The Development in Router Configuration Learning using e-Learning

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ABSTRACT

The purpose of this research is to develop in router configuration learning using e-Learning in Computer Laboratories subject. Router configuration learning is an interesting and important part of study in Computer Laboratories subject. The main objective of this laboratory is to make the student’s skill on the router configuration. The e-Learning on router configuration is divided into four topics which are the router topology, setting up router, static route, and dynamic route. The sample group of this research was eight bachelor’s degree students who studied in computer of engineering education program, Department of Engineering Education, Faculty of Industrial Education, King Mongkut’s Institute of Technology Ladkrabang. Students were taught, learned, and used on the development of the e-Learning on router configuration. The result of this research is indicated that the achievement score of students on score on the e-Learning is higher than the before achievement score of students at less than 0.01 in significant statistical level.

Keywords
e-Learning on Router, e-Learning, Router, Router configuration

1) INTRODUCTION

The good management of computer network will bring the efficiency and stability usage of the computer network. But the studying of network management has several limitations such as the insufficient number of network devices, the space in laboratory is not enough. So in many universities have only the lecture for the computer network subject which led to the lack of skills for network management. We can use the network simulation tools to solve these problems. Unfortunately, the simulation software does not support all functions used in the real lab environment. The virtual laboratories (Duarte & Butz, 2001), that uses the simulation softwares, can solve the insufficient number of network devices only. The remote laboratories such as Chirico, Scapolla, and Bagnasco (2005), Fàbrega, Massaguer, Jové, and Mérida (2002), Klempous, Nikodem, Walkowiak, and Rozenblit (2004), Steinemann, Zimmerli, Jampen, and Braun (2002) which using the real equipments via the Internet and manage these resources for efficiency sharing is another way to address this issue. In an influential research, Nedic, Machotka, and Nafalski (2003) summarize about the advantage and disadvantage of the remote laboratories and the virtual laboratories. The cost of virtual laboratories is lower than the remote laboratories, but the software does not support all functions of the network device. For remote laboratories, user can interact with the real network device. The devices that used in Duarte & Butz (2001), Chirico et al. (2005), and Klempous et al. (2004) such as the engineering instruments do not need to store the previous device status for the result processing. So the students simultaneously use these devices. In contrast, the management of computer network devices has to store the previous device status to process the next same instruction from each
student for the concurrent usage of the devices as mentioned in Fàbrega et al. (2002), Steinemann et al. (2002). If the previous device status did not store, only one student can use these network devices. The objective of this research is to develop the virtual laboratory, because the insufficient number of network devices, low cost and need skill of all students. We can use router simulator.

2) RESEARCH OBJECTIVE

In this research, the research objective is to develop the e-Learning on router configuration in computer laboratory subject for students who study in bachelor's degree majoring in computer.

The e-Learning on router configuration is accomplished in four primary goals:

1. Give students increasingly interest on router configurations.
2. Help students understand on network design.
3. Help student achievement on router configuration.
4. Give teachers and students a tool for learning on router configuration.

In this research, the researchers used and listed topics of router configuration that were taught for bachelor's degree students in engineering education program majoring in computer, Department of Engineering Education, Faculty of Industrial Education, King Mongkut's Institute of Technology Ladkrabang. There are 4 topics on router configuration following as:

1. Router topology
2. Setting up router
3. Static route
4. Dynamic route

3) DEVELOPED CONTENT

In the router configuration, we divided the experiment into 4 contents following as:

3.1) Router Topology
The router topology is the content that helps students know about the details on equipments and how to connect the network line. Originally, one student can practice and connect the network line one at the time. But, now, students can have experimented on network connecting at the same time by using e-Learning based on network design programs shown as figure 1.

![Figure 1: Router topology for basic two routers](image)

3.2) Setting up Router
In the experiment, the students were practiced how to basically set the router. Students were familiar with the command line to set up router on router simulator program. The example on command line and results is shown as figure 2.

```bash
transport input none
line aux 0
line vty 0 4
!
no scheduler allocate
end

Router(config-if)
 Enter configuration commands, one per line. End with Ctrl/2.
Router(config-if)#interface ethernet 0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#
```

![Figure 2: Result of setting up router](image)

3.3) Static Route
Static route is the content that supports students to find the network route and understand the concept of stub network by using routing table. The results on the experiment and command line are shown as figure 3.

```bash
#LINK-3-UPDOWN: Interface Ethernet0, changed state to up
Router(config-if)#
```
By using e-Leaning on router configuration, the students can complexly set the router in the real time status. In the figure 6, there are 5 routers in connecting by RIP protocol. The results of network connecting are shown as figure 7.

### 3.4) Dynamic Route

Dynamic route is the experiment that uses the routing protocol in distance vector and link state. The distance vector routing protocol is used RIP as the routing protocol and the link state is used OSPF as routing protocol shown as figure 4 and 5 in orderly.

### 4) STUDENTS’ ACHIEVEMENT

Students are taught and studied with the e-Learning on router configuration. At the beginning of class, the researchers gave the pretest to students. At the ending of class, the researchers gave the posttest to students. A statistic analysis was conducted to compare learning outcomes measured by pretest and posttest across the students’ achievement. The result of student’s achievement is shown on Table 1.
### Table 1: Students’ Achievement

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>$\bar{x}$</th>
<th>SD</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>8</td>
<td>8.4750</td>
<td>0.89083</td>
<td>-4.558</td>
<td>0.000</td>
</tr>
<tr>
<td>Posttest</td>
<td>8</td>
<td>11.8125</td>
<td>1.86964</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note:* The result of this research is the achievement score of students at less than 0.01 in significant statistical level.

The result of using the e-Learning on router configuration in the class teaching indicated that the achievement score of students on score on the e-Learning is higher than the before achievement score of students at less than 0.01 in significant statistical level.

5) CONCLUSIONS

The development of e-Learning on router configuration is the subject content that gives and helps students to learn how to connect the routers in network. The development of e-Learning on router configuration is divided into 4 parts which are the router topology, setting up router, static route, and dynamic route. The result of this research indicated that the achievement of bachelor’s degree students who studied in computer program, Department of Engineering Education, Faculty of Industrial Education, King Mongkut’s Institute of Technology Ladkrabang is improved according to learning with the development of e-Learning on router configuration.

REFERENCES


