

# An Evaluation of the Opportunities and Challenges of Wi-Fi Adoption in Malaysian Institutions

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**Abstract**—There have been many variations of technologies that helped educators in teaching & learning. From the past research it is evident that Information Technology significantly increases student participation and interactivity in the classrooms. This research started with a aim to find whether adoption of Wi-Fi environment by Malaysian Higher Educational Institutions (HEI) can benefit students and staff equally. The study was carried out in HEI's of Klang Valley, Malaysia and the data is gathered through paper based surveys. A sample size of 237 units were randomly selected from 5 higher educational institutions in the Klang Valley using the Stratified Random sampling method and from the analysis of the data, it was found that the implementation of wireless technologies in HEIs have created lot of opportunities and also challenges.

**Keywords**—Wired Technologies, Wireless Classroom, HEI, Dense User Environment.

## I. INTRODUCTION

WIRED technologies have been widely used by educators, school administrators, students in higher educational institution to help them in teaching and learning for the last several decades and they have enjoyed the benefits of wired technology. However, it cannot provide anytime, anywhere functionality, a benefit now offered by wireless technologies. In the 21<sup>st</sup> century, higher educational institutions are moving towards wireless technologies as the use of these technologies can overcome wired technology's limitations with its educational flexibility. Wireless classrooms are flexible because students are able to arrange their course works without any physical connection [1]. In common, computer classrooms with fixed PCs and network infrastructure often hinder students from flexibly and fluently shifting between computer-embedded learning and other learning activities.

Wireless technologies have already been deployed in colleges and universities; it provides unique opportunities for educators to deliver educational materials efficiently, and to support the social process of student learning. Wireless computing is becoming the focus of learning environments in higher educational institutions. Wireless communications, a

rich data environment providing for information infrastructure is being developed in many developing nations. The use of wireless technologies is increasingly widespread, especially among Asian countries such as China, India and Malaysia. Many Malaysian higher education institutions are already equipped to provide wireless access; with many students and staff using notebook computers in class rooms. This encouraged the authors to study the opportunities and the challenges of wireless environment in Malaysian Higher learning institutions and based on findings, recommended that all the HEI's in Malaysia should encourage Wi-Fi as there were more opportunities compared to few challenges, which can be addressed easily.

## II. LITERATURE REVIEW

### A. Advantages of Implementing Wireless Technology

Wireless systems escape the wired network's limitations and offer competitive advantages in terms of cost, flexibility, and easy of use.

- **Flexibility:** wireless Laptops can be used within existing rooms, it does not require special furniture or space, and more than twenty laptops can be accommodated in a classroom. Wireless can provide network access to locations where wiring is impossible such as older buildings which have historic value; Wireless Laptops can create one-to-one learning opportunities that traditional method of wired computers can't provide; Easy to be moved anywhere in the building [2].
- **Scalability:** wireless laptops are simple, comfortable, and reliable; There is almost no setup time for wireless laptops, they can be used without connect and without moving to a fixed computer workstation, teachers and students can focus on learning, not on hardware [3].
- **Low cost.** The technology is good for the bottom line; Wireless technology's installation is usually cheaper than standard wired network's installation. In older buildings, wireless access costs only a fifth of wired network installation in an institution [3]. By

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using cost effective wireless technology, higher educational institutions can provide a comprehensive computing and broadband networking solution while minimizing technology deployment costs and reducing administrative expenses. Wireless classrooms can provide access to network in every classroom with little or no renovation cost [4].

- Anytime, anywhere use. Students can access to the Internet with wireless laptops or PDAs from just about anywhere in campus [5]. Laptops are fairly lightweight; they can easily be moved to wherever student learning is taking place - while PDAs fit inside your pocket, both students and teachers being comfortable.

Wireless technology not only brings benefits to students' learning but also brings beneficial to teachers. Zardoya [6] states that most teachers found the Pocket Books are very useful; Teachers are likely to see increased student motivation and participation, better retention and achievement in the wireless classroom (Mathews, 2005).

#### *B. Unique Challenges for Wi-Fi Technology in the Campus Environment*

##### *1. Dense User environments throughout the Campus*

In Wi-Fi networks, higher educational institutions contend for access to a shared medium. As the number of active users increases, performance typically degrades due to increased collision rates among clients seeking access. This poses a serious challenge for the university with a number of locations where the user population is dense, such as classrooms, libraries, labs, and other common areas.

##### *2. Expensive Campus with Dynamic User Requirements*

Usually higher educational institution's campuses are large sites, consisting of dozens of buildings lie across hundreds of acres. Wireless LAN deployments are typically phased in over time, necessitating on going changes to the network design. The wireless deployment may also be modified as higher user densities are experienced, or new applications are deployed. These changes to the wireless LAN design are extremely complicated to plan, with potential ripple effects on the existing deployment, due to the limited number of non-overlapping channel availability.

##### *3. One Network, Numerous Security Profiles*

University network users include many different groups, including students, faculty, staff, visiting researchers and community users. Each group will require different access policies to maintain appropriate security levels for different network resources. Moreover, the university has little control over end user devices, making it very difficult to implement and manage security mechanisms that require client software [2].

