

## ICND2 MAESTRO - An Android App Companion and Cisco IOS Command Guide for Interconnecting Networking Devices 2

Nomar B. Maestro<sup>1</sup>, August Anthony N. Balute<sup>2</sup>

<sup>1</sup>(AMA University Graduate School, Quezon City, Philippines)

<sup>2</sup>(AMA University Graduate School, Quezon City, Philippines)

**ABSTRACT:** This study aimed to develop an Android application specifically for AMA Computer College - Makati, to improve ICND 2 (CCNA R&S Modules 3 and 4) classes as well as to motivate and inspire Cisco Networking Academy students and instructors. The cross platform application which is available for Android contains 18 summarized chapters from the 2 modules of ICND 2, as well as exercises, command guides, glossary of terms and cheat sheets. It also contains a quiz page that could help students review for examinations. Video tutorials are also made available for study. The software was evaluated on the basis of efficiency, reliability, accuracy, and user-friendliness, with the goals of being more efficient and user-friendly when compared with references provided by Cisco and other online resources, while maintaining a high level of accuracy and reliability.

**Keywords** - Cisco Systems, Accuracy, Reliability, User-friendliness, android Kitkat

### I. INTRODUCTION

Information technology together with digital devices like computers, tablets, and smartphones have changed everyday life and work immeasurably. It has altered the way we learn, communicate, and consume media. Education has been greatly affected by information technology by providing more information for both teacher and student. The need to visit the library and lookup for information was lessened since almost any type of information can be accessed instantaneously at any time through digital devices for learning and the Internet. Studying and preparing for quizzes and examinations as well as doing research has been easier since most information are now available online. Preparing and reviewing for certification examinations such as Cisco certifications have become simpler through the availability of digital resources provided by Cisco and user created content in the form of video tutorials and exercises available via the Internet. A person preparing for such certification can switch from Cisco provided references which is both printed and digital to online user created content if an idea or topic becomes complex or needs more explanation. Though materials for preparing Cisco certifications are widely available, these materials come from different types and sources. In order to get the most information, a person needs to compile all the references needed while being in front of a PC or laptop and having constant internet connection. The researcher thus had the idea of developing a user friendly Android application that will help the students of AMA Colleges Makati, Inc. – Cisco Networking Academy, as well as those preparing for ICND2 certification and networking professionals in need of a portable command reference. As a mobile application, it can serve as a portable and easily accessible reference and supplement to classroom learning, literally providing a speedy lookup of information at one's fingertips. It is intended to be a companion and complement to traditional classroom learning. For a person preparing for the certification exam, it is a good offline reference that presents in an easily understandable and interesting manner, making learning more interactive through the integration of text based instructions and exercises and video tutorials.

#### A. Background of the Study

The Cisco Networking Academy Program is a partnership between Cisco Systems, education, business, government and community organizations around the world, aimed at nurturing IT professionals. The educational program employs an e learning model, using a combination of Web-based and instructor-led training along with a hands-on lab environment to teach students how to design, build and maintain computer networks. First launched in 1997, the Cisco Networking Academy Program now has 10,000 Academies in more than 145 countries worldwide. More than 1000 Academies are located in 24 countries in Asia Pacific. AMA Education System has been a Networking Academy Program member since 1998. Today, AMA has more than

30 local networking academies under its system, the highest number of local academies under a regional academy in country. Through the years, AMA has consistently promoted innovative ways of learning to enhance the global competitiveness of the Filipino. It would only be fitting that an improved method of delivering classes, such as providing a mobile companion for its Cisco Networking Academy Program be incorporated, specifically for Cisco Certified Network Associate: Routing and Switching subjects.

### B. Statement of the Problem

The current method of delivering ICND2 classes in AMA Colleges Makati, Inc. uses the online references provided by Cisco Networking Academy and other internet related resources. The system can be improved by taking advantage of newer technology, such as mobile applications that would appeal to a newer and wider range of potential clients. In addition to this, in order to review and prepare for examinations, a student must be in front of a computer with all the required references needed. Though Networking Academy provided references which can be accessed using mobile devices, compatibility is still an issue and a stable internet connection is required. Internet connection is also required to access up-to-date exercises and video tutorials. Specifically, this study endeavored to answer the following problems 1. What is the assessment of the respondents regarding the software in terms of?

1.1 Efficiency

1.2 Reliability

1.3 Accuracy

1.4 User-Friendliness

2. Is there any significant difference in the assessment of the respondents regarding the software in terms of?

2.1 Efficiency

2.2 Reliability

2.3 Accuracy

2.4 User-Friendliness

C. Significance of the Study

This study represents an advancement in the application and study of ICND2. Taking what was previously available as online digital references and tutorial videos and assembling it to a more accessible and readily available application brings the structure and format of reference materials to the modern world of instant information and ubiquitous mobile technology.

