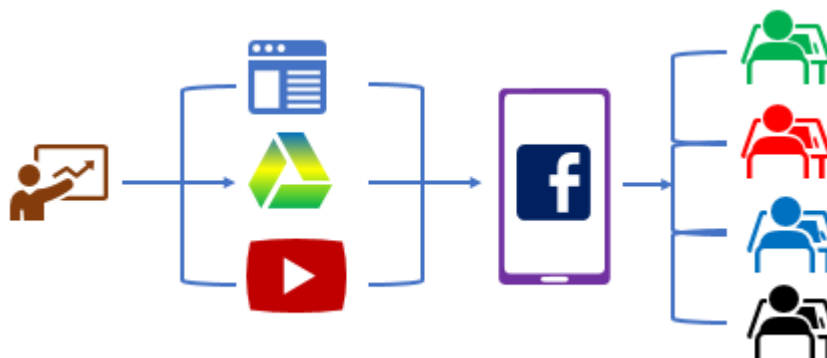

Figure 3. Online Learning Flow

Learning Groups (Organization of Groups)

Study groups help motivate students to take part in learning and help each other between students when there are difficulties (Syahmi, 2016). This activity makes it easier for lecturers to carry out learning. All related will be included in the available sub. Complete sub-sections are an essential part of learning. The groupings carried out here include class grouping, adjusted to a predetermined schedule. Even though learning is online, classes are not combined into one, even though they study the same material and the same assignments. The grouping continues to use the initial class because at the end of the assessment will also be carried out per class, which will be included in the SIAKAD (Academic Information System).

The next grouping is about the material being studied. Grouping to make it easier for students to learn and distinguish between one material and another. In addition, the grouping related to the material is a task grouping because the problems with other materials are different.

In this grouping, classes are not grouped like lectures that make presentations because the material is delivered directly by the lecturer. It is based on the material provided in statistics and calculations, which, if submitted by students later, will take more time if there is a conceptual error made. Instead, students are given assignments every week to hone their learned material.

Allocation of Time

The allocation of learning time needs to be considered when learning takes place so that learning will produce optimal learning outcomes (Sabri, 2012). The time used follows the agreed schedule, following the time according to the lecture schedule. This schedule was chosen to facilitate coordination because the time was not changed. It follows the policies set by the institution. While the place used is adjusted to the current system. Several applications are used.

Theory

The material is delivered according to the class schedule. At least on that day, the material to be studied was distributed to students. Lecturers do not limit access time due to different student conditions and different activities. It happens because of the position of students in various regions and the possibility of doing other activities. So that to access the material at a time when students are free, it is hoped that the material can be followed on the same day so that other tasks are not forgotten. The following is the distribution of the material in each meeting.

Table 1. Statistical Material for Each Meeting

Meeting	Study Materials/Learning Materials
1	Concept Map of Educational Statistics Stage 2 (Inferential Statistics)
2	Hypothesis Testing Concepts and Parametric, Nonparametric Statistics
3	Data Normality Test
4	One Population Test Cases in Education
5	One Population Test
6	One Sample Proportion Test
7	Two-Pair Populations Test
8	Midterm Exam
9	Test of Two Independent Populations
10	One Way ANOVA Test
11	Parametric Correlation Test
12	Nonparametric Correlation Test
13	Concepts of Regression Analysis
14	Introduction to Statistical Analysis Software
15	Statistical Analysis Software Applications for Inferential Statistics
16	Final Semester Exams

Ask

The questioning session is not required on the same day but is flexible whenever questions can be asked. The most important thing is the material presented. Furthermore, time is limited to one week for each material, so it does not get piled up with other materials.

Task

The assignment time is determined for one week and must be collected at the latest before new material is submitted. Assignments are collected through the link provided by the lecturer. Students scan the answers in handwritten answers, then convert them into pdf form and send them via link.

Determining the Room (Allocation of Space)

Online learning shows between those who learn and those who learn in different places simultaneously (Chaeruman, 2020). The learning model uses online mode by utilizing applications to assist learning in situations where lecturers and students are not in the same room. The media chosen is media that is easy to access and quota friendly. In addition, of course, the media used makes it easier to follow the learning process.

As previously stated, the applications used are Facebook and YouTube, so Facebook can be said to be a study space, and YouTube can also be used, but in this case, YouTube is only an explanation of the material presented. Facebook is the chosen space for several reasons. Facebook, although not as popular as it used to be, there are still quite a lot of Facebook users, and they are pretty familiar. There is a chat column that can be grouped into one question theme. The application is easy to access, and there are few obstacles. It is rarely used as an online learning medium, so it will not be stacked with other classes. Some of the advantages of Facebook features include creating a kind of web.

Choosing Media (Allocation of Resources)

Media is a tool used to transfer information to students (Sulistyawati et al., 2021). The media used is associated with the material being studied. There are several related media used in this lecture.

Reference

The majority of references used in statistics courses are in the form of books. Some of the recommended books for taking this course are *Doing Quantitative Research in Education with SPSS* by Muijs, *Applied Statistics for The Social and Health Science* by Gordon, *Quantitative Research in Education* by Hoy and Adams, and other references related to the material.

