
Development of a Local Area Network with Netsupport in Learning in a Computer Laboratory**La Ode Alwin Syahputra¹, Hansi Effendi², Yeka Hendriyani³, Ambiyar⁴**

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Abstract

Technological developments are increasingly advanced so as to increase the use of computer laboratories in higher education, especially in the learning process. However, this is not matched by the completeness of adequate infrastructure, which causes problems when using the laboratory. This study aims to develop and update a local area Network with net support for learning in computer labs 5 and 6. This research uses the Network development life cycle (NDLC) method. Data collected by questionnaire technique. The results of this study indicate that the validator test assessment from the innovation aspect of the IT infrastructure component is 89.17% so that the level of validity can be interpreted as valid in use, from the information system aspect it is 93.55%, so it can be interpreted as valid in use, practicality (group A) practicality test of 92.60%, so that it can be interpreted as practical to use, practicality (group B) practicality test is 94%, so the level of practicality can be interpreted as practical to use, practicality (Lecturer) practicality test is 95.23%, so that the practicality level can be interpreted as practical used, the effectiveness (group A) of the effectiveness test was 94.55%, so that the level of effectiveness could be interpreted as effectively used, the effectiveness (group B) of the effectiveness test was 93.70%, so the level of effectiveness could be interpreted as effectively used, effectiveness (labor assistant) effectiveness test of 93.58%, so that the level of effectiveness can be interpreted as effectively used. So that it can be concluded that the development of a local area Network with Netsupport in computer laboratory learning is feasible to use.

A. Introduction

The progress of the world of information technology is currently so rapid, so that the information needed by a person will be obtained very quickly, easily and cheaply even without the person having to move from his seat. For example using internet technology. The internet has become a necessity for most people, government or private institutions[1].

In the world of education, the internet also has a very large positive impact in supporting learning. So it is a big lag if an institution or agency cannot be connected to the internet. Information technology, especially computer networks at this time has become one of the basic things in all aspects[2]. Information technology infrastructure is a strategic resource for private and state companies, high schools and even universities and needs to be managed properly by companies, colleges and universities. Information technology infrastructure supports the continuous flow and processing of information within an enterprise. In building information technology infrastructure we need to use the network. The network used to connect computers with a limited distance between two or more different places is called a Local Area Network[3].

At present the computer laboratory has developed quite rapidly this can be seen in the changes that occur from time to time, a few years ago the computer laboratory was only used as a place for computer training, but at this time the computer laboratory has become a classroom where students study with take advantage of the internet network[4]. The more computer laboratories in universities, the more problems will arise in their management. The problem is how or what software is used to monitor computer use in the learning process, communicate in writing and audio-video, lock and turn off student computers remotely in a local area network (LAN) environment, which is a network that connects a number of computers in one location. with a limited area such as in a room or building[5].

Netsupport application manager specifically to assist in the process of remote control, learning and supervision of computer use by students. The Netsupport manager is divided into two. The first is the lecturer's Netsupport, and the student's Netsupport which is installed on the student's computer or[6]. With this software the teacher can monitor all student screen displays or see what programs are being run by students, the lecturer can display what is on the monitor so that it can be seen on the student's computer[7]. Through Netsupport the lecturer manager can communicate in writing or with audio-video, besides that the teacher can lock students' computers if students take unwanted actions, turn off and turn on students' computers remotely[8].

Netsupport manager is a system or computer application that runs on several computers connected to the network. The Netsupport manager system is an application specifically developed to assist in the learning process and monitoring computer use by students, university students, study participants[9]. With this application teachers, mentors, lecturers can monitor all student screen displays or see what programs are being run by students. a network-based application that can manage student data, material data, assignment data, and quizzes that are held in a computer laboratory.

A computer laboratory is a facility used for computer practicum as an Information and Communication Technology learning approach. Ideally, it is not only computer practicums that are carried out, but ICT learning in the form of other innovations from the world of computers from the development of modern times.[10]. To support modern innovation learning, of course, adequate computer laboratory facilities must be provided according to ideal standards so that learning activities are effective. So that what is learned and practiced by students is obtained mastery of broader knowledge[11].

The use of hardware media (installation of local area networks in computer laboratories) and software (netsupport remote control applications to support the learning process) in the teaching and learning process is an effort to increase the practicality and effectiveness of student learning[12]. Learning using information technology (local area network) and communication (netsupport remote control application) will be effective if the lecturer's role in learning is as a learning facilitator or providing facilities for learning, not just as a provider of information. "LAN" hardware media and learning "netsupport application" software are one of the learning components that have an important role in the learning process[13]. The use of media should be a part that must receive the attention of lecturers as facilitators in every learning activity[14]. Learning Media is very useful and beneficial for students if they are directly involved in using the media.

