



## International Journal of Research in Education and Science (IJRES)

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#### To cite this article:

Ghavifekr, S. & Rosdy, W.A.W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. *International Journal of Research in Education and Science (IJRES)*, 1(2), 175-191.

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## Teaching and Learning with Technology: Effectiveness of ICT Integration in Schools

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### Abstract

Integration of Information, Communication, and Technology (ICT) will assist teachers to the global requirement to replace traditional teaching methods with a technology-based teaching and learning tools and facilities. In Malaysia, ICT is considered as one of the main elements in transforming the country to the future development. The Ministry of Education, through the latest Education Blue print (2013-2025), insights the importance of technology-based teaching and learning into the schools' national curriculum. This study aims to analyze teachers' perceptions on effectiveness of ICT integration to support teaching and learning process in classroom. A survey questionnaire was distributed randomly to the total of 101 teachers from 10 public secondary schools in Kuala Lumpur, Malaysia. The data for this quantitative research were analyzed for both descriptive and inferential statistic using SPSS (version 21) software. The results indicate that ICT integration has a great effectiveness for both teachers and the students. Findings indicate that teachers' well-equipped preparation with ICT tools and facilities is one the main factors in success of technology-based teaching and learning. It was also found that professional development training programs for teachers also played a key role in enhancing students' quality learning. For the future studies, there is a need for consideration of other aspects of ICT integration especially from management point of view in regard to strategic planning and policy making.

**Key words:** ICT integration; Teaching and learning; Technology effectiveness; Education; Malaysia

### Introduction

In this 21st century, the term "technology" is an important issue in many fields including education. This is because technology has become the knowledge transfer highway in most countries. Technology integration nowadays has gone through innovations and transformed our societies that has totally changed the way people think, work and live (Grabe, 2007). As part of this, schools and other educational institutions which are supposed to prepare students to live in "a knowledge society" need to consider ICT integration in their curriculum (Ghavifekr, Afshari & Amla Salleh, 2012).

Integration of Information, Communication, and Technology (ICT) in education refers to the use of computer-based communication that incorporates into daily classroom instructional process. In conjunction with preparing students for the current digital era, teachers are seen as the key players in using ICT in their daily classrooms. This is due to the capability of ICT in providing dynamic and proactive teaching-learning environment (Arnseth & Hatlevik, 2012). While, the aim of ICT integration is to improve and increase the quality, accessibility and cost-efficiency of the delivery of instruction to students, it also refers to benefits from networking the learning communities to face the challenges of current globalization (Albirini, 2006, p.6). Process of adoption of ICT is not a single step, but it is ongoing and continuous steps that fully support teaching and learning and information resources (Young, 2003).

ICT integration in education generally means technology-based teaching and learning process that closely relates to the utilization of learning technologies in schools. Due to the fact that students are familiar with technology and they will learn better within technology-based environment, the issue of ICT integration in schools, specifically in the classroom is vital. This is because, the use of technology in education contributes a lot in the pedagogical aspects in which the application of ICT will lead to effective learning with the help and supports from ICT elements and components (Jamieson-Procter et al., 2013). It is right to say that almost all ranges of subjects' starts from mathematics, science, languages, arts and humanistic and other major fields can be learned more effectively through technology-based tools and equipment. In addition, ICT provides the help and complementary supports for both teachers and students where it involves effective learning with the help of the computers to serve the purpose of learning aids (Jorge et al., 2003). Computers and technology does not acts

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as a replacing tools for quality teachers but instead they are considered as an add-on supplements needed for the better teaching and learning. The need for ICT integration in education is crucial, because with the help of technology, teaching and learning is not only happening in the school environment, but also can happen even if teachers and students are physically in distance. However, ICT integration is not a one-step learning process, but it is a continual process of learning that provides proactive teaching-learning environment (Young, 2003).

ICT can be used in various ways where it helps both teachers and students to learn about their respective subject areas. A technology- based teaching and learning offers various interesting ways which includes educational videos, stimulation, storage of data, the usage of databases, mind-mapping, guided discovery, brainstorming, music, World Wide Web (www) that will make the learning process more fulfilling and meaningful (Finger & Trinidad, 2002). On the other hand, students will benefit from ICT integration where they are not bounded to the limited curriculum and resources, instead hands-on activities in a technology-based course is designed to help them to stimulate their understanding about the subject. It also helps teachers to design their lesson plans in an effective, creative and interesting approach that would result in students' active learning. Previous researches proved that use of ICT in teaching will enhance the learning process and maximizes the students' abilities in active learning (Finger & Trinidad, 2002; Jorge et al., 2003; Young, 2003; Jamieson-Procter et al., 2013).