- To the researcher, this study represents an advancement in the field of study. It is also representation of his new found skills that will be applied in a practical and pristine function. The application will be his main contribution to the beneficiary.
- To the beneficiary, this application is a useful tool in improving their curriculum of ICND2 and is an effective marketing method as it offers something new and different that will stand out from the services offered by other schools.
- To Cisco Networking Academy Instructors, this study provides a new option for supplementing and enriching their teaching methodology. It also serves as an easy way of giving out resources and study materials to students.
- To ICND2 students, this study represents a new and enticing form of learning that is outside the traditional textbook and PC based reference. It is an exciting form of practice and education using modern tools available to everyone, and will make the learning experience easy and fun.
- To individuals preparing for ICND2 Certification, this study provides an alternative way for reviewing and preparing for the big day. Information can be accessed even when not in front of a PC or without Internet connection.
- To networking professionals, this study provides a new option for reinforcing networking skills and knowledge. The application provides an easy way of scanning needed commands.

### C. Significance of the Study

[4] This study represents an advancement in the application and study of ICND2. Taking what was previously available as online digital references and tutorial videos and assembling it to a more accessible and readily available application brings the structure and format of reference materials to the modern world of instant information and ubiquitous mobile technology.

- To the researcher, this study represents an advancement in the field of study. It is also representation of his new found skills that will be applied in a practical and pristine function. The application will be his main contribution to the beneficiary.
- To the beneficiary, this application is a useful tool in improving their curriculum of ICND2 and is an

effective marketing method as it offers something new and different that will stand out from the services offered by other schools.

- To Cisco Networking Academy Instructors, this study provides a new option for supplementing and enriching their teaching methodology. It also serves as an easy way of giving out resources and study materials to students.
- To ICND2 students, this study represents a new and enticing form of learning that is outside the traditional textbook and PC based reference. It is an exciting form of practice and education using modern tools available to everyone, and will make the learning experience easy and fun.
- To individuals preparing for ICND2 Certification, this study provides an alternative way for reviewing and preparing for the big day. Information can be accessed even when not in front of a PC or without Internet connection.
- To networking professionals, this study provides a new option for reinforcing networking skills and knowledge. The application provides an easy way of scanning needed commands.

#### D. Objectives of the Study

##### 1) General Objective

The general objective of this study is to design and develop an Android application and Cisco IOS command guide for AMA Colleges Makati, Inc. – Cisco Networking Academy that will serve as a companion in teaching, studying and reviewing for ICND2 Certification.

##### 2) Specific Objectives

- Develop a mobile application that would provide summarized lessons, exercises and video tutorials, and Cisco IOS command guide.
- Identify the appropriate programming or scripting language that will be used in developing the application.
- Determine the mean assessment of respondents in terms of application design and application contents.
- Determine and assess the proposed system for user acceptance regarding efficiency, reliability, accuracy and user-friendliness.

#### E. Theoretical Framework

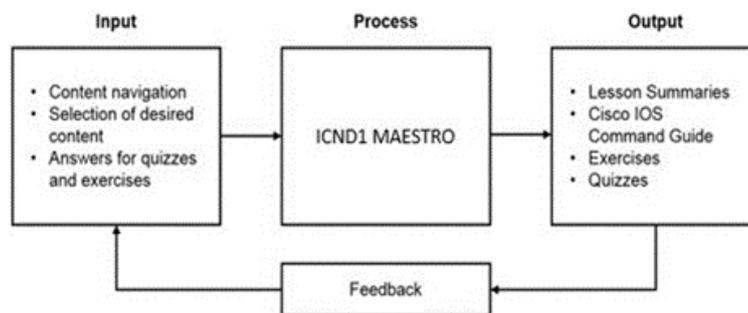


Figure 1.1: IPO Diagram of ICND2 MAESTRO Application

Usage of the software application is based on resource requests by the user and the application providing feedback in the form of informational content. The user navigates the interface to a particular page, like an IOS Command Guide or a lesson summary, for example. The software then returns text, images, and videos pertaining to that particular section.

Interactivity is introduced in the form of quizzes the application provides for the user. The application presents questions to which the user answers, and then provides feedback by showing the correct answer and its explanation.

#### F. Scope and Limitations

The software is designed to meet the requirements of students and instructors of AMA Colleges Makati, Inc. – Cisco Networking Academy, individuals preparing for ICND2 certification and networking professionals. It runs on Android OS which can be installed through a provided package. It contains a command guide for Cisco IOS, glossary of important terms, summarized lessons for all chapters covered in ICND2 accompanied by tutorial videos and exercises or quizzes that serve as end of chapter review.