Based on the experience of researchers, various aspects of labor have come to institutions of vocational training centers, vocational high schools and universities, from some of the labor systems the system does not use net support, the computer is used or controlled by those who use the computer, it is not controlled by a computer server or labor assistant, so it is often there is damage in the form of software or hardware, lack of monitoring from assistant labor[15].

At this time it is important to support education by utilizing existing technology, namely LAN computer networks in various schools to universities both in the classroom and in practice rooms, referring to the progress of the information technology era which has begun to enter various aspects of life. Entertainment, multimedia and education[16]. For learning, maintenance, multimedia and computer monitoring, an application is needed that can automatically be used by admins or technicians, teachers, lecturers, and students. University utilizes a local area network and implements the Net Support application as a very effective software medium for learning as well as student monitoring.

Exploration of the functions of the tools in the Netsupport application is needed to make it easier for lecturers to use and utilize this application on a regular and targeted basis. On the other hand, this application can be used at the same time to facilitate computer maintenance, such as monitoring and running client PCs, sending data. The characteristics of the labor found in the computer labor center researchers feel the need to conduct research at University computer laboratory center by emphasizing studies on aspects of using the Netsupport application.

The development carried out by researchers will analyze local area networks and an application used by assistants, lecturers to students at the University computer laboratory center. From this analysis activity, it is hoped that it will be

known how effective and practical the applications used for laboratory monitoring are in order to be able to create a conducive laboratory atmosphere in carrying out learning activities in the laboratory. Therefore, based on the description above, the authors will conduct a study entitled: Development of a Local Area Network with Netsupport in Learning in a Computer Laboratory.

B. Research Method

The development in this study uses the R & D (Research and Development) model through the Network Development Life Cycle (NDLC) design. Research and development is the method used to define process cycles in the form of stages of the theoretical mechanism needed in a series of system processes on computer networks with applications and to test the effectiveness of these products[17].

Network Development Life Cycle (NDLC) is the key model behind the computer network design process. Like the systems development model for software applications, NDLC consists of elements that define specific phases, steps, steps, or mechanisms. From the word "cycle" (cycle) is a descriptive keyword of the network system development life cycle which describes explicitly all processes and stages of continuous network system development[18].

The NDLC model is a research method used to develop or validate products used in structured analysis techniques used to plan and process the development process of a system, NDLC is a model that describes the cycle process of developing and designing a computer network, as the development of a computer network supports education and learning programs, especially in computer laboratories. NDLC has elements that define specific stages, phases, steps, or process procedures.[19] The word cycle in NDLC is the descriptive center of the network system development cycle which is described as a whole, so that the processes and stages of network system development run continuously. Researchers chose the NDLC model because according to researchers, the NDCL model is a development model that is easy to implement and has structured stages and very clear in practice. With the need for increasingly complex network services, we need a methodology that supports network architecture and design.[20]

The author's development method cycle model will use the Network Development Life Cycle for the development of a local area network network with netsupport. The approach with a top-down design model, directs network infrastructure to adapt to whatever applications are needed by a network, the following are the stages of the NDLC method as follows:

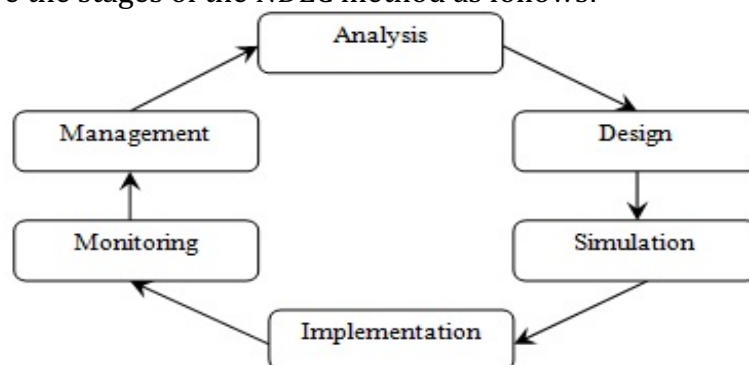


Figure 1. NDLC Models (Kosasi, 2011)

1. Analysis

From the results of the analysis obtained from the results of problem identification and understanding of the problems that have been carried out, that is to design a local area network with Netsupport which allows installation on computer laboratories. Then the author will also implement IP Address management by connecting Netsupport to the local area network network, thus enabling the distribution of IP based on class C by developing a LAN network.

In the computer laboratory lab 5 the system running a local area network so that when the learning process is carried out the lecturer experiences difficulties on several client computers used by students because they cannot share data from the lecturer's computer (server) to the student's computer (clients).

The results of conducting an analysis of the local area network in the computer laboratory namely the author can see after conducting research among all labs, especially lab 5, the local area network installation has not used the cover on the RJ45 connector (used to connect network cables) to a computer device), for a LAN network connection. From the results of the analysis of the RJ45 cable network hardware connected to the client-server via a hub which is forwarded to enter the local network between one computer labor, and connected to the server, which is then shared with the client with the local area network. The topology used at the computer laboratory center uses a bus topology, where the server computer used by the lecturer becomes the central link for local area network connections. The IP address used is a class C IP address.