Hermans, Tondeur, Van-Braak, and Valcke (2008) have identified three main stages for ICT to be highly valued and regarded by the teachers; integration, enhancement and complementary. Integration approach is about implementing right use of ICT in particular subject area that involved complex concepts and skills to improve student's achievement and attainment. Besides, the review of curriculum is also needed so that only related ICT resources and appropriate software will be installed for the main aims and objectives of curriculum to be achieved. Enhancement approach is about using ICT to give great emphasis on the topic introduced. For instance, Microsoft PowerPoint can be used to present the topic in a very innovative and creative way that will lead into discussion and exchanging ideas and thoughts. Finally, complementary approach is when the ICT is used to aid and support the student's learning. This approach allow students to be more organized and efficient in which they can take obtain the notes from computer, submit their works by email from home as long as they meet the deadline and looking for information from various sources provided online to fulfil the task given to them (Hermans et al., 2008) .

Technology-based teaching and learning can make many changes in school that requires for proper planning and policy making. Researchers and policymakers must both have the same insight about the future plan. Dudeny (2010) noted that national ICT policies can serve several crucial functions. They provide a rationale, a set of goals, and a vision of how education systems run if ICT is integrated into teaching and learning process, and they are beneficial to students, teachers, parents and the general population of a given country. Ministry of Education Malaysia has formulated three main policies for ICT in education. The first policy insists on all students are given opportunity to use ICT. This is aimed to reduce the digital gap amongst the schools. The second policy focuses on the role and function played by ICT in education. Besides that, another policy stressed on the use of ICT for accessing information, communication and as productivity tool (Chan, 2002).

However, infrastructure and facility of ICT is then needed to supply to the schools throughout the nation. A key factor in use of ICT is sufficient computer labs and ICT equipment. This is to ensure that subject teachers are easily access to ICT tools whenever needed (Hennessy, Ruthven, & Brindley, 2005). Lack of adequate ICT equipment and internet access is one of the key problems that schools specifically in rural areas are facing now. For example, results of a research show that in Kenya, some schools have computer but this could be limited to one computer in the office only. Even in schools with computers, the student-computer ration is high. In addition, the report continues revealed that the schools with ICT infrastructure are supported by parents' initiative or community power (Chapelle, 2011).

In most schools, technical difficulties sought to become a major problem and a source of frustration for students and teachers and cause interruptions in teaching and learning process. If there is lack of technical assistance and no repair on it, teachers are not able to use the computer for temporarily (Jamieson-Procter et al., 2013). The effect is that teachers will be discouraged from using computers because of fear of equipment failure since they are not given any assistance on the issue. Türel and Johnson's study (2012) revealed that technical problems become a major barrier for teachers. These problems include low connectivity, virus attack and printer not functioning. However, there are a few exceptions. Schools in the countries like Netherland, United Kingdom and Malta have recognized the importance of technical support to assist teachers to use ICT in the classroom (Yang & Wang, 2012).

In addition, teachers' readiness and skills in using ICT are playing essential role in the use of ICT in education. Teachers need sufficient ICT skills to implement the technology and to have high confident level to use it in a classroom setting. Besides, teachers require insight into the pedagogical role of ICT, in order to use it meaningfully in their instructional process (Hennessy et al., 2005). According to Winzenried, Dalgarno and Tinkler (2010) teachers who have gone through ICT course are more effective in teaching by using technology tools as opposed to those that have no experience in such training. A school in Ireland reported that teachers who did not develop sufficient confidence avoided using ICT. Similar case happened in Canada, some teachers admitted they were reluctant ICT users because they worried they might get embarrassed that the students knew more about the technology than they did (Hennessy et al., 2005).

Beyond basic skill training, schools had used a variety of strategies to provide further professional development for teachers. According to Warwick and Kershner (2008) the significance and advantages of ICT should be known by teachers in order to conduct a meaningful lesson with the use of ICT. Indeed, teachers should be sent to attend training courses to learn about integration ICT in teaching and learning process. Nonetheless, many school schools used peer-tutoring systems. A more skillful teacher in ICT would assist and guide another teacher who has less experience with ICT along the preparation work for teaching and learning process. As what has been discussed, there are many factors to enable the use of ICT in classroom teaching and learning. Begin with policy, follows by the supplement of all the ICT hardware and software facilities, continued by readiness and skills of teacher to integrate it into pedagogical process (Agbatogun, 2012). Besides, technical support and continuous professional development in ICT should be conducted from time to time. In short, all parties must cooperate in order to bring the nation to become a country advance in technology.

The main purpose of this study is to analysis the effectiveness of ICT integration in. Specifically, this study aims to identify; (I) the effectiveness of ICT integration form teaching and learning perspectives and (II) the effective elements of ICT integration in teaching in public schools in Kuala Lumpur.