Connectivity will be provided for AMACC website, Facebook and Twitter to provide a forum for user interaction, social networking, advertising and promotion.

The application will be as a simple tool for learners and beginners of Routing and Switching, and is

intended only to supplement and not replace existing reference and learning materials. It also serves as promotional material for the company for relatively low cost in manpower and expenses. It is not a full course reference for ICND2.

The summarized topics section as well as end of chapter assessments covers all 22 chapters in the two modules of ICND2. It consists of 11 chapters from Introduction to Networking and 11 chapters from Routing and Switching Essentials.

The IOS command guide section only contains and discusses essential IOS commands as well as the glossary of terms will only mention important terms that were covered in ICND2.

Facebook and Twitter integration is done through website links to be opened in the phone browser. No integration was done through the native Facebook and Twitter applications.

The application was developed for the latest version Android OS devices. Bug-free operation will not be guaranteed for users installing on lower versions of the software, or for those who use mobile devices which will not meet the requirements for the version used in development. The application will be tested on a newer generation of phones, complete compatibility with older hardware will not be guaranteed.

The software will not be released in the Google Play, but rather through direct contact with the academy. This is intended to minimize the possibility of piracy and the infringement of intellectual property through sharing in unauthorized channels. G. System Requirements Analysis

Below is a table for the recommended system requirements for the development and use of ICND2 MAESTRO.

**Table 1.1: Recommended System Requirements**

Requirements	Description
<b>Form Factor</b>	Tablet or smartphone
<b>CPU</b>	Dual-core
<b>Memory</b>	1 Gigabyte
<b>Display</b>	480x800
<b>OS</b>	Android 4.4 "KitKat"
<b>Languages</b>	JavaScript, HTML5 and CSS

## II. REVIEW OF LITERATURE

### A. Foreign Related Studies

[1] In a study directed by CourseSmart and Wakefield Research which concentrated on more than 500 presently selected understudies found that about the greater part of the understudies (98%) that claim a gadget have utilized it as a part of school and 90% of these understudies expressed that it profited them. These computerized gadgets likewise take into account on-the-run reference to data with 79% of undergrads reporting they have done a brisk hunt on a cell phone or tablet to check something just before an examination. Print course books are losing their notoriety of being imperative in which just 5% of understudies say reading material are the most critical thing in their pack and a greater part of understudies say they will probably bring a tablet (51%) than a print reading material (39%) to class.

[2] In this study led by Compuware utilizing on the web overviews of 3,500 worldwide respondents and pieces of the pie and versatile measurements for both Apple and Android from the year 2012, it demonstrated that an expansive part of the piece of the pie is being taken up by Android and that there is proceeding with pattern of the increment in the interest for cell phone applications and clients are leaning toward portable applications over web applications because of accommodation, execution and simple access of data. The concentrate likewise discovered that clients don't endure dangerous applications and anticipate that applications will perform speedier than sites.

[3] In this study, information were gathered about responsibility for gadgets among understudies utilizing an assorted specimen from a vast college. The study demonstrated that versatile learning in advanced education is on the ascent. Undergrads utilize their cell phones generally for self-coordinated casual adapting as opposed to in the formal scholastic setting, be that as it may, which makes it testing to get an exact picture of scholarly utilize. The outcomes demonstrate that learners require more access to scholarly cordial gadgets, for example, tablets, and extra support to coordinate portable advancements for learning.

[4] Cisco finished a study focused at comprehension the estimation of Cisco confirmation for bosses of Cisco guaranteed experts. Intended to quantify manager observations about workers with Cisco affirmations, the concentrate particularly centered around how bosses measure the estimation of Cisco guaranteed people in their business. Seventy five percent of 200 system administrators overviewed agreed that their Cisco confirmed workers are more proficient and more significant than their noncertified representatives.

[5] This study proves that Cisco certified employees are valuable assets to a company. With that in my mind, the ICND2 MAESTRO aims to assist in improving the performance of the Cisco certified employee by providing a mobile reference of Cisco IOS commands.

## B. Local Related Literatures

[6] This study is a versatile application in beta stage designed for learning and training. Courses accessible through Khawna are intended to prepare you on particular skillsets and information expected to prevail in a specific field. Khawna conquers any hindrance between hypothetical, scholastic educational modules and real industry application by giving you simple access to top to bottom data straight from master experts.

[7] This study uncovers that buyers in Metro Manila, Philippines, are driving the country's cell phone reception. It additionally demonstrates that the normal number of gadgets every shopper in Metro Manila has is at 4.6, which incorporates portable workstations, tablets, desktop PCs, keen TVs, and cell phones and most clients today may have a blend of each one of those. This study has additionally demonstrated that while there is development, there remains an immense lump of the Philippine populace as yet utilizing highlight telephones on account of moderateness. It is normal that the present rate cell phone clients in the capital are to increment once cell phone costs bring down further.