2. Design

At this stage, it aims to observe the detailed requirements specifications of the system to be built, namely the Bus topology network with the MPLS system, in this case the author divides the design into two, namely:

a. Bus topology design

At this design stage, a design drawing of the interconnection network topology will be made. It is hoped that this drawing will provide a complete picture of the existing needs. The topology used in this study is the bus topology which is very suitable for the conditions of the computer laboratory center as shown below:

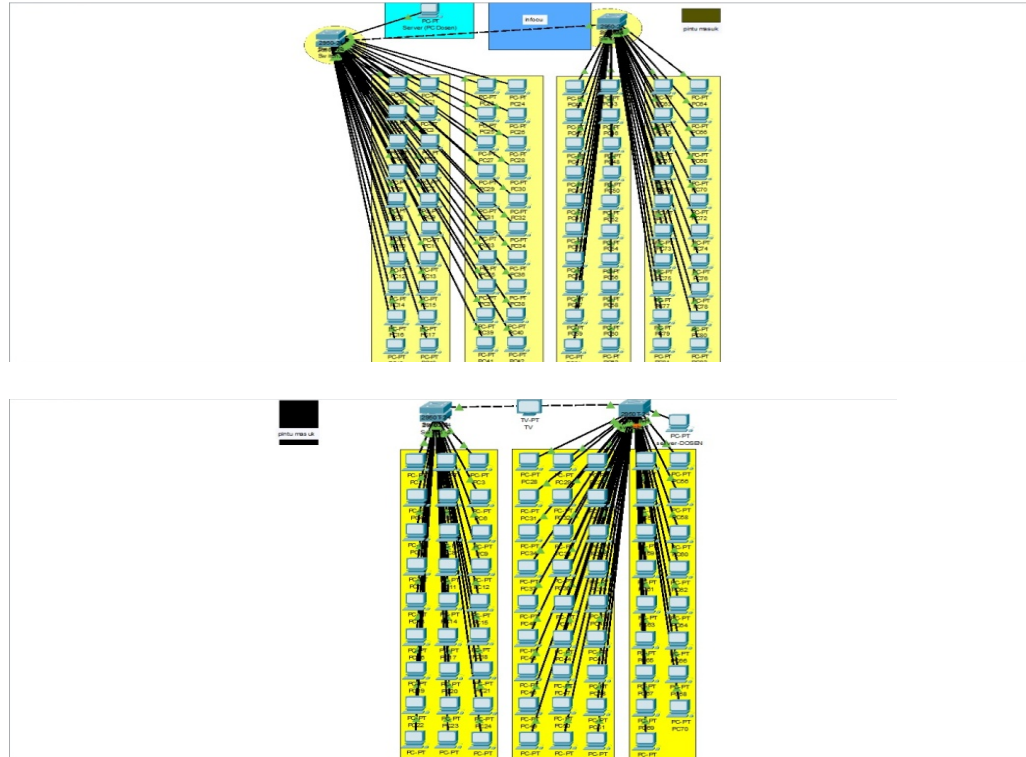


Figure 2. Network Topology in Computer Laboratory (lab 5) & (lab 6)

b. MPLS (Multi Protocol Label Switching) system design

After the network topology design is made, the next step is to develop a new system design that will be built and implemented, namely specifying all the components or elements needed to build an MPLS network system. The following are the system specifications to be built:

Table 1. System Composition

System	Information
MPLS	Switch / hub
Net Support	Netsupport manager (server), netsupport (client)

3. Prototyping Simulation

At this stage, the author builds a prototype of the system that will be built and implemented in the MPLS environment using an emulator. This stage aims to demonstrate the MPLS system that has been running properly along with the IP Class management Server-Client.

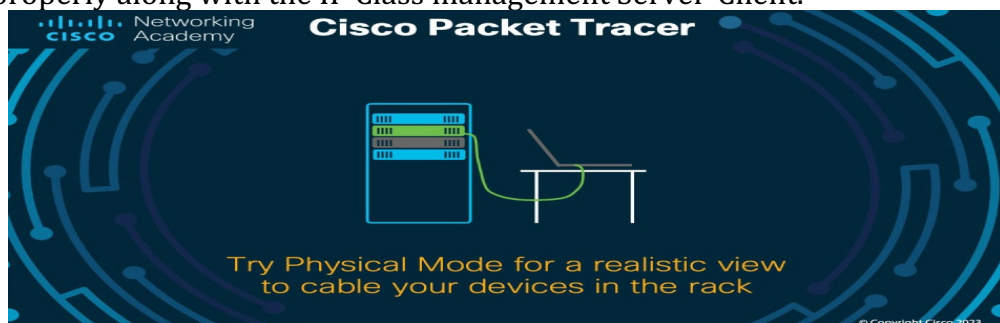


Figure 3. Emulator *cisco packet tracer*

4. Implementation

The next stage is the implementation or application of the topology and system design details in the real environment as a local area network simulation with Netsupport, the design details will be used as an instructor in the implementation phase so that the system to be built can be relevant to the system that has been designed, the implementation stage is the development of a local area network (LAN) with Netsupport can be done in the following way:

