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COMPUTER NETWORK LEARNING EXPERT SYSTEM ANALYSIS USING SYSTEM USABILITY SCALE

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ABSTRACT

The use of artificial intelligence technology has been used in activities to facilitate the process of completing work, one of the growing artificial intelligence Expert Systems that have been widely used in the field of health to help doctors and patients in diagnosing diseases and providing solutions in medicine. The development of Expert System began to enter the world of education which has an impact on the ease of learning in solving this problem occurs because students are allowed to learn independently and think like an expert in solving problems. This research focuses on the ease of users in using Expert System applications in computer network learning based on acceptability ranges, scale grades, and ranges. The research method uses a quantitative approach with the calculation of the SUS Score formula involving 50 respondents who use expert systems in computer network learning. The results of research based on data processing showed that expert systems are very good in supporting learning this is seen from the calculation of 89.9 several aspects including acceptability ranges in marginal high range, Scale range Excellent, and in Grade Scale in category B. This shows that Expert System can be used in supporting learning.

Keywords: *System Usability Scale, Expert System, Learning.*

1. Introduction

The growing utilization of technology brings convenience to the activities of daily life, with the help of technology various jobs can be completed quickly, precisely, and accurately[1]. Technological innovations that occur one of which is an artificial intelligence system that has been widely used in various health fields and even the development of artificial intelligence has innovated in the world of education such as expert systems that can be used as a support for learning by processing, storing, disseminating and presenting the information [2][3].

The utilization of technology in the world of education is increasing based on field data in 2019 with a sample number of 5,900 significant increases in the number of users seen from 2017 with a percentage of 54.68% rising to 64.8% seen that the needs of internet users increase every day APJII based on internet users in the learning process such as changes in activities that occur in the world of education to facilitate communication [4].

The use of technological media can improve students' skills in learning [5]. Knowledge and skills can be developed through the utilization of information sources in the era of the industrial revolution 4.0, one of which is innovation in

creativity, critical thinking skills, collaboration, and communication that provide insight for students[6]. Learning outcomes affect the development of soft skills and hard skills of students in learning independently with sources of information relevant to learning sources [7].

The need for learning competence is one of the goals that must be obtained by students for graduates to compete in the world of work by the needs and skills of students, one of which is competence on computer networks[8].

Expert System is one of the media used to support student learning independently, in the Expert System there is some knowledge derived from an expert based on actual data and facts in providing knowledge of problem-solving designed by special needs in improving competence, to find out the usefulness of expert systems need to be measured so that expert systems can be developed and used positively, maximum in support of learning [9], [10][11].

Learning with the support of artificial intelligence media can provide convenience to students in developing knowledge and provide stimulants to continue to carry out the learning process independently [12][13]. Innovative learning media is highly influential on student learning outcomes as well as improved

interpersonal communication due to interaction between users and learning media [14].

Lecturers as facilitators must be able to innovate technology-based learning media so that students are motivated in learning independently, actively, and creatively [15].

Learning systems using internet network technology is a learning medium that is widely used by students and lecturers in learning, with a good internet network structure providing opportunities for students and lecturers to be able to continue to communicate well[16]. The quality of the learning system also affects the satisfaction of students in using the system as a learning medium that is integrated with the subject matter [17].

Expert System testing in learning needs to be done to find out the level of usefulness and ease of students in using expert systems in learning, one of the testing methods using the System Usability Scale (SUS) that has been significantly proven in measuring user satisfaction with the system [18][19]. System quality needs to be measured in order to be optimally developed and utilized to achieve the goal of using the system as a supporting medium of SUS techniques to be the first step to looking at user opinions for the system to be evaluated [20]–[22].

Analysis using SUS aims to look at the value of system satisfaction and feasibility in supporting user learning activities by measuring the features that reside on the system [23]. To develop a good system, measurement and analysis of user needs must be taken. SUS analysis has its own calculations and formulas in processing data based on a sample of respondents using questionnaire instruments in the range of values 0 -100 with the following SUS formula calculations.

$$SUS\ Score = ((R1-1) + (5-R2) + (R1-3) + (5-4)+(R1-5) + (5-R6) + (R7-1) + (5-R8)+(R9-5)+(5-R10))*2,5$$

Source : Brooke, 1986

Calculations in SUS include several aspects including acceptability ranges, grade scales and adjective ratings that serve as preliminary data in system improvement [24], with grade scales in SUS assessments can be used to measure the evaluation of scores obtained by a system against the satisfaction and usefulness of users in supporting learning [25], the score on SUS analysis has been determined based on calculations from data analysis about SUS Score on Figure 1.