[8] This reference app on Philippine laws is a good reference for both lawyers and non-lawyers who need to look up law-related matters. There are thousands of Philippine laws, from the downright obscure to more controversial ones that make the headlines, such as the Tobacco Regulation Act of 2003.

[9] This study expresses that the headway of versatile innovation and their expanding reasonableness and wide ability, cell phones especially Android stages have changed from a method for correspondence to apparatuses for socialization, excitement, and learning. It has incredibly changed the working of the world, even the learning procedure. Learning through cell phones or Mobile Learning has turned out to be a piece of the educative procedure. Portable Learning or M-Learning is a kind of e-discovering that conveys instructive substance and learning bolster materials through remote specialized gadgets. In spite of the fact that the utilization of portable application innovation in learning is still new, there are an advancements with respect to the subject.

[10] This individual test examination analyst application was produced for understudies/experts get ready for Philippine Civil Service Exams. It contains each subject that is secured on the exam and gives an exquisite and instinctive realistic interface. This analyst application additionally gives critical thinking inquiries and its answers. The application can be utilized without the requirement for Internet, as Internet is required for the download of the application and for redesigns.

## A. Foreign Related Literatures

[11] This article talks about portable learning appropriation and application in the instruction business. It affirms there is noteworthy and distinctive employments of versatile learning in the training business. Portable learning is picking up its fame as it is acknowledged to be a successful method of conveying lesson and obtaining information as its primary qualities are whenever and wherever. Components have provoked numerous specialists to further research on versatile learning because of its potential in making educating and adapting more alluring and promising.

[12] This reference material contains a well ordered instructional exercise for Android application advancement for total amateurs, beginning from introducing Eclipse and the Android SDK, finding out about Android goals and exercises, giving thoughts to valuable applications, and distributing in the Android Market. It likewise addresses the Android working framework, equipment and security then clarifies tips for easy to understand designs, investigating and troubleshooting guidance, and offers approaches to enhance application execution. It additionally covers the Eclipse environment and SQLite.

[13] This reference material adopts a case by illustration strategy to figuring out how to program in Android. Rather than examining the specifics of android coding, it promptly challenges per user to begin programming by case. Beginning from straightforward applications and bit by bit developing to extensive ones, this book educates the essential and propel techniques for Android programming. It likewise contains instructional exercises for sound and video bolster in Android, including illustrations, organizing with site pages and web benefits, and putting away information with SQLite.

[14] The Cisco Networking Academy is a worldwide group connected by shared objectives and advancements. Schools, schools, colleges, and different elements in more than 160 nations partake in the program. Educators and understudies that are individuals from the foundation need to the majority of the online references gave. These online course materials incorporate course message and related intuitive media, Packet Tracer reproduction exercises, genuine gear labs, remote get to labs, and a wide range of sorts of tests. These materials give essential criticism to help the course advance of the understudy. The course materials envelops a wide scope of advances that encourage how individuals function, live, play, and learn by speaking with voice, video, and other information.

[15] The Cisco CCNA confirmation is the most surely understood PC organizing accreditation in the

business. In spite of the fact that enlistment in a Cisco Networking Academy would be the most ideal path for any individual who needs to find out about PC organizing, some of the individuals who take confirmation consider utilizing material effectively accessible from the Internet and a case of this is DansCourses.

[16] This article states that the country's mobile network operators are working to provide mobile education services to help the government to reach their goal faster. The Department of Education currently aims to provide education to at least one million Filipino youths in 2014. Three mobile applications were unveiled at the Mobile World Congress in Spain, which was held on February 24-27, 2014. The apps were created through a GSMA-facilitated partnership between DepEd and three of the country's largest telecommunications companies: Globe Telecom, Smart Communications, and Digital Mobile Philippines. These apps were an online portal that allows out-of-school youths to find training programs from Smart Communications, an interactive voice response (IVR) app that provides English lessons from Globe Telecom and an app that tracks student's progress as they take IVR courses from Digital Mobile Philippines.

[17] This article states that mobile devices will be better than paper since information can be both text based and non-text based. Many formal educators consider mobile devices as just a medium of entertainment, but for many students much of the learning occurs when they are having fun. Educators need to acknowledge change and that mobile devices or gadgets can be a tool for learning. Another barrier in the adoption of mobile devices in education are the parents for they simply do not trust mobile technology and their imagination is limited, that is the reason they do not use them. The last barrier stated in the article is the education system. The present philosophy of learning is no longer working for students and technology have changed.