- a) Network cable creation
- b) Installation of LAN network topology
- c) Hub configuration
- d) Installation of the RJ-45 connector cover
- e) TCP/IP configuration settings
- f) Installing netsupport manager
- g) Setting protocol name Netsupport manager

5. Monitoring

After the implementation of the monitoring phase is an important stage, so that the development of a local area network network with Netsupport can run according to the wishes and initial goals of the user at the initial stage of the analysis, it is necessary to carry out monitoring activities, monitoring can be in the form of making observations in the form of:

- a) Monitoring the cable installed



Figure 4. Lab 10 LAN network

- b) Perform monitoring for network connectivity
- c) Test the LAN network and client server monitoring

6. Management

Laboratory management is an attempt to manage the laboratory in order to have good governance. Laboratory management can be managed properly, is determined by several factors that are interrelated with one another.

This stage is related to policy, management, including maintenance and maintenance activities of the entire system that has been built. However, the authors explain that this stage, specifically the management stage, is under the authority of the computer laboratory center, so the

authors only look at the previous phase, namely monitoring which is monitored for a limited time.

C. Result and Discussion

1. Product Validity Test

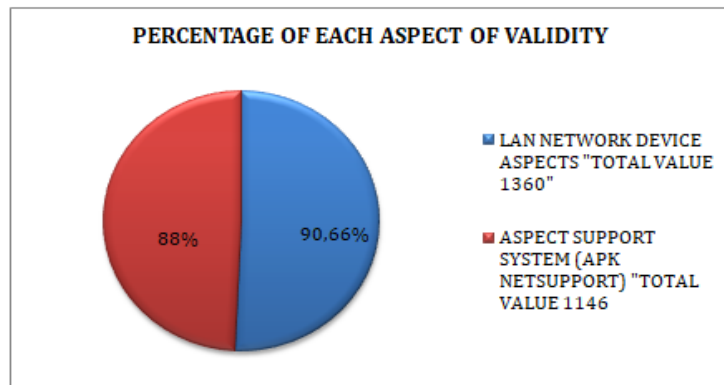
a. Validity Trial (Indicator Assessment of IT Infrastructure Component Innovation Expert)

Based on the results of data analysis from a questionnaire validation test sheet for IT infrastructure component innovation, the development of a local area network with Netsupport by 3 Validators, namely two IT and one lecturer, is based on three aspects, namely aspects of LAN network devices, aspects of support systems (Netsupport applications).

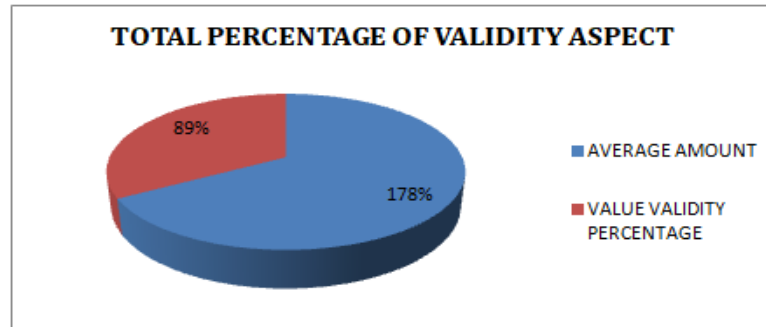
In terms of the aspect of LAN network devices, the Validator rated 90.66% with very valid criteria, which means the development of a local area network with net support for learning in computer laboratories is in accordance with what is described through the aspect indicators.

In terms of the support system aspect (Netsupport application), the Validator rated 88% with valid criteria, meaning that the local area network with net support in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

Table 2. Validity Histogram Percentage (%)



In terms of the aspect of the LAN network device the average is 90.66%, in terms of the support system aspect (netsupport application) the average is 88%, has an average total number of 178 with an overall percentage of 89% "valid" validation value criteria which means that the development of a local area network network in learning in a computer laboratory is in accordance with what is described through the aspect indicators.

Table 3. Histogram of Total Value Validity Percentage (%)

Based on the frequency distribution table and histogram validity questionnaire, the results of data analysis show that the development of a local area network with net support for learning in the computer laboratory obtained an average value for the calculation of the three validators, then it is concluded that "valid" from experts testing the validity of the innovation of IT infrastructure components for the development of local area networks with netsupport in learning in computer laboratories.

