CHAPTER 2

LITERATURE REVIEW

2.1 Online Learning System

2.1.1 System Definition

The system comes from Latin (systema) and Greek (sustema) is a unit consisting of components or elements that are connected together to facilitate the flow of information, matter or energy. (A.Sultoni et al., 2018) The system is a series of two or more interconnected components, which interact to achieve a goal. Most systems consist of smaller subsystems that support the larger system. Tyoso (2016:1) quoted from (Rosadi & Wulandari, 2020) The system is a collection of components that form a unity. While the explanation of Ismail (2011: 78) quoted from research (Hartati, 2018) reveals that the system is an orderly arrangement of various elements, where one element and another are functionally interrelated, thus providing a unified understanding.

From the definition of the system described above, it can be concluded that the understanding of the system above reflects the existence of several parts and part relationships, this shows the complexity of the system which includes cooperation between parts that are interdependent with each other, the system is trying to achieve its goals.

2.1.2 Understanding Online Learning

The term online learning is learning that is carried out online using the internet and is carried out remotely anywhere and anytime. (Kurtarto, 2017) said online learning is learning that is able to bring together students and lecturers to carry out learning interactions with the help of the internet . (Suhery et al., 2020) Online learning is an electronic-based learning process using smartphone and computer network media with a learning system that does not have access restrictions and allows more time to be done. (Kristina et al., 2020) Online learning is a learning activity carried out by utilizing digital devices and the internet to make

learning more interesting, creative and independent. (Lestariyanti, 2020) Online or online learning is the most chosen alternative method for implementing learning from home (BDR) policies.

During the current pandemic, online learning is not only at the higher and secondary education levels, but also at the elementary level because of restrictions on schools with a face-to-face system. With online learning, students have the flexibility of learning time, can study anytime and anywhere. Students can interact with lecturers using applications such as classroom, e-learning, open learning, schoology, zoom meet, Microsoft teams, google meet, telephone or live chat, or via whatsapp group.

2.2 Media in Online Learning

The learning component is learning tools (media). Media is an intermediary tool to convey messages or information. A teacher will not be separated from the name of a lecturer's learning media as well as learning media. That is why the media is a component of learning. The word media comes from Latin and is the plural form of "medium" which literally means intermediary or introduction. So the media is an intermediary or messenger from the sender to the recipient of the message. Learning media is software (software) or hardware (hardware) that serves as a learning tool or learning aid. Media is essentially one component of the learning system. As a component, the media should be an integral part and must be in accordance with the overall learning process. The end of the selection of media is the use of these media in learning activities, thus allowing students to interact with lecturers. Some of the teaching media used during online learning during the current pandemic:

a) Classroom
b) OpenLearning
c) E-Learning
d) School
e) Zoom meet
f) Google meet

g) Microsoft Teams

2.3 Student Satisfaction

2.2.1 Understanding Student Satisfaction

Satisfaction comes from the Latin ' *satits',* which means enough and something satisfying will definitely meet expectations, needs, or desires, and not cause complaints. A student's satisfaction is a level of feeling comparing the performance / results he feels in accordance with the expectations he wants.

(Wibisono & , 2016) High value creation can produce a level of satisfaction which is the level of one's feelings stating the comparison of the results obtained for the product/service. Student satisfaction will be achieved if there is a match between the services from both the university and the educators provided to students, which is seen from the match between expectations and the performance of the service it receives.

2.2.2 Dimensions of Student Satisfaction

Student learning satisfaction describes a feeling between what is expected and what actually happens. During the COVID-19 pandemic, there were many things that became a measure of student satisfaction regarding student rights. (Sukmanasa et al., 2017) describes student satisfaction with learning which can be seen from 5 dimensions of satisfaction, namely:

A. Tangible is a physical dimension. A service cannot be smelled, and cannot be touched, so physical evidence becomes important as a measure of service. *Tangible* is the ability to provide campus physical facilities and adequate lecture equipment regarding the appearance of lecturers and public facilities, for example: the availability of infrastructure. Students will assess the quality of learning from all existing facilities and facilities.
B. Reliability, which is a dimension that measures the reliability of higher education in providing services to its students. There are two aspects of this dimension, namely a) the ability of lecturers to provide learning methods as promised and, b) how far the lecturers provide accurate learning. *Reliability* is

the ability of lecturers to provide learning as promised (on time), immediately, relevantly and accurately so as to satisfy students.

C. Responsiveness is a dynamic dimension of service quality. *Responsiveness* is the willingness and responsiveness of lecturers to help and provide learning according to student needs. This dimension can be seen where lecturers are easily found for consultation purposes. Students' expectations of service accuracy will always change from time to time.

D. Assurance, which is a dimension of quality assurance related to the behavior of teaching staff or lecturers in instilling trust and confidence in students. *Assurance* includes competence, knowledge, skills, courtesy. There are four aspects of the *assurance dimension* , namely friendliness, competence, credibility, and security.

E. Empathy is the attitude of the lecturer in providing wholehearted service, such as personal attention and understanding that each student has different abilities and needs.

2.4 Data Mining

Basically data mining is closely related to data analysis and the use of software to look for patterns and similarities in a set of data. The basic idea is to extract valuable resources from the most unexpected places such as data mining software extracting previously invisible or not so obvious patterns that no one noticed before.