[18] This article states that Google is committed to education so they are willing to assist higher education institutions in the Philippines who want to use tools or applications such as Gmail, Google Calendar, Google Talk, Google Drive and Google Sites for a more collaborative learning experience. Google Apps for Education has been adopted by institutions such as University of the Philippines, Ateneo de Manila University, De La Salle University, Adamson University and many more.

[19] Based on this article, one can sort to a variety of resources in line with training and preparation for the examination. One of which is to enroll in a Cisco bootcamp. For those who are not capable of paying for the bootcamp fee or do not have sufficient time to spend for such facility, they may very well prepare for the simulation exam by purchasing an applicable software program. Another option is to find a Cisco study guide that would suit your training.

### III. RESEARCH METHODOLOGY

#### A. Research Design

The proponent of this study will be employing the descriptive research method to assess the improvement of the proposed system when compared to an existing one. Descriptive research (also termed as statistical research) employs statistics, surveys, questionnaires and other methods of numerical information to derive an accurate understanding of the effect of the study.

The research will be performed to satisfy the objective of the proponent to improve language learning through the use of a software application as a supplement to the traditional language learning method. Thus, it is required to accurately compare the effect of the proposed software system when compared to a traditional system. It necessitated carrying out a survey across samples of varying experience and background to determine if significant positive results can be obtained through the use of the proposed software system, therefore meeting its objective as a tool that can be utilized by the beneficiary.

#### B. Respondents of the Study

The chosen descriptive method of research will require a wide amount of feedback from multiple samples to obtain data for a definitive conclusion. To meet this objective, a survey was conducted among potential users of the software, of varying degrees of expertise and background, in order to collect sample data that can be used to judge the proposed software's benefits over existing resources. Statistical analysis will be performed on the data to obtain the summarized result of the survey.

The target respondents of the study will be the students and instructors of the beneficiary: AMA Colleges Makati, Inc. – Cisco Networking Academy. The category of respondents were selected because they will be the primary users of the proposed software system. The table below shows the numerical data of the respondents. The total participants of the survey will be 50 individuals, where 70% are students, 30% are instructors.

Respondent	Frequency	Percent age
Students	35	70%

Instructors	15	30%
-------------	----	-----

**Table 3.3:** Respondent, Frequency and Percentage

#### IV. FIGURES AND TABLES

##### A. Data Collection Methods

The survey was performed in the premises of the AMA Colleges Makati, Inc.. Students taking ICND2 and instructors were selected to be sampled. Opportunity sampling was employed for the selection of student classes, which involved choosing the current student classes that are already taking ICND2.

Before the survey, a basic explanation of the research being performed, the respondents were given 15 minutes to assess the proposed software prototype at their own leisure, where they were allowed to use it unguided. Questionnaires were handed out and the respondents were given time to answer.

After the collection of the questionnaires, the data collected underwent statistical treatment. The results were then assessed and conclusions were drawn with reference to the objectives of the study.

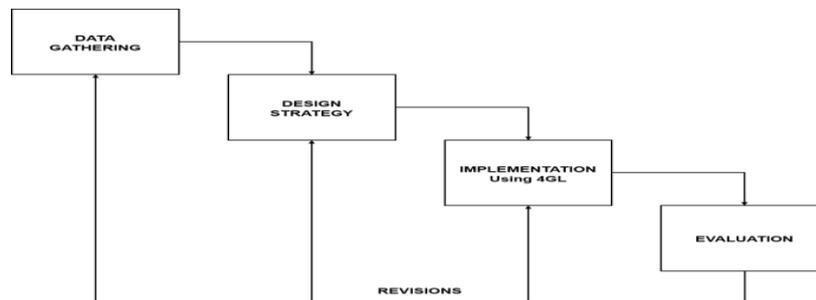
##### B. Sampling Techniques

The proponent of the study used quota sampling in conducting the research. Quota sampling is a type of non-profitability sample in which the researcher selects people according to some fixed quota. According to businessdictionary.com

“Quota sampling is a sampling method of gathering representative individuals chosen out of a specific subgroup.” For example, a researcher might ask for a sample of 100 females, or 100 individuals between the ages of 20-30. The proponent of the study has decided to have 50 respondents from instructors and students taking up ICND2. In statistics, a population of 50 will be enough to gather the mean assessment of the respondents. Through the use of quota sampling, it will allow the samples to be completed in a short amount of time which is best for an independent study which requires no follow ups.

##### C. Software Methodology

The researcher used the Fourth Generation Technique of Software Development, also called the 4GT paradigm. The process starts with the Data Gathering stage, where the customer lays out the requirements for the software system. The Design Strategy stage then takes place, where the developer takes those requirements and designs an application to meet those goals. Actual coding is performed in a 4GL, or 4th Generation Language, whose features include automatic generation of code based on programmer requirements, easily modifiable features, and a visually-oriented approach to design. Finally, the completed software is evaluated and tested.