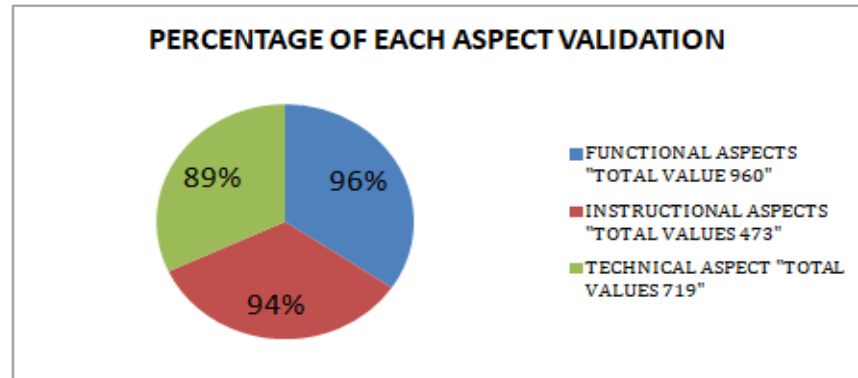
b. Validity Trial (Indicator of Information System Expert Assessment)

Based on the table, it can be explained that data analysis from information system validity test sheet questionnaires, local area network development with Netsupport by 3 Validators, namely two (2) IT and one (1) lecturer based on three aspects, namely aspects of LAN network devices, aspects support system (Netsupport application).

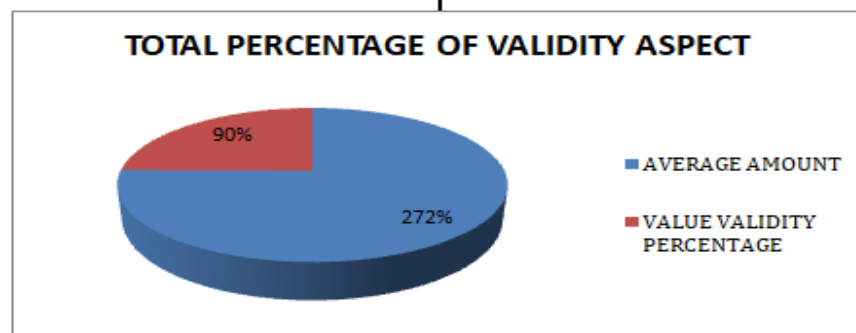
In terms of functional aspects, the Validator rated 96% with the criteria of "very valid" which means the development of a local area network with net support for learning in computer laboratories is in accordance with what is described through the aspect indicators.

In terms of the instructional aspect, the Validator rated 94% with the "very valid" criteria, meaning that the carrier of the local area network with net support for learning in the computer laboratory is in accordance with what is described through the aspect indicators.

In terms of technical aspects, the Validator rated 89% with the "valid" criteria, meaning that the carrier of the local area network with net support for learning in the computer laboratory is in accordance with what is described through the aspect indicators.

Table 4. Validity Histogram Percentage (%)

In terms of functional aspects, it averages 96%, in terms of instructional aspects, it averages 94%, in terms of technical aspects, it averages 89%, has an average total number of 272 with a total percentage of 90%, the validation value criterion is "valid " which means that the development of a local area network in learning in a computer laboratory is in accordance with what is described through the aspect indicators.

Table 5. Histogram of the Total Value Validity Percentage (%)

Based on the frequency distribution table and histogram validity questionnaire, the results of data analysis show that the development of a local area network with net support for learning in the computer laboratory obtains an average value for the calculation of the three validators, namely then it is concluded "very valid" from experts testing the validity of information systems developing local area networks with netsupport in learning in computer laboratories

2. Product Practicality Test

a. Practicality Test (Group A)

After carrying out the validity test, the researcher then conducted a practicality test of developing a local area network with Netsupport for learning in the computer laboratory that the researcher made.

Practical trials were used to determine the level of practicality carried out by students.

Based on the table it can be explained the data analysis of the practicality test questionnaire by students of Information Systems Faculty of Computer Science, the practicality test questionnaire sheets were distributed to 35 respondents (students) at one time during the learning hours.

In terms of interest, respondents rated 91% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

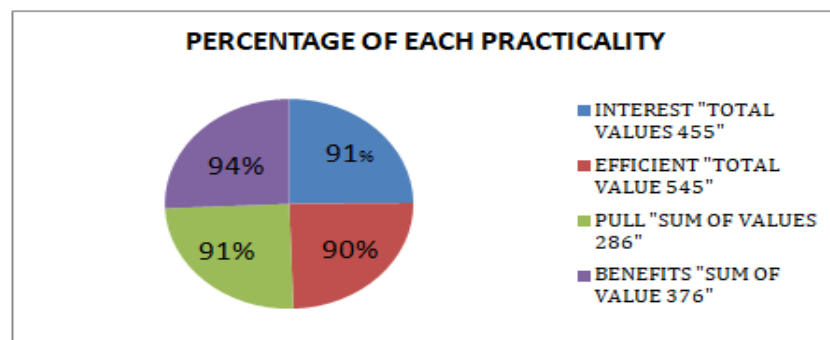
In terms of efficiency, respondents rated 90% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