Material Powerpoint

The material in the reference is then packaged in ppt form, which students can later enjoy. Ppt is made as easy as possible and as attractive as possible so that in reading the material, students do not get bored. In addition, the ppt is set to be interactive so that it seems as if we are face to face with the lecturer.
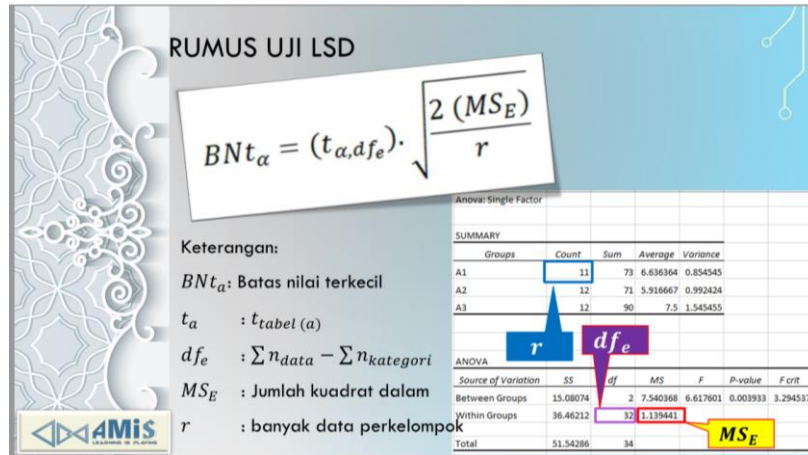

Figure 4. One display of ppt material

Videos

If the ppt is still not enough, students can access a video explaining the ppt that has been given. It is to help students understand the material presented. There may be parts that are not understood. It will be more precise by watching an explanatory video.

Figure 5. Explanatory material from youtube
(Source: https://www.youtube.com/watch?v=jcfp3nNkCok&list=PLl1ebBM8nl6_RFOS0fs4DBO4TIORx0knH)

Facebook

Facebook is used as a place for discussion to conduct discussions using previously prepared materials. The discussion is carried out openly so that other audiences are allowed to join in expressing their opinions.

Figure 6 Display Material on Facebook

Evaluation of Learning Outcomes (Evaluation of Performance)

Evaluation or assessment is carried out by lecturers based on student performance during the learning process. Assessment, in this case, is in the form of attendance, assignments, and exams (Surur, 2019).

Presence

Attendance is an absolute must for students. Even though learning is online, they need and are obliged to attend attendance. Attendance is done every day when lectures take place according to schedule. The time that students can do when absent is from morning to evening. It provides an opportunity for students to find an easy time to access the specified application. In this case, attendance is done by visiting campus e-learning, which was previously adjusted. For attendance, students must attend at least 75%. If less than that, they will not be allowed to pass or have to repeat in the following semester. In the 16 planned meetings, students are allowed not to take attendance four times; if it exceeds that, they have to repeat this course next year.

Task

Assignments are given every week. After the assignment is collected, the lecturer will correct it and end it by giving a grade. These values are then taken as the average value of the overall value of the students' assignments.

Exam

In assessing the above components, it is necessary to determine the percentage. The exam consists of a midterm exam and a final semester exam. This exam is individual, so students do it by relying on their abilities. It is through a discussion process with students and is adjusted to the task's level of difficulty.

Analyze Feedback (Analysis of Feedback)

Giving feedback can provide higher learning outcomes than classes that are not given feedback (Aggraini et al., 2015). According to the learning objectives, lecturers provide responses related to questions/comments submitted by students. In providing feedback, the lecturer does it subjectively and does not take sides with any students. In addition, when submitting the results of student assignments, the lecturer is also open if there are errors in assessing. Students are welcome to complain if the lecturer makes mistakes in assessing.

In addition, regarding the material presented by the lecturer, students are also allowed to express their opinion if the material displayed is not appropriate, such as an error in typing or completion or an explanation. The lecturer will clarify if the error is proven after the lecturer checks.

In the video provided, students are also welcome to provide public input, such as the use of fonts and animations that, if they do not interfere with the appearance of the material, can help provide illustrations. In addition, there is a background sound that might interfere with the explanation sound, so in the following video, it can be fixed.

Overall, lecturers provide the best service so that students can understand the material presented. The material is essential because it is one of the sciences used to prepare students' final assignments. With an exciting delivery and according to learning objectives, it can attract students to take a final project with a quantitative theme in which there are calculations and statistical analysis.

CONCLUSION

In applying the Gerlach and Ely learning model, the lecturers can adapt it to students' circumstances when learning online. This learning model is used online using Facebook, WhatsApp, YouTube, and a combined Google application. Gerlach and Ely's learning model has a complete and detailed character. In addition to preparing the material in full through videos, learning is also delivered in written form (slides) so that students have a choice in taking learning resources. The advantage of this learning model is that it is detailed step by step according to the learning needs to achieve learning objectives. Furthermore, this model needs detail of the activities of the steps in the Gerlach and Ely model so that this model can be applied as alternative learning that should be taken into account for use.

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429 of 2021, concerning Recipients of the 2021 Budget Research and Community Service Assistance Fund. Hopefully, the results in this research can be applied to other subjects and, in general, can be considered by a lecturer (educator) when conducting learning, both online and offline learning.

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