**Figure 3.2:** Fourth Generation Technique (4GT)

The benefits of 4GT include being flexible, easily accommodating change or modifications, and the lack of restriction in the development process in terms of being able to go back and redo any step that may require revision.

##### D. Statistical Treatment

The proponent of the study used the Likert scale to compare the data gathered to its corresponding scale. According to Wikipedia, “Likert scale is a psychometric scale commonly used in questionnaires, and is the most widely used scale in survey research.” Respondents specified their level of agreement when responding to a questionnaire item.

A. Assessment of the Respondents in Terms of Efficiency, Reliability, Accuracy, and User-Friendliness

The data presented in this chapter is derived from a survey that was conducted in the premises of the AMA Colleges Makati, Inc.. Samples were picked out in two groups using the opportunity sampling method. One group is made up of instructors, while the other group is made up of students who have taken or is currently taking ICND2 subjects. The breakdown of the answers to the questionnaire per sample group and the

corresponding statistical analysis is presented below. Where:

$\alpha$  = Level of significance FD

= Frequency Distribution

% = Percentage

Df = Degree of freedom Tv

= Critical Tabular value t = t value

H0 = Null hypothesis

W.Mean = Weighted mean

Question	Students		Instructors	
	W.Mean	Interpretation	W.Mean	Interpretation
There were no slowdowns in the software.	4.14	Agree	4.47	Strongly Agree
The application reference is faster than the book reference.	4.60	Strongly Agree	4.93	Strongly Agree
The quizzes and video content were delivered without delay.	4.43	Strongly Agree	4.73	Strongly Agree
Overall W. Mean	4.39	Strongly Agree	4.71	Strongly Agree

**Table 4.4:** The Respondents' Total Assessment in Terms of Efficiency

The calculation of the weighted mean shows that the students and the instructors rated the software highly (strongly agree) in each question answered except on there were no slowdowns in the software in which the students rated it high enough (agree). The overall weighted mean also shows a high rating from both groups of respondents in terms of efficiency.

Question	Students		Instructors	
	W.Mean	Interpretation	W.Mean	Interpretation
The program did not crash.	4.83	Strongly Agree	4.67	Strongly Agree
The quizzes did not fail to load.	4.77	Strongly Agree	4.93	Strongly Agree
The video tutorials did not fail to play.	4.74	Strongly Agree	4.93	Strongly Agree
Overall W. Mean	4.78	Strongly Agree	4.84	Strongly Agree

**Table 4.5:** The Respondents' Total Assessment in Terms of Reliability

The calculation of the weighted mean shows that the students and the instructors rated the software highly (strongly agree) in each question answered. The overall weighted mean also shows a high rating from both groups of respondents in terms of reliability.

Question	Students		Instructors	
	W.Mean	Interpretation	W.Mean	Interpretation
The course content is accurate and without mistakes.	4.69	Strongly Agree	4.67	Strongly Agree
The quizzes are accurate and without mistakes.	4.80	Strongly Agree	4.73	Strongly Agree
The video content is accurate and without mistakes.	4.74	Strongly Agree	4.60	Strongly Agree
Overall W. Mean	4.74	Strongly Agree	4.67	Strongly Agree

**Table 4.6:** The Respondents' Total Assessment in Terms of Accuracy

The calculation of the weighted mean shows that the students and the Instructors rated the software highly (strongly agree) in each question answered. The overall weighted mean also shows a high rating from both groups of respondents in terms of accuracy.

Question	Students		Instructors	
	W.Mean	Interpretation	W.Mean	Interpretation
The application interface is easy to understand for a first time user.	4.80	Strongly Agree	4.67	Strongly Agree
It is easy to find the content that the user requires.	4.63	Strongly Agree	4.67	Strongly Agree
The layout of the content is neat and not confusing.	4.71	Strongly Agree	4.80	Strongly Agree
Overall W. Mean	4.71	Strongly Agree	4.71	Strongly Agree

**Table 4.7:** The Respondents’ Total Assessment in Terms User Friendliness

The calculation of the weighted mean shows that the students and the instructors rated the software highly (strongly agree) in each question answered. The overall weighted mean also shows a high rating from both groups of respondents

Respondents	W.Mean	Standard Deviation	Computed T-Value	Remarks
Students	4.39	0.75	-1.72	t < Tv, thus accept H0
Instructors	4.71	0.53		

\*df = 48 ; Tv = 2.0106 ; α = 0.05

**Table 4.8:** T-test for a Significant Difference in the Respondents’ Assessment in Terms of Efficiency

Shown in the table above are the results of a two tailed t-test for a significant difference in the answers of the two groups of respondents with a degree of freedom of 48 and a 0.05 level of significance, resulting in a tabular value of 1.72. Because the computed t-value does not exceed the critical table value, the null hypothesis is accepted and it is concluded that there is no significant difference between the assessments of the two groups of respondents in terms of efficiency.