From an interactive point of view, respondents rated 91% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

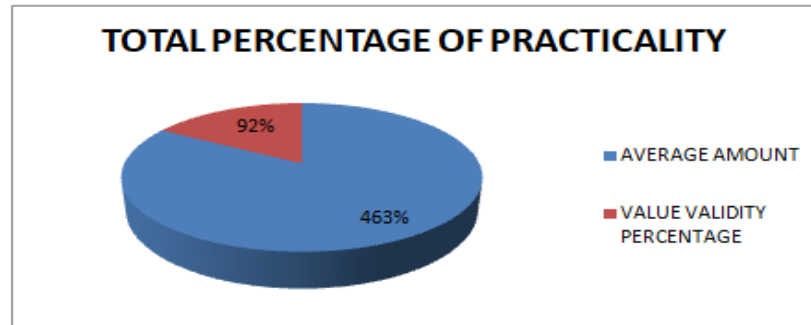
In terms of attractiveness, respondents rated 95% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

In terms of benefits, respondents rated 94% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

Table 6. Practicality Percentage Histogram (%)



In terms of interest, the average is 91%, in terms of efficiency, the average is 94%, in terms of interest, the average is 91%, in terms of benefits, the average is 94%, has an average total number of 376 with an overall percentage of 90% the validation value criterion is "very practical" which means the development of a local area network with net support for learning in the computer laboratory is in accordance with what is described through the aspect indicators.

Table 7. Histogram of the Total Value Practicality Percentage (%)

Based on the frequency distribution table and practicality questionnaire histogram, the results of the data analysis show that the development of a local area network with Netsupport for learning in the computer laboratory obtains an average score of thirty five respondents by the student is 92% and looking at the interpretation table, it is concluded "very "practical" from respondents (information systems students) practicality test of developing local area networks with Netsupport in learning in computer laboratories.

b. Practicality Test (Group B)

After carrying out the validity test, the researcher then conducted a practicality test of developing a local area network with Netsupport for learning in the computer laboratory that the researcher made. Practical trials were used to determine the level of practicality carried out by students.

Based on the table it can be explained the data analysis of the practicality test questionnaire by students of the Information Systems Faculty of Computer Scienc, the practicality test questionnaire sheets were distributed to 33 respondents (students) at one time during the learning hours.

In terms of interest, respondents rated 92% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

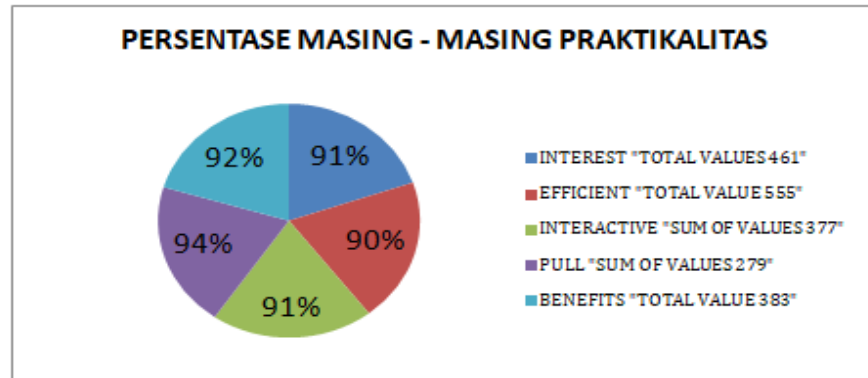
In terms of efficiency, respondents rated 92% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

From an interactive point of view, respondents rated 94% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with is described through the aspect indicators.

In terms of attractiveness, respondents rated 93% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

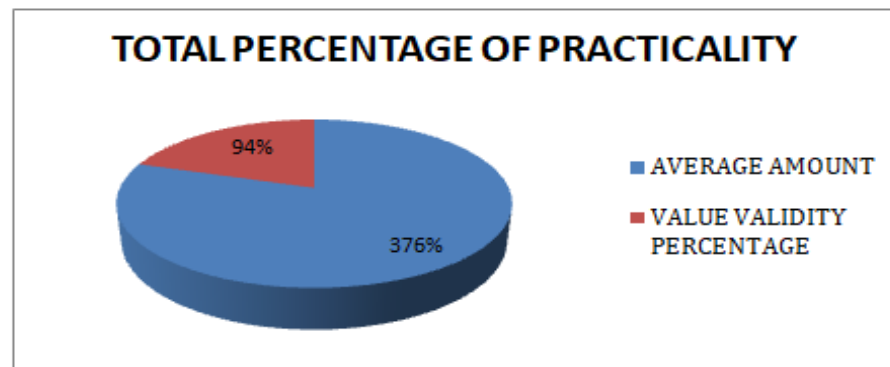
In terms of benefits, respondents rated 95% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

Table 8. Practicality Percentage Histogram (%)



In terms of interest, the average is 91%, in terms of efficiency, the average is 94%, in terms of interest, the average is 91%, in terms of benefits, the average is 94%, has an average total number of 376 with an overall percentage of 90% the validation value criterion is "very practical" which means the development of a local area network with net support for learning in the computer laboratory is in accordance with what is described through the aspect indicators.

