

Information & Communications Technology (ICT) Infrastructure Assessment of Pangasinan State University, Open University Systems

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Abstract – Information and Communications Technology assessment is important before the implementations of several IT-related programs such as the development and proposed eLearning Framework. The main objective of this study is to determine Information & Communications Technology (ICT) Infrastructure’s Level of Implementation as Perceived by the faculty and students based on the following criteria: Computers; Network and Internet; Display Screen and Peripherals; Software and Information System. Master students with a background in Information Technology and all academic staff of Open University Systems are the respondents. All academic staff and selected students with Information Technology background are invited to participate in the survey by answering an online form. Based on the result, ICT Infrastructure of PSU Open University Systems has moderately implemented and needs an improvement-based result. It is therefore concluded that ICT Infrastructure is moderately implemented except for Network and Internet which is an external factor that is uncontrollable. It is recommended that a follow-up study should be conducted to determine the improvement in the future.

Keywords – ICT Infrastructure, Information and Communications Technology.

INTRODUCTION

In the past 15 years, the ICT revolution has driven global development in an unprecedented way. There are Technological progress, infrastructure deployment, and falling prices have brought unexpected growth in ICT access and connectivity to billions of people around the world. According to the “The world in 2015” by the *Telecommunication Development Bureau*, the growth of mobile cellular subscription worldwide was blown to 7 billion from less than 1 billion in the year 2000. Globally 3.2 billion people are using the Internet of which 2 billion are from developing countries [1]. This shows that ICT plays a major role in achieving goals that include the education sector. Technology pressured new productivity and service demands as well as expectations [2] in education and the world. Thus, the Pangasinan State University, Open University Systems is open to assess the current ICT Infrastructure as a basis for future decision making [3] anchored with the mission of globalization and the information and communication revolution [2], [4].

Information and Communication Technology Infrastructure is vital in embracing the new methods of learning. The Open University Systems should be ready

before adopting the fully online learning mode. The institution should be E-Ready. E-readiness is generally defined as the degree to which an institution is prepared to participate in digital learning. The Pangasinan State University, Open University Systems has the vision to become a premier state university in 2020 [5], this Vision was driven by the top management by including ICT and focus on ICT based learning environment based on ICT and technology integration. The administration is aware and well informed [5].

Pangasinan State University is one of the state university in the Philippines that has Open University Systems, and despite the presence of the OUS in the institution, there lacks a pure online instruction done by the institution’s component [6]. The institution is currently using GSuite applications which as a bridging application while implementing the full online platform.

OBJECTIVES OF THE STUDY

The main objective of this study is to determine Information & Communications Technology (ICT) Infrastructure’s Level of Implementation as Perceived by the faculty and students based on the following criteria: (1) Computers, (2) Network and Internet, (3)

Display Screen and Peripherals (4) Software and Information System [7]. The Rubric For Assessing ICT Infrastructure In Malaysia Higher Education was adopted in this study to assess the ICT Infrastructure of the PSU Open University Systems.

MATERIALS AND METHODS

The target respondents of this study are selected Master students with a background in Information Technology; another target is the professors of Open University Systems. All professors and selected students are invited to participate in the survey by answering an online form which was distributed privately thru invitation. A purposive and convenience sampling was used in order to gather the respondents. The researcher shortens the link using bit.ly.

The survey questionnaire was floated using Google Forms, and extracted in CSV format for simple analyzation. The survey questionnaire was adopted from the Rubric For Assessing ICT Infrastructure In Malaysia Higher Education that assesses the ICT Infrastructure of higher education. [7].

Statistical Treatment Used

Frequency and Percentage were used. Average weighted mean was also used in determining the interpretation based on the 3-point Likert rating scale used.

Table 1: Rating Scale

Range	Equivalent
1.00 – 1.66	Low
1.67 – 2.32	Moderate
2.33 – 3.00	High

In order to interpret the results, the researcher uses Low, Moderate and High interpretation based on the rubrics [7] for ICT infrastructure.

RESULTS AND DISCUSSION

The results of the study are divided into two summaries, first is the response from the faculty with ICT expertise, second is the response from the student with ICT expertise.

Table 2: Response to Faculty-Experts

Criteria	Indicators	Low		Moderate		High		AWM	Implementation Level
Computers	Ratio of all computers to students	2	17%	8	67%	2	17%	2.00	Moderate
	Ratio of Internet-enabled Computers to students	3	25%	9	75%	0	0%	1.75	Moderate
	Ratio of all computers to academic staff	2	17%	7	58%	3	25%	2.08	Moderate
	Ratio of Internet-enabled computers to academic staff	6	50%	6	50%	0	0%	1.50	Low
Network and Internet	Network Specification	7	58%	5	42%	0	0%	1.42	Low
	Internet Bandwidth	9	75%	3	25%	0	0%	1.25	Low
	Wireless Coverage	8	67%	4	33%	0	0%	1.33	Low
	Network/Internet Performance	9	75%	3	25%	0	0%	1.25	Low
Display Screen and Peripherals	Classrooms equipped with display screen technologies	4	33%	7	58%	1	8%	1.75	Moderate
	Peripherals	8	67%	4	33%	0	0%	1.33	Low
Software and Information Systems	Application Software	2	17%	8	67%	2	17%	2.00	Moderate
	Learning Platforms	5	42%	7	58%	0	0%	1.58	Low
	Academic/Student Information Systems	8	67%	3	25%	1	8%	1.42	Low