Respondents	W.Mean	Standard Deviation	Computed T-Value	Remarks
Students	4.78	0.45	-0.52	t < Tv, thus accept H0
Instructors	4.84	0.37		

\*df = 48 ; Tv = 2.0106 ; α = 0.05

**Table 4.9:** T-test for a Significant Difference in the Respondents’ Assessment in Terms of Reliability

Shown in the table above are the results of a two-tailed t-test for a significant difference in the answers of the two groups of respondents with a degree of freedom of 48 and a 0.05 level of significance, resulting in a tabular value of -0.52. Because the computed t-value does not exceed the critical table value, the null hypothesis is accepted and it is concluded that there is no significant difference between the assessments of the two groups of respondents in terms of reliability.

Respondents	W.Mean	Standard Deviation	Computed T-Value	Remarks
Students	4.74	0.47	0.53	t < Tv, thus accept H0
Instructors	4.67	0.47		

\*df = 48 ; Tv = 2.0106 ; α = 0.05

**Table 4.11:** T-test for a Significant Difference in the Respondents’ Assessment in Terms of Accuracy

Shown in the table above are the results of a two tailed t-test for a significant difference in the answers of the two groups of respondents with a degree of freedom of 48 and a 0.05 level of significance, resulting in a tabular value of 0.53. Because the computed t-value does not exceed the critical table value, the null hypothesis is accepted and it is concluded that there is no significant difference between the assessments of the two groups of respondents in terms of accuracy.

Respondents	W.Mean	Standard Deviation	Computed T-Value	Remarks
Students	4.71	0.75	0.02	t < Tv, thus accept H0
Instructors	4.71	0.45		

\*df = 48 ; Tv = 2.0106 ;  $\alpha = 0.05$

**Table 4.8:** T-test for a Significant Difference in the Respondents' Assessment in Terms of User-Friendliness

Shown in the table above are the results of a two tailed t-test for a significant difference in the answers of the two groups of respondents with a degree of freedom of 48 and a 0.05 level of significance, resulting in a tabular value of 0.02. Because the computed t-value does not exceed the critical table value, the null hypothesis is accepted and it is concluded that there is no significant difference between the assessments of the two groups of respondents in terms of user friendliness.

## V. CONCLUSION

### A. Summary

The proposed application was developed with the goal of bringing a portable ICND2 reference and command guide to one's fingertips. With this in mind, the main goals of ICND2 MAESTRO is to be faster and more easily accessible to a student, teacher or a networking professional while remaining as accurate and as truthful to the subject matter as a textbook or online reference. It should bring together the efficiency and user-friendliness of a well-designed software application with the comprehensiveness and accuracy of a textbook or online reference while remaining as error-free as possible. This research was performed to evaluate the achievement of those goals. Listed below is the summary of the interpreted data: 1. The respondents' assessment of the software based on the established criteria: • Efficiency – Both the groups of student and teacher respondents strongly agreed that the software is faster than o materials and offered information readily on user demand. • Reliability – Both the groups of student and teacher respondents strongly agreed that the software is error-free and devoid of any problems for the user. • Accuracy – Both the groups of student and teacher respondents strongly agreed that the software maintains a high level of accuracy of information provided. • User-Friendliness – Both the groups of student and teacher respondents strongly agreed that the software is user friendly and easily accessible by any person, regardless of background. 2. Significant difference in the assessment of the two groups of respondents: there was no significant difference observed in the assessment of the two groups of respondents. Both groups rated the software highly in all categories: Efficiency, Reliability, Accuracy, and User Friendliness.

Conclusion Based on the interpretation of the statistical data derived from the evaluation scores of the respondents, the following are the conclusions of the researcher of this study:

1. The software application scored highly on all categories set out for its evaluation. It can be concluded that the software meets the goals of being efficient, reliable, and user-friendly, while maintaining a high level of accuracy in the information presented.
2. Where was no significant difference between the results of the evaluations of the two groups of respondents, thus it can also be concluded that the software performs in such a way that satisfies the needs and expectations of the user, regardless of background.
3. Because of the evaluated strengths of the software application (efficiency and user-friendliness while maintaining reliability and accuracy), ICND2 MAESTRO is shown to be a viable and beneficial supplement or alternative to classroom tools.
4. Acceptance and implementation of the highly evaluated software application by the beneficiary will be a significant step in modernizing their ICND2 curriculum. Not only will it serve as a helpful tool for students, but it will also provide a large avenue for marketing though the use of its social media functions.