Table 9. Histogram of the Total Value Practicality Percentage (%)



Based on the frequency distribution table and practicality questionnaire histogram, the results of the data analysis show that the development of a local area network with net support for learning in the computer laboratory obtains an average score of 35 respondents by the student is 94% and looking at the interpretation table, it is concluded "very practical" from respondents (information system students at the Faculty of Computer Science, Putra Indonesia University "YPTK") tested the practicality of developing a local area network network with netsupport in learning in a computer laboratory.

3. Product Effectiveness Test

a. Effectiveness Test (Group A)

After carrying out the validity test, the researcher then conducted a practicality test of the development of a local area network that was integrated with Netsupport in the learning process in the computer laboratory which the researcher made. Effectiveness trials were carried out to determine the level of effectiveness of reciprocal use of netsupport that students feel during the learning process.

The effectiveness of developing a local area network with Netsupport in learning in the computer laboratory from the respondents was carried out to assess the reciprocity of the use of the Netsupport. Respondents provide assessments, suggestions and comments as well as conclusions on these developments, by filling out the questionnaire that has been provided.

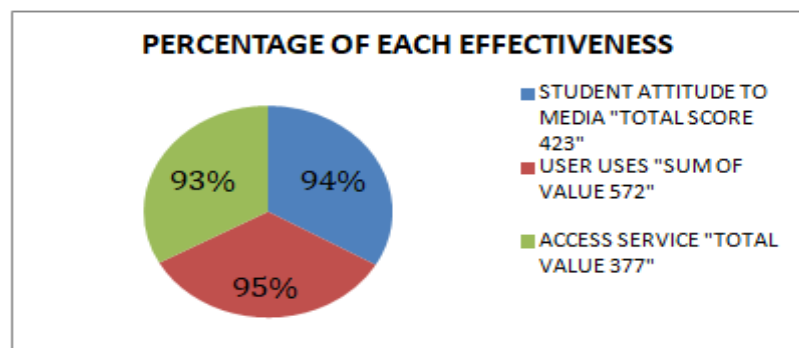
Based on the table it can be explained the data analysis of the effectiveness test questionnaire by Information Systems students at the Faculty of Computer Science, the practicality test questionnaire sheets were distributed to 30 respondents (students) at one time during the learning hours.

In terms of student attitudes towards media use, respondents rated 94% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

In terms of user usability, respondents rated 95% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

In terms of access services, respondents rated 93% with the criteria of "very valid" which means that the installation and use of netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

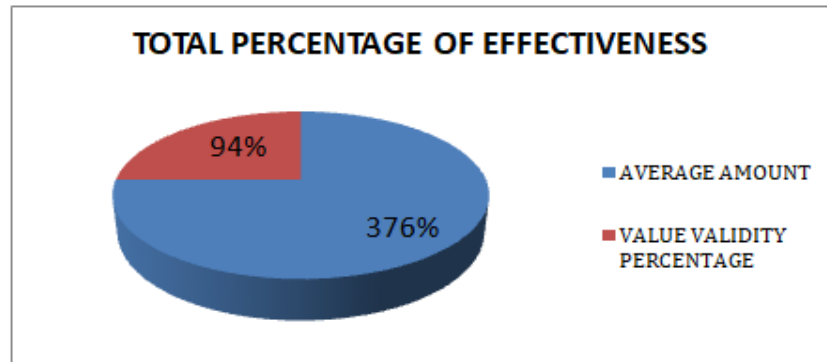
Table 10. Effectiveness Percentage Histogram (%)



In terms of student attitudes towards the use of media an average of 94%, in terms of usability use an average of 95%, in terms of service access an average of 93%, has an average total number of 282 with a

percentage of the total value is 94% criterion value validation "very practical" which means the development of a local area network with net support for learning in the computer laboratory is in accordance with what is described through the aspect indicators.

Table 11. Histogram of the Total Value Effectiveness Percentage (%)



Based on the frequency distribution table and practicality questionnaire histogram, the results of the data analysis show that the development of a local area network with Netsupport for learning in the computer laboratory obtains an average score of thirty five respondents by the student is 94% and looking at the interpretation table, it is concluded "very practical" from respondents practicality test of developing local area networks with netsupport in learning in computer laboratories.

b. Effectiveness Test (Group B)

After carrying out the validity test, the researcher then conducted a practicality test of the development of a local area network that was integrated with netsupport in the learning process in the computer laboratory which the researcher made. Effectiveness trials were carried out to determine the level of effectiveness of reciprocal use of netsupport that students feel during the learning process.