Based on the response of the faculty-experts, Computers have a moderate ratio except for the Internet-enabled computers to academic staff. In the case of PSU Open University Systems, one Computer laboratory is utilized for the Computer Courses which can accommodate up to 30 students. A ratio of 1:1 is

not possible on the current numbers of an enrollee for SY 2018-2019 where there are six classes with around 30 students in each class. Thus, students are advised to bring a laptop during classes.

Network and Internet is relatively a problem in the Philippines because of lack of availability of the

network. Faculty-experts shows a nonsatisfying answer of Low in all indicators under Network and Internet. Internet Bandwidth and Network/Internet Performance obtained the lowest weighted mean of 1.25 which is Low. The computer laboratory is currently equipped with an internet connection that may not accommodate some clients if connected simultaneously. Based on the respond of the Internet Administrator, the computer laboratory is connected using a DSL from an ISP due to the absence of other option [8]. In all classroom, Wifi is unavailable.

Under the criteria Display Screen and Peripherals, the Faculty-experts answered Moderate for Classroom equipped with display screen technologies. Most of the classroom is equipped with LED Projectors and fully airconditioned. There are some instances where classes are simultaneously conducted that there are isolated cases that LED Projectors are unavailable.

Peripherals obtained a low implementation due to the absence of computer Units in each classroom. The faculty in charge are the one bringing their laptop and mobile device to be used.

Under software and Information System, Application software obtains a moderate implementation, since all of the computers in the laboratory are installed with open source Office applications and productivity software, despite the presence of the software, some faculty is not familiar with open source office productivity tools. Learning platform and Student Information Systems obtain a Low implementation level. As of the moment, the PSU Open University Systems is still using Google Classroom as part of the blended learning approach, which may not be usable in the OUS perspective. Information Management System is not yet implemented.

Table 3: Responses of Students-Experts

Criteria	Indicators	Low		Moderate		High		AWM	Implementation Level
Computers	Ratio of all computers to students	2	17%	7	58%	3	25%	2.08	Moderate
	Ratio of Internet-enabled Computers to students	2	17%	7	58%	3	25%	2.08	Moderate
	Ratio of all computers to academic staff	1	8%	6	50%	5	42%	2.33	High
	Ratio of Internet-enabled computers to academic staff	2	17%	6	50%	4	33%	2.17	Moderate
Network and Internet	Network Specification	2	17%	7	58%	3	25%	2.08	Moderate
	Internet Bandwidth	6	50%	6	50%	0	0%	1.50	Low
	Wireless Coverage	7	58%	5	42%	0	0%	1.42	Low
	Network/Internet Performance	5	42%	7	58%	0	0%	1.58	Low
Display Screen and peripherals	Classrooms equipped with display screen technologies	2	17%	6	50%	4	33%	2.17	Moderate
	Peripherals	6	50%	6	50%	0	0%	1.50	Low
Software and Information Systems	Application Software	1	8%	6	50%	5	42%	2.33	High
	Learning Platforms	4	33%	8	67%	0	0%	1.67	Moderate
	Academic/Student Information Systems	8	67%	4	33%	0	0%	1.33	Low

Based on the response of the students-experts, Computers have a moderate ratio except for the computers to academic staff. Students may be unaware that the laptop being used by the faculty members are not issued by the organization.

Student-experts also shows a nonsatisfying answer of Low in all indicators under Network and Internet except for Network Specification. The computer laboratory is currently equipped with an internet connection that may not accommodate some

clients if connected simultaneously. Wifi is unavailable in all of the classroom and students are currently using a personal hotspot or personal internet connection during classes.

Under the criteria Display Screen and Peripherals, the students-experts answered Moderate for Classroom equipped with display screen technologies. Peripherals obtained a low implementation due to the absence of computer Units in each classroom.

Under software and Information System, Application software obtains a high implementation level. Learning platform obtains a moderate implementation level due to the use of Google

Classroom. Lastly, the Student Information System obtained a Low Implementation level because Information Management System is not yet implemented.