##### *4. Providing support is not easy*

Another challenge for Wi-Fi technology is in providing user support; in particular for students who may be using a variety of wireless connections and devices in different ways [7].

##### *5. Keeping the student attention*

Judith B. Rajala [8] describes that wireless technology poses a new challenges to teachers, which is "retaining their students' attention". While students go online to read course materials, they can also send instant messages, check email, look at sports, or play online games. When students' multitasking is the norm outside of the classroom, wireless networks seem poised to open the door to more distraction inside the classroom. They take the threat of losing their students' attention to email and online newspapers/games as a challenge to keep lectures interesting and lively.

### III. RESEARCH AIM

The main aim of the research is to identify the opportunities and challenges faced by students and staff of Malaysian HEI's in the Klang valley through the adoption of wireless technology environment and to conclude /recommend based on findings.

### IV. RESEARCH METHODOLOGY

#### *A. Research Approach*

This positivist research philosophy adopted deductive approach and it aimed at testing the below theory drawn based on the frame work suggested by Judith B. Rajala [8] for evaluating the impact of Wireless technologies on Higher Educational Institutions..

#### *Hypothesis:*

Null, Ho: Wireless technologies will not help students to improve their ICT & Research skills

Alternative, H1: Wireless technologies will help students to improve their ICT & Research skills

#### *B. Sampling Technique*

The sample technique that the authors used for this particular research was quota sampling. The authors decided on this technique as the survey has to be done for selected HEIs within Klang Valley, Malaysia.

Proposed quota for collecting data is shown in below Table I.

TABLE I  
PROPOSED QUOTA FOR DATA COLLECTION

Gender	Age	Socioeconomic status	Quota
Both	Any	Teachers	50
Both	Any	Students	200

## V. DATA ANALYSIS & EVALUATION

The survey was distributed manually to teachers and students of 5 Higher learning Institutions within Klang valley. A quota was assigned to distribute the questionnaire to 50 teachers and 200 students. The response rate achieved was 87%, which is 217 respondents out of 250.

The data from the survey has been analysed quantitatively using software to find the results of the data collected. Internal consistency approach was used in testing the reliability of data, which resulted in a reliability coefficient of 0.83 to indicate satisfactory reliability. Relevant techniques were adopted to describe and show the results of the finding of the survey.

## VI. FINDINGS

*Testing hypothesis:* Wireless technologies will not help students/staff to improve their ICT & Research skills.

The research further analyzed to study the relationship between the usage of wireless technologies and ICT/research skills. The analysis was done using the chi square test to see whether there is a significant association or relationship between the two variables namely the wireless technologies and ICT/research skills.

TABLE II  
ACTUAL RANGE

Actual Range					
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree	Total
0	5	20	116	38	179
0	1	2	30	5	38
0	6	22	146	43	217

TABLE III  
CHI SQUARE TEST - EXPECTED OR THEORETICAL RANGE

Expected or Theoretical Range					
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree	Total
0	4.95	18.15	120.43	35.47	179
0	1.05	3.85	25.57	7.53	38
0	6	22	146	43	217

As the the chi-square value for the data obtained is **1.45** with 4 degrees of freedom and 95% confidence level that the probability of the values occurring by chance is less than 0.10, rejecting the null hypothesis and accepting the fact that Wireless technologies will help students/staff to improve their ICT & Research skills.

## VII. CONCLUSION

The research carried out in Malaysian Higher Educational institutions has confirmed that the usage of wireless technologies in HEI have full of opportunities & challenges.

### A. Opportunities

It has been found that the introduction of wireless technologies will surely help students/ staff to improve their ICT & research skills. This has been proved by hypothesis test using Chi square test that concluded that there is a statistically significant association or relationship between the wireless technologies and improving ICT/research skills. Apart from this the study also found that students feel more comfortable using wireless environment than teachers and they would love it as they it provides them real-time feedback.

### B. Challenges

The study has shown significant concerns from the staff that introduction of wireless environment is raising / giving more opportunities for plagiarism. Also few staff expressed more concern on the level of attention students pay in the class room is decreasing due to wireless environments.

### C. Recommendations

The concerns raised by staff about the creation of high distraction and file transmission issues can be addressed by the administrator or the policy planners at school. They should develop a classroom policy concerning the appropriate use of wireless devices in the class. The security problem and other related issues about using the wireless devices in the classroom should be explained or discussed during the orientations, in special seminars or in the workshops. In these sessions students need be educated on the benefits of wireless environment. If this fails then the administrators should think of deploying firewalls.

The other concern raised by staff is plagiarism. In fact it is not really a problem created by wireless environments alone. May be, the environment made it happen easily. By creating necessary awareness among the students this can be easily addressed.

Though there are few challenges for the deployment of wireless environment, since it provides more opportunities, the authors would like to conclude that all the HEI in Malaysia should be encouraged towards a wireless society.

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