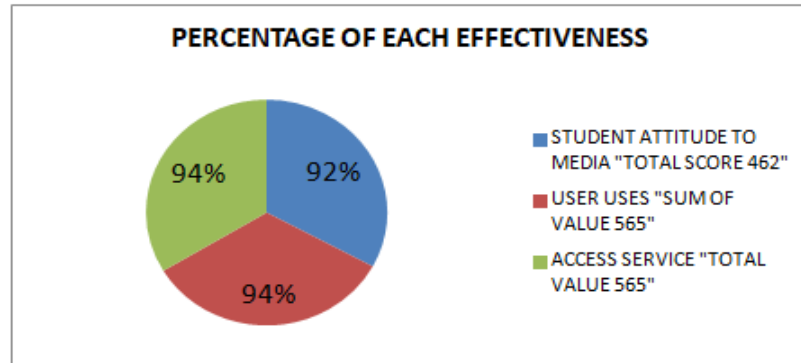
Based on the table it can be explained the data analysis of the effectiveness test questionnaire by students of the Information Systems Faculty of Computer Science, the practicality test questionnaire sheets were distributed to 33 respondents (students) at one time during the learning hours.

In terms of student attitudes towards media use, respondents rated 92% with the criteria of "very valid" which means that the installation and use of netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

In terms of user usability, respondents rated 94% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

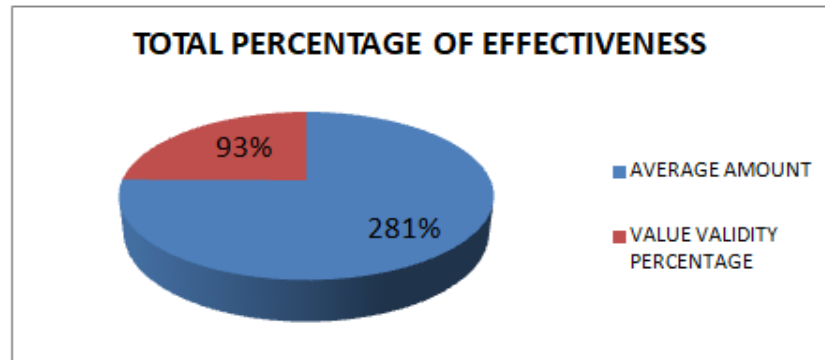
In terms of access services, respondents rated 94% with the criteria of "very valid" which means that the installation and use of Netsupport in learning in the computer laboratory is in accordance with what is described through the aspect indicators.

Table 12. Effectiveness Percentage Histogram (%)



In terms of student attitudes towards the use of media an average of 92%, in terms of usability use an average of 94%, in terms of service access an average of 94%, has an average total number of 281 with a percentage of the total value is 93% criterion value validation "very practical" which means the development of a local area network with net support for learning in the computer laboratory is in accordance with what is described through the aspect indicators.

Table 13. Histogram of the Total Value Effectiveness Percentage (%)



Based on the frequency distribution table and practicality questionnaire histogram, the results of the data analysis show that the development of a local area network with net support for learning in the computer laboratory obtains an average score of thirty five respondents by the student is 93% and looking at the interpretation table, it is concluded "very practical" from respondents (information systems students at the University) practicality test of developing local area networks with Netsupport in learning in computer laboratories.

D. Conclusion

From the results of the research conducted, it can be concluded that with the development of a local area network with net support for learning in the computer laboratory at University monitoring and data sharing between servers and clients can be carried out, to share source files of teaching materials, lecturers simply need sharing data with students when learning is carried out, the lecturer no longer needs to walk to each student's computer to supervise or help if there is an error on the student's computer. Netsupport can monitor or display student computer screens on lecturer computer screens, so lecturers only need to monitor and control student computers from their computers, all of this is also supported through a local area network so that student computers and lecturer computers are connected to each other. This is evidenced by the results of the validation in terms of the innovation of IT infrastructure components of 89.17% and information systems of 93.55% so that the validity level can be interpreted as valid to use. The results of the practicality test questionnaire for group A were 92.60% and group B were 94% so that the practicality level could be interpreted as very practical to use. The results of testing the effectiveness of group A was 94.55% and group B was 93.70%, so that the level of effectiveness can be interpreted to be very effective in use.

E. Acknowledgment

Thanks to all those who have helped in completing this research. Especially to the supervisors, discussants and validators who contributed a lot of suggestions and input in this research and to all UPI YPTK Padang teaching staff and students who have facilitated and contributed to the implementation of this research so that this research can run well and produce an article that can be a reference for other researchers.

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