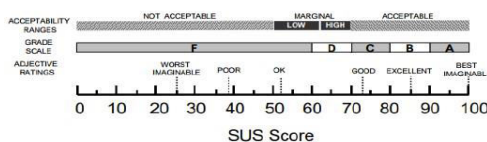


Fig 1. SUS Score

SUS score is the key to the improvement and development of a structured and measurable system based on the calculation of the score [26][27]. The purpose of SUS analysis on Expert System is to determine the student's response to the utilization of Expert System in computer network learning in improving students' knowledge and skills in learning.

2. Research Method

The testing method uses the dissemination of questionnaires to see the ease of users, this study will be tested based on the provisions of the Calculation System Usability Scale, questionnaires will be distributed to students who take computer network courses who will be respondents who have the background of expert system application users in the learning process, the research stage is seen in Figure 2.

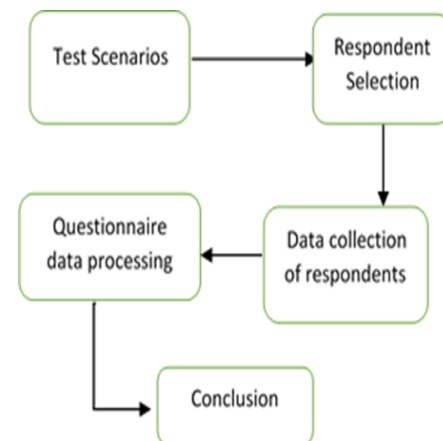


Fig 2. Research stage

The research scenario uses the SUS approach in the dissemination of questionnaires, students who take computer networking courses at Pagaralam High School of Technology become respondents. Processing questionnaire data using Microsoft Excel applications by following the provisions of the calculation of the SUS formula to find out the conclusions of the results of the spread of questionnaires that have been given to respondents when using the Expert System on computer network learning.

Data collection methods

In the analysis of research using SUS, the process of collecting data through the dissemination of questionnaires to users of expert system applications of computer networks by providing 10 questions about the ease of using expert system applications in computer network learning data collection conducted in April - June 2021 through a google form.

3. Results and Discussions

Research on Expert System analysis using a descriptive quantitative system usability scale approach that aims to get the perception of expert system application users as a supporting medium in computer network learning. In the process of testing scenarios in the research stage through the process of analysis of students who use expert system applications that take computer network courses to be sampled in data retrieval.

The second stage of the respondent selection is by determining the number of respondent criteria consisting of the number of samples of 50 students who use expert systems in computer network learning. The process of spreading data using the help of google forms to respondents of Pagaralam High School of Technology students who are taking computer networking courses. Questionnaire questions using the System Usability Scale there are 10 questions seen in Table 1.

Table 1
Questionnaire Items

No	Questionnaire Items
1	I think that I want to use this system for the learning process
2	I find this system complicated to use
3	I find this system easy to use
4	I need help from someone else or a technician in using the zoom app
5	I feel that the features of this system should run properly
6	I feel many things are inconsistent with this system in supporting the learning process
7	I feel the user will understand how to use this system quickly and easily
8	I find this system confusing in the learning process
9	I feel there are no obstacles in using the zoom system on learning
10	I need to practice to get used to it first before using this system

Source : [26]

Questionnaire data was distributed to 50 students who took computer networking courses with expert system assisted to support the learning process. In the analysis process using the formula System usability Scale to find out the results of respondents to the use of Expert System in learning.

The results of the recapitulation of respondents' assessment of computer network expert systems are seen in Table 2.

Table II
Calculation Recapitulation Result

No	Result	Score	No	Result	Score
1	37	92.5	26	34	85
2	39	97.5	27	36	90
3	36	90	28	32	80
4	39	97.5	29	34	85
5	37	92.5	30	35	87.5
6	35	87.5	31	33	82.5
7	36	90	32	33	82.5
8	33	82.5	33	32	80
9	35	87.5	34	35	87.5
10	35	87.5	35	36	90
11	34	85	36	35	87.5
12	35	87.5	37	34	85
13	35	87.5	38	34	85
14	35	87.5	39	36	90
15	34	85	40	36	90
16	33	82.5	41	38	95
17	36	90	42	35	87.5
18	36	89.8	43	33	82.5
19	34	84.6	44	33	83.1
20	36	90	45	32	80
21	34	83.8	46	35	87.5
22	33	83.4	47	37	92.5
23	33	82.5	48	37	92.5
24	33	82.5	49	35	87.5
25	32	78.8	50	33	81.8
Average					86.9