(Muliono & Sembiring, 2019) data mining is also known as Knowledge Discovery in Database (KDD), which is a process that automatically searches data in a very large memory space from data to find patterns using techniques such as association or grouping. (clustering). While the explanation (Abdillah et al., 2016) data mining is the process of extracting data into information that has not previously been conveyed, with the right technique the data mining process will provide optimal results.

(Hendrian, 2018) explains that data mining is a process that uses statistical techniques, mathematics, artificial intelligence, and machine learning to extract

and identify useful information and related knowledge from various large databases.

2.5 Decision Tree

Decision tree is the most popular classification technique or method because it is easy for humans to interpret. Decision trees are also commonly used to explore data, finding hidden relationships between a number of potential input variables and a target variable.

(Aidi Saputra et al., 2020) explained that the decision tree is a flowchart structure that resembles a tree, where each internal node indicates an attribute test, each branch represents the test result, and the leaf node represents a class or class distribution. Decision tree is a method that is one of the most powerful and well-known classification methods. The Decision Tree method converts big facts into a decision tree that represents the rules, so that the rules can be easily understood by humans.

(Ninla Elmawati Falabiba et al., 2014) Explaining in this definition it is stated that the decision tree is a flowchart tree or flow diagram where each node shows the attributes that have been tested, each branch represents the results of the division that has been tested and each leaf node (internal nodes) represents a particular class group.

The benefits of a decision tree can be seen as follows:

1. Break down complex decision-making processes into simpler ones so that decision-makers will better interpret solutions to problems.
2. Decision trees are also useful for exploring data, finding hidden relationships between a number of potential input variables and a target variable.
3. Decision trees combine data exploration and modeling, so they are great as a first step in the modeling process even when used as the final model of some other technique.

2.6 C4.5 Algorithm

(Hendrian, 2018) The C4.5 algorithm is one of the classification methods used. Involves the construction of a decision tree, a collection of decision nodes.

Each branch then leads to either another decision node or to a leaf node to terminate. (Hendri & Oscar, 2021) C4.5 algorithm is a group of decision tree algorithms (Decision Tree). This algorithm has input in the form of training samples and samples. Training samples in the form of data that will be used to build a tree that has been tested for truth.

Meanwhile, according to the C4.5 algorithm is a method that can be used to perform the formation of a decision tree. The decision tree is able to make complex decisions simpler, so that decision makers will better interpret solutions to problems.

2.7 Previous research

Table 2. 1 Previous Research

No	Title	Author/Year	Method	Research result
1	STUDENT SATISFACTION ANALYSIS OF ACADEMIC SERVICES USING THE C4.5 ALGORITHM METHOD (CASE STUDY: STMIK PRINGSEWU)	Oktafianto, 2016	In this study, the method used is the C4.5 algorithm by taking 5 aspects of the level of satisfaction, tangible, reliability, assurance, responsiveness, and empathy. Then to prove it using the RapidMiner application.	With this research using the C4.5 algorithm method, it can measure the level of student satisfaction and is clearly measurable. With 5 aspects as the benchmark for the assessment, it can be seen that the most dominant results from the aspect of responsibility.
2	APPLICATION OF C4.5 ALGORITHM FOR PREDICTION OF	Anggita Safitri Febriarini, Erna Zuni Astuti 2019	This study uses the decision tree method, precisely the C4.5 algorithm	With 3 tests that have been carried out, it can be seen that test 1 with

	PASSENGER SATISFACTION OF THE RAPID TRANSIT (BRT) TRANS SEMARANG BUS		with the passenger satisfaction measurement variables used are price, facilities, and service. And the attributes used produce a cause-and-effect relationship in classifying satisfied and dissatisfied passengers.	a comparison of training data and testing data of 60%: 40% is an accuracy value of 92.5%, precision is 92.42% and recall is 98.39%, and test 2 of The ratio of 70% : 30% is the accuracy value of 93.33%, precision is 93.88%, and recall is 97.87%, while test 3 with a comparison of 80% : 20% is the value of 95% accuracy, 96.67% precision, and recall of 96.67% can be said to be successful and good, because it can be seen clearly that the accuracy value continues to increase and is getting more accurate .
3	Application of the C4.5 Algorithm in Measuring Visitor Satisfaction with	Hendri, Dony Oscar, 2021	This study uses data mining techniques application of data mining C4.5. with data	The results of this study can be concluded that the satisfaction of wildlife visitors

	Facilities at the Jakarta Wildlife Park		sources from distributing questionnaires to visitors.	can be predicted and evaluated by utilizing the C4.5 algorithm to predict satisfaction with the training obtained.
4	Classification of the C4.5 Algorithm in the application of the level of student satisfaction with online learning media	Kiki Aidi Saputra Jaya Tata Hardinata, Muhammad Ridwan Lubis, Sundari Retno Andani, Ilham Syahputa Saragih, 2020	This study applies the C4.5 algorithm to measure the level of satisfaction with this type of classification research with the concept of data mining.	Research conducted on the application of the C4.5 algorithm on the classification of student satisfaction with online learning media. Can be solved using data mining techniques.