### B. Recommendation

The following are recommendations by the researcher for those who are interested in continuing in the same direction of study:

1. The interface can be improved with the inclusion of themes that would cater to a specific audience, such as different color schemes and designs.
2. More variety of quizzes and exercises can be included, with each one a potential creative use of Android functions, such as Drag and Drop items for quizzes and Packet Tracer Mobile activities for exercises.
3. A method of keeping track of scores for the quizzes is recommended to be added in any future development of the software in order for the user to be evaluated and his or her proficiency tracked and graded.
4. An exam page in which the user could give a specified number of questions and then be given random questions for simulating a certification exam.

5. Better integration with Facebook and Twitter to supply even more personalized sharing and update options on both systems.

### REFERENCES

- [1] Lepi, K. (2012). 11 Real Ways Technology Is Affecting Education Right Now. Retrieved from <http://www.education.com/reference/article/whatimpacttechnology-learning/>.
- [2] Compuware. (2013). Mobile Apps: What Consumers Really Need and Want. Retrieved from [http://www.bitpipe.com/detail/RES/1381925362\\_194.html](http://www.bitpipe.com/detail/RES/1381925362_194.html).
- [3] Chen B. & Denoyelles A. (2013). Exploring Students' Mobile Learning Practices in Higher Education. Retrieved from <http://www.educase.edu/ero/article/exploring-studentsmobile-learning-practices-higher-education>.
- [4] Cisco Systems (2013). What Is the Value of a Cisco Certified Employee?. Retrieved from <https://learningnetwork.cisco.com/blogs/certifications/2014/02/04/6-reasons-employers-value-cisco-certifications>.
- [5] Cavus, N. and Al-Momani M. (2011). Mobile System for Flexible Education. *Procedia – Computer Sciece*, 3(2011), 1475-1479.
- [6] Orange Apps (2014). Khawna – It Starts with You!. Retrieved from [www.khawna.com](http://www.khawna.com)
- [7] Magdirila P. (2013). Philippine Smartphone Adoption is Growing, But Users Still Stick to Basic Features. Retrieved from <http://www.techinasia.com/philippine-smartphoneadoption-growing-users-stick-basic-features>.
- [8] Juan J. (2011). LawJuan: Thousands of Philippine Laws in your Pocket. Retrieved from [www.itunes.apple.com/ph/app/lawjuan/id431473607?mt=8](http://www.itunes.apple.com/ph/app/lawjuan/id431473607?mt=8).
- [9] Cabanban C. (2013). Development of Mobile Learning Using Android Platform. Don Mariano Marcos Memorial State University-South La Union Campus Agoo, La Union, Philippines.
- [10] Ampoloquio J. (2013). Philippines Civil Service Exam. Retrieved from <https://play.google.com/store/apps/details?id=com.civilserviceexam>.
- [11] Bidin, S. and Ziden A. (2012). Adoption and Application of Mobile Learning in the Education Industry. *Procedia - Social and Behavioral Sciences*, 90(2013), 720-779.
- [12] Burd B. (2011). *Android Application Development Allin-One For Dummies*. USA: For Dummies.
- [13] Burnette, E. (2010). *Hello, Android: Introducing Google's Mobile Development Platform*. USA: Pragmatic Bookshelf.
- [14] Cisco Networking Academy. (2013). Cisco Certified Network Associate Routing and Switching 1-4 Course Reference. Retrieved from [www.netacad.com](http://www.netacad.com).
- [15] Alberghetti A. (2014). DansCourses for ICND2 1 - 4. Retrieved from [www.danscourses.com](http://www.danscourses.com).
- [16] Omang J. (2014). Educational Apps Aim to Make Learning More Fun in the Philippines. Retrieved from [www.truelogic.com.ph/blog/local-news/educational-appsaim-make-learning-fun-philippines](http://www.truelogic.com.ph/blog/local-news/educational-appsaim-make-learning-fun-philippines).
- [17] Gadgets Team. (2013). PH Universities “go Google” to Improve Education System. Retrieved from <http://www.gadgets magazine.com.ph/news/phuniversities-google-to-improve-education-system.html>.
- [18] Magtira M.C. (2013). Diwa Embarks on Mobile Elearning with Tablet PC. Retrieved from [www.interaksyon.com/infotech/diwa-embarks-on-mobileelearning-with-tablet-pc](http://www.interaksyon.com/infotech/diwa-embarks-on-mobileelearning-with-tablet-pc).
- [19] Espiritu, J.L. (2009) Opportunities and Barriers for Mobile Learning in the Philippines.
- [20] Rivan IT. (2011). Cisco Training Options. Retrieved from [www.ciscobootcamp.net/category/networkingtips/page/48/](http://www.ciscobootcamp.net/category/networkingtips/page/48/).