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25. **Okporu Uruemu Charity** - *Department of Public and Community Health, Novena University, Ogume, Nigeria.*
26. **Odjimogho Stella** - *Department of Opthometry University of Benin, Edo State Nigeria.*
27. **Agofure Kingsley** - *Department of Public and Community Health, Novena University, Ogume, Nigeria.*
28. **Isioma Abuh** - *Department of Public and Community Health, Novena University, Ogume, Nigeria.*
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STUDENTS' REACTION TO COMPREHENSION AND SKILL ACQUISITION IN COMPUTER NETWORK TOPOLOGY WITH THE USE OF CISCO-PACKET-TRACER SIMULATOR IN NIGERIA

¹ADEDOKUN-SHITTU, N. A.; ²AJANI, A. H.; ³ABDULKAREEM, O. I. & ⁴NUHU, K.M.

^{1,2,3&4}Department of Educational Technology, Faculty of Education, University of Ilorin, Nigeria.
adedokun.sna@unilorin.edu.ng, ajaniadedejihhammad@gmail.com, olans777@gmail.com,
nuhu.km@unilorin.edu.ng

Abstract

This study was conducted to explore students' reaction to their comprehension and skill acquisition in computer network topology with the use of cisco-packet-tracer simulator in Nigeria. A case study of Ilorin. CPTS usually are based on interactive tool which gives the learner the ability to visualize a process or an activity. CPTS has been found useful for teaching for some reasons including, remote access for distance education, low cost, reliability, security, flexibility, and convenience to the students. This study adopted a quantitative research design as its methodology while the sample size included purposively sampled: 1 senior secondary school, 1 intact senior class II and 26 computer study students. All samples were selected because the researcher intends to examine the participants without influencing their characters. Two validated research instruments with a reliability value of 0.81 were employed, and one research questions was answered. The findings of the study were that CISCO-packet-tracer could be adopted in teaching computer studies, especially in a network topology. CPTS makes teaching of network topology easier, fun and more meaningful by providing a realistic simulation and visualization environment. This study recommended among others, that more learning simulated packages similar to the CISCO-packet-tracer simulator should be adopted in the teaching and learning of computer studies; as it would help to foster students' reaction towards the network topology concept, thereby having improved performance in it in senior secondary school computer studies examinations.

Keywords: Reaction on Comprehension and Skill Acquisition; Computer Network Topology, CISCO-packet-tracer simulator and Gender Difference

Introduction

CISCO-packet-tracer simulator is an initial platform for students that are just starting in the ICT networking, the graphical platform for learning network topologies, the configuration of the internet protocol. It provides a realistic simulation and visualization learning environment that supplements classroom equipment, including the ability to see internal processes in real-time that are normally hidden on real devices. Innovative features of the Cisco-packet-tracer Simulator will help students and teachers collaborate, solve problems, and learn concepts in an engaging and dynamic social environment. It enables dragging, placing, connecting, and clustering virtual network devices such as hubs, switches, routers. (Exposito, Trujillo & Gamess, 2010).

CISCO-packet-tracer simulator is user friendly and easy to use tool that can help students to do a lot of practice and gain experience and confidence which is very useful in designing real networks (Javid, 2014). It also provides students with more advanced study conditions with the "self-study" setting, which builds the needed skills for independent lifelong learning and more practice chances for the student to adopt (Alnoukari, 2014). In this context, CPTS encourages students to engage in active learning and enable them to participate in inquiry-based learning, also allow them to have higher-order thinking tasks as problem-solving analysis, synthesis, and evaluation. It serves as a challenge for the student to learn through transfer and encourages deeper understanding (Alnoukari, 2014).

CPTS allows students to demonstrate diversity in the ways they learn best. Students have opportunities to learn in a variety of ways individually, cooperatively, independently, with teacher direction, through hands-on experience, and examples followed by practice. In CPTS, students are required to learn concepts, procedures, and processes. They develop competence in these various areas with the aid of instructional and learning strategies that are suited to the particular type of learning. The approaches and strategies used in the classroom to help students meet the expectations of this curriculum should vary according to both the type of learning and the individual needs of the students (Ontario, 2013).

Objective of the Study

Based on the objective of this study which is to examine the reaction of students, including consideration for gender difference, to the use of CISCO-packet-tracer simulator in learning network topology concept in computer Studies, the following research question was raised:

Research Questions

- i. What are the reactions of students to the use of the cisco-packet-tracer simulator in learning network topology concept in computer studies?
- ii. Does gender difference exist in students' reactions to the use of the CISCO-packet-tracer simulator in learning network topology?