Table 4: Overall Response from Student-Experts and Faculty-Experts

Criteria	Indicators	Low		Moderate		High		AWM	Implementation Level
Computers	Ratio of all computers to students	5	21%	19	79%	5	21%	2.00	Moderate
	Ratio of Internet-enabled Computers to students	6	25%	20	83%	3	13%	1.90	Moderate
	Ratio of all computers to academic staff	4	17%	17	71%	8	33%	2.14	Moderate
	Ratio of Internet-enabled computers to academic staff	9	38%	16	67%	4	17%	1.83	Moderate
	Average Weighted Mean								1.97
Network and Internet	Network Specification	11	46%	15	63%	3	13%	1.72	Moderate
	Internet Bandwidth	17	71%	12	50%	0	0%	1.41	Low
	Wireless Coverage	18	75%	11	46%	0	0%	1.38	Low
	Network/Internet Performance	16	67%	13	54%	0	0%	1.45	Low
	Average Weighted Mean								1.49
Display Screen and peripherals	Classrooms equipped with display screen technologies	7	29%	17	71%	5	21%	1.93	Moderate
	Peripherals	15	63%	14	58%	0	0%	1.48	Low
	Average Weighted Mean								1.71
Software and Information Systems	Application Software	4	17%	18	75%	7	29%	2.10	Moderate
	Learning Platforms	10	42%	19	79%	0	0%	1.66	Low
	Academic/Student Information Systems	19	79%	9	38%	1	4%	1.38	Low
	Average Weighted Mean								1.71

Using the performance indicators, the findings from the case study are described based on low, moderate and high levels of ICT implementation based on four criteria.

Computers (Moderately Implemented)

A computer is a fundamental part in eLearning, it makes the work easier and using computer software, a student can perform the project or work spending less energy-time but more realistic [9]. The availability of computers to students and academic staff is moderately implemented, and it has obtained the highest weighted mean compared to other criteria. The ratios of computers to students and Internet-connected computers to students are around 1:6. Many of the computers are also quite new, and speed is reasonable. The policies on computer use for students and staff are generally permissive, where they allow the campus community to utilize the campus ICT facilities and resources for

educational reasons. As for the academic staff, there is a complete number of a desktop computer for each academic staff. The desktop computer is not shared between groups since most of the faculty and staff bring own laptop for personal and business use. Personal Notebook computers are frequently used by academic staff for delivery of lectures and student presentations.

Network and Internet (Lowly Implemented)

The campus network in the institution is based upon a mixture of 10Mbps DSL connection and LTE connection with around 3Mbps. All computers are networked in the computer laboratory, but WIFI is disabled. To access the Internet, one must proceed to the Computer Laboratory. The campus uses DSL from PLDT and LTE from Globe Telecom. From observations and interviews with academic staff and students, access to the Internet is very slow unreliability is a frequent problem. As for the wireless network, there

is no coverage whatsoever, and student and staff bring own internet connection for mobility. Internet connection plays a big role in distance education where students not physically present but interacting with the instructor and the educational process remotely [10]. Internet connection is an external which is uncontrollable on the side of the PSU Open University Systems due to the low speed of Internet Connection in the area. The problem is not only in the area but in the whole country [11].

Display Screen and Peripherals (Moderately Implemented)

The display screen technologies used are by large LCD projectors. Multimedia delivery of instruction has enhanced the students' learning achievement [12]. The LCD projectors are not permanently mounted in classrooms. They are portable with one LCD projector is shared by three classes. With this reasonable access to this ICT display screen technology, an increasing number of academic staff have started to use presentation software with display screen technology, and no one is using a whiteboard. As for IT peripherals, students and academic staff have no access to a variety of peripherals such as printers, scanners, and other input devices.

Software and Information Systems (Moderately Implemented)

The application software available to students and academic staff is office applications that are open source due to a limited number of Microsoft Office License. The online learning platform Google Classroom which might not be fully functional for Open University Systems perspective [6], [13], [14]. The utilization rate by academic staff and students is still relatively low at approximately forty percent. Moodle, as one of the best LMS [15], should be adopted by the PSU Open University Systems. As for academic information system, Open University Systems is not yet automated when it comes to enrolment and student information system. The result of this study is essential in order to maximized the instructional competency of the teachers in the Open University System that could contribute in opening other programs [16], [17].

CONCLUSION

It is therefore concluded that ICT Infrastructure is moderately implemented except for Network and Internet which is an external factor that is uncontrollable. The conclusion of this study shows that

Open University Systems needs improvement in its Information & Communications Technology (ICT) Infrastructure. Though there are external factors which are uncontrollable, the University may invest in the internal factors to be ready.

RECOMMENDATION

It is recommended that the administrators may add computers and additional separate Computer Laboratory to accommodate the growing need of students and academic staff. It is also recommended that more MS Office licenses can be purchased since it is the most familiar productivity tools.

Since the internet is still a problem due to unavailability, multiple internet connections might bridge the gap in order to accommodate the number of academic staff and students. Wifi can be enabled for academic staff in order to communicate with students without interruptions. The Internet Administrator and Online Administrator can collaborate to add security features in controlling the network to maximize the usage.

Display Screen is not an issue, but peripherals can be purchased and provide access to the student. Access to peripherals can be managed by the Internet Administrator and can be added as an Income Generating Project of the Open University Systems for sustainability.

Application Software is available in the Computer laboratory, while learning platforms and information system is still lacking. It is recommended that PSU Open University System should adopt Moodle as a fully functional learning management system for distance education. It is also recommended that the Student Information System should accommodate the OUS students as soon as possible in order to reduce the clerical workload of non-academic staff. Lastly, it is recommended that this study should be conducted again in the next school year to record the improvement in the infrastructure of PSU Open University Systems.

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