From Table 2, the results of the recapitulation questionnaire measurement of Expert System applications in support of computer network learning are based on data as many as 50 respondents with an average score of 89.9 when viewed from the aspect of ease of Expert System users in the learning process is very good. This is because students can develop knowledge independently of computer network problems with the help of Expert System which provides opportunities for students to be able to analyze computer network problems and think in solving problems like an expert.

Assessment system usability scale based on several aspects including acceptability ranges, grade scale, and adjective ratings. Data processing using the SUS Score formula to find out the perception of the usefulness of expert systems in computer networking courses as a supporting

medium in learning to improve students' abilities and skills in building computer network structures.

Based on the results of the questionnaire calculations that have been recapitulated there is a score with an average score of 89.9 based on student perception so that it has an impact on the utilization of expert systems that have been designed to help students in learning computer networks. Referring to the base of the SUS score is seen the Acceptable ranges aspect in Figure 3.

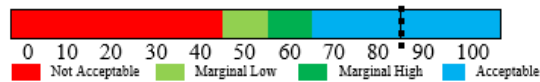


Fig 3. Score SUS Acceptable Ratings

It is seen that the perception of Expert System users in the Acceptable ranges aspect is in an acceptable position so that the Expert System can be well received by all students as a supporting medium for the computer network learning process. Students feel a new atmosphere in carrying out computer network learning, especially in the process of designing network structures with the student Expert System more easily solve problems that occur during the computer network design process.

On the Grade Scale, the assessment of the Expert System as a supporting medium of the learning process with student presence when using the Expert System is seen in Figure 4.

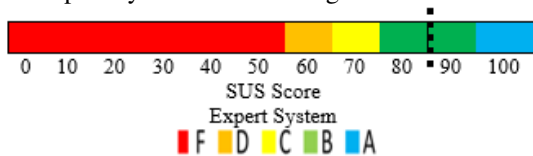


Fig 4. Score SUS Grade Scale

Based on data processing with an average score of 89.9 on the calculation of SUS score seen in Figure 5 that Grade uses Expert System as a support medium for computer network learning in Grade B. Students feel a good experience in learning with the help of Expert System, especially to solve problems in learning materials while working on projects.

In the Adjective range aspect seen in Figure 5. The results of processing questionnaire data that has been distributed to students who use Expert Systems in computer network learning.

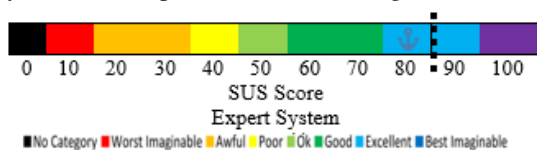


Fig 5. Score SUS Adjective

Based on data processing there is a sus score with an average value of 89.9 on the calculation using the formula SUS is in the adjective aspect with excellent ranges. The presence of Expert System as one of the learning media that innovates with artificial intelligence systems has a good advantage, it is seen that students are increasingly confident in doing learning independently to deepen knowledge and abilities in computer network learning.

The advantages of Expert System can provide solutions to problems that occur in the learning of computer network structures, the knowledge process that has been designed in the Expert System comes from the knowledge of an expert so that the process in analyzing computer network problems becomes faster and more precise based on the mindset and knowledge of an expert that has been translated into computerized language.

4. Conclusion

Expert System is a branch of the growing science of artificial intelligence to provide ease in solving problems based on knowledge, facts, and data to conclude providing solutions to problems. Expert System has innovated into the world of education, including as a supporting medium for computer network learning that aims to provide convenience to students in deepening science as well as the conclusion of Expert System analysis using SUS.

1. Acceptable assessment is in a marginal high position where students can receive and utilize Expert System as the latest learning medium in improving knowledge and skills, especially in computer network materials.
2. Grade Score based on SUS the use of Expert System is in Grade B students can well receive Expert System media in learning so that Expert System can be developed and used in other subjects.
3. Based on Adjective ratings are in an excellent position of students feel the advantages of expert systems including being able to provide solutions to computer network problems to make it easier for students to solve problems independently with the help of expert systems.

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