Adapted Model

This study adapted Kirkpatrick's successive four-level model of evaluation is a meaningful way of measuring the reaction, learning, Transfer, and results that occur in the user of a program to determine the program's effectiveness. The model is graphically illustrated in Figure 1:

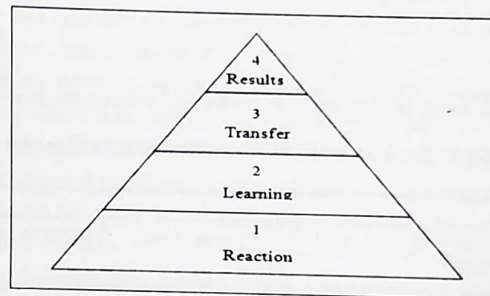


Figure 1: Kirkpatrick's Successive Four-Level Model of Training Evaluation (Adedokun-Shittu, 2013)

The first level termed 'reaction', measures the relevance of the objectives of the CISCO- packet-tracer and its perceived value, favorable, engagement, and satisfaction from the viewpoints of users. they find it easy to design network topology using CPTS and that the CPTS is user friendly, fun, interactive also influences their engagement in the class, promotes active learning, relate different connections in our school cafe to network topology after using CISCO-packet-tracer simulation.

The second stage, 'learning', evaluate the degree to which participants acquired the intended knowledge, skills, attitude, confidence, and commitment based on their participation in the training.it is the extent to which participants change attitudes, and improve their knowledge or increase their skills as a result of the program.it also assesses whether the learning that occurred is intended or non-intended. It was concluded that most of the respondents were able to initialise, connecting, redirecting, configuring; and simulating the computers with networking devices. These attributes make the CISCO-packet-tracer simulator attractive for any learning and teaching that requires hands-on practice such as network topology. Practice for skill attainment involves interaction with equipment and the work environment.

In the transfer stage, the behaviours of the users are assessed in terms of whether the newly acquired skills are transferred to the working environment. The degree to which skills are acquired during training increases their performance in WAEC questions. It also includes processes and systems that reinforce, monitor, encourage, and reward the performance of critical behaviours. Finally, the result level measures the success of the program by determining the increase in users' understanding of the concept and whether the desired outcomes are being achieved (Nafisat, 2013).

The result obtained from the data gathered and analysed indicated that students reacted positively to the use of the Cisco-packet-tracer simulator in learning network topology concept in computer studies. Therefore, the findings concluded that the majority of the respondents claimed that learning network topology using Cisco-Packet-Tracer Simulator makes networking easy and fun they can now easily relate different connections in their house to network topology after using Cisco-packet-tracer simulator, they feel responsible for their learning when they use Cisco-packet-tracer compare to the conventional approach, working and learning with Cisco packet tracer is not time-consuming.

Methods

This study adopted a quantitative research design of survey method. The researcher-designed questionnaire was used for the survey method. This method was found appropriate because the researcher intends to examine the participants without influencing their characters. In this study, two research instruments were developed and validated: adopted software (CISCO-packet-tracer Simulator); A researcher-designed questionnaire was used to examine students' reactions. The instruments had a reliability value of 0.81. The entire research was conducted within a space of three weeks. Research ethics and principles were strictly adhered to by informing the participants about the voluntary participation, anonymity and confidentiality of data. Data obtained was analysed using descriptive statistical tools of frequency counts, percentage, range and statistical mean.

Results

This portion describes the findings of this study in tables and subsequently interpreted.

Table 1: Students' Reaction to the Use of CISCO-packet-tracer Simulator in Learning Network Topology

S/N	Items	Mean	Rank
1.	Learning network topology using CISCO-packet-tracer Simulator makes networking easy and fun	3.42	2 nd
2.	I feel responsible in my learning when I used a CISCO-packet-tracer simulator compare to the conventional approach	3.23	4 th
3.	Using a CISCO-packet-tracer simulator allows me to create and arrange devices in a real-time mode, thereby concretizing my understanding of network topology	3.63	1 st
4.	a CISCO-packet-tracer simulator aids my understanding of networking	2.96	8 th
5.	a CISCO-packet-tracer simulator is user-friendly	2.75	10 th
6.	Working and learning with CISCO-packet-tracer is not time-consuming	3.19	5 th
7.	CISCO-packet-tracer simulator influences my engagement in the class and promotes active learning	3.16	6 th
8.	I can now easily relate different connections in my house to network topology after using a CISCO-packet-tracer simulator	3.29	3 rd
9.	Without the influence of my teacher, I can easily use a CISCO-packet-tracer simulator	3.03	7 th
10.	I look forward to its adoption in teaching other networking programmes in Computer studies	2.91	9 th
Grand Mean		3.16	

Table 1 revealed the reaction of the students to the use of a CISCO-packet-tracer simulator in the learning network topology. Based on the benchmark, all the items have mean values greater than the benchmark. Generally, among many other attributes, the majority of the respondents claimed that a CISCO-packet-tracer

simulator allows them to create and arrange devices in a real-time mode, thereby concretizing their understanding of network topology; allows them to create and arrange devices in a real-time mode, thereby concretizing their understanding of network topology; learning network topology using a CISCO-packet-tracer simulator allows them to create and arrange devices in a real-time mode, thereby concretizing their understanding of network topology; makes networking easy and fun; they can now easily relate different connections in their house. Working and learning with Cisco-Packet-Tracer is not time-consuming. Cumulatively, the grand mean of $3.16 > 2.50$ indicates that students reacted positively to the use of CISCO-packet-tracer simulator in learning network topology concept in computer studies.

Table 2: Independent Sample *t*-test Analysis of Gender Difference in the Students' Reaction to Learning Network Topology Using CISCO-Packet-Tracer Simulator

Gender	N	<i>X</i>	<i>SD</i>	<i>Df</i>	T	<i>Sig. (2-tailed)</i>	Remark
Male	11	3.54	.19	24	1.97	.060	Accepted
Female	15	3.32	.28				

From Table 2, it can be deduced that there was no significant difference between male and female students' reactions to the use of a CISCO-packet-tracer simulator in the learning network topology. This is reflected in the findings of the hypothesis tested $df (24)$, $t = 1.97$, $p > 0.05$. Thus, the hypothesis which states that "there is no significant difference between male and female students' reaction to the use of CISCO-packet-tracer simulator in learning network topology" is accepted.

Discussion

The result obtained from the data gathered and analysed indicated that students reacted positively to the use of the CISCO-packet-tracer simulator in learning network topology concept in computer studies. Therefore, the findings concluded that the majority of the respondents claimed that learning network topology using CISCO-packet-tracer simulator makes networking easy and fun they can now easily relate different connections in their house to network topology after using CISCO-packet-tracer simulator, they feel responsible for their learning when they use CISCO-packet-tracer simulator compare to the conventional approach, working and learning with Cisco packet tracer is not time-consuming. This finding supports the findings of Javid (2014) who posited that the CISCO-packet-tracer simulator is user friendly and easy to use tool that can help students to do a lot of practice and gain experience and confidence which is very useful in designing real networks. It also provides students with more advanced study conditions with the "self-study" setting, which builds the needed skills for independent lifelong learning and more practice chances for the student to adopt (Alnoukari, 2014).

The result of the *t*-test established in hypothesis two revealed that there is no significant difference between male and female students' reactions to the use of the CISCO-packet-tracer simulator in the learning network topology. Both male and female students feel responsible for their learning when using the CISCO-packet-tracer simulator compare to the conventional approach. This finding supports the findings of Onah, et al., (2020) which indicated that one important way of bringing about positive change in students' reactions towards school subjects is by employing a student-centered approach through the integration of computer-assisted instructions like simulations into teaching and learning process. therefore, the result of the study revealed that students' gender was not a barrier to their academic performance when learning with the CISCO-packet-tracer simulator. This implies that CPTS improved the skill acquisition of both the male and female students in network topology, thus reducing the discrimination of gender in computer studies.

Recommendations

The findings and conclusion of this study prompted the following recommendations, thus:



- i. Educators should use the CISCO-packet-tracer simulator to allow students to practice asynchronously. Where access to real networking equipment is limited but access to computers is possible, the CISCO-packet-tracer simulator can be used to allow students to practice and experiment with the networking environment in their own time and place.
- ii. More learning simulated packages similar to the CISCO-packet-tracer simulator should be adopted in the teaching and learning of computer studies. This would help to foster students' reaction towards the network topology concept, thereby having improved performance in it in senior secondary school computer studies examinations; and
- iii. Students should utilize the opportunity offered by the gender-friendly CISCO-packet-tracer simulator to engage in independent study and for remedial activities to foster their positive attitude towards network topology and encourage them to choose an IT-related career later in life.

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