### **Teachers' Belief on Technology-based Teaching and Learning**

With the development of learning technologies in the late 20th century, education system has changed rapidly. This is due to the capability of technology to provide a proactive, easy access and comprehensive teaching and learning environment. Nowadays, Ministry of education in all over the world has provide a lot of facilities and training in order to enhance the use of advanced technologies in the countries' teaching and learning process. A high budget has been placed in order to provide the equipment needed by teachers to improve the education system. Despite all the efforts, most of the countries are facing similar problem whereby the teachers are not maximizing the usage of the technology provided (Albirini, 2006). This has become a serious matter as many previous researches have proven the usage of ICT in teaching and learning process could improve students' achievement (Nakayima, 2011, Jamieson-Proctor et al., 2013). Many, researchers have taken an effort to analyse the factors that affecting teachers' acceptance of ICT usage in the classrooms (Capan, 2012; Virkus, 2008; Zhang, 2013; Dudeney, 2010). It shows that, the major barrier of the implementation was the teachers' belief as the teachers are the person who implements the change in their teaching and learning process. Moreover, previous research (Cassim & Obono, 2011) shows that the correlation of teachers' belief and the use of ICT are high. Teachers' role is getting more important especially in usage of ICT in pedagogy which could increase the achievement of the students, their creativity and thinking skills.

Furthermore, a research by Chien, Wu and Hsu (2014) has shown that students in school are having high expectation on ICT integration in classroom as the new generation are born and grown with technologies and could be define as the digital – native phenomenon. The younger the students, the higher their expectation are on ICT integration in classroom. It also proved that the integration of ICT is mostly dependent on the personal factors which define as self-perceptions. This research also shows that the acceptance of ICT of teachers and students in classroom and outside of classroom whereby both are more likely to use technologies outside the classroom. They found that the barriers of ICT integration in classroom are confidence, competence and attitudes of teachers reduce the percentage of ICT integration.

Results of a previous research (Cox & Marshall, 2007) shows that teachers only need a traditional – centered approach when developing ICT skills in the classroom. The teachers are having high confidence and competency in using ICT in classroom even though it does not represents the types of ICT used. This is because they believe that ICT is a tool could help in learning process especially to relate with real life practices. This factor has reform the teaching method to integrate ICT in order to create and construct knowledge for the students. The research shows that the relationship between competency and confidence could reflect the

balances between training and pedagogically focused approaches in ICT professional development. With this, the school management could make sure that there are sufficient supports for the teachers to integrate ICT in the classroom.

However, teachers' efficacy in urban schools changes as the years of experience of working and age of teachers (Cuban, 2001). It shows that the teachers' efficacy are decreasing as the years of experience and age increases but somehow the decrease and the efficacy belief depend on the school management. School management here means the opportunities for collegial interaction, and the use of the instructional resources. Schools that could provide opportunities for teachers to reflect on teaching and learning with their colleagues and for administrators and teachers to collaborate and communicate, as well as support the use of instructional resources. From this research, the teachers efficacy belief is depend on the school management and culture. Therefore, if the school has always implant the culture to change and teachers are always sent for training for upgrading themselves, and then the integration of ICT in classroom will be easier to be enhanced in the classroom.

### **Integration of ICT in the Malaysian Context**

The integration of ICT in classroom is getting more important as it help student in enhancing their collaborative learning skills as well as developing transversal skills that stimulates social skills, problem solving, self-reliance, responsibility and the capacity for reflection and initiative. All these elements are core values that students need to achieve in an active teaching and learning environment (Ghavifekr et al., 2014). Similarly, in Malaysia the government has implemented the integration of ICT in learning and teaching process in early 1970's. This is due to the importance of technology literate which produce critical thinking workforce to face and involve the country in the global economy (Hamidi, Meshkat, Rezaee, & Jafari, 2011). Accordingly, many schools were upgraded with computer's lab, the internet connection, smart white boards, LCD and other ICT tools and equipment. Despite all these, the problem faced was the teachers' skill and aptitude, technical support and stability of the system in order to implement the policy successfully. However, the government is still improving and upgrading the systems to be fully utilising by ICT. As a developing country, exploration of the factors that affecting Malaysian teachers' ICT usage in schools can help to increase the integration of ICT in country's teaching and learning process.

The Ministry of Education launched a comprehensive review of the education system in Malaysia in October 2011. In order to raise the education standards, government developed a new national education blueprint; the latest one is the Education Blueprint 2013-2025. This blueprint provides the plan for the sustainable educational transformation of the Malaysia education system until 2025 (Ministry of Education, 2012). This document also includes the plan to raise the role of ICT in the whole education system. In order to complete the transformation mission, Blueprint proposed 11 strategic and operational shifts. ICT has been mentioned on the 7<sup>th</sup> shift, which requires scaling up quality learning in Malaysia by providing internet access and virtual learning environment via 1BestariNet for all schools in Malaysia by 2013 (Ministry of Education, 2012). It ensures possibilities of maximizing the implementation of ICT for self-guided learning.

In line with global attempts on the deeper needs of educational performance, incompetence of teachers and inadequateness of hardware and software was also recognized by the Malaysian education authority (Education and Manpower Bureau, 2008). It indicates that the ICT culture in schools should be improved with using ICT among teachers in terms of training (Hussain, Morgan, & Al-Jumeily, 2011). The main goal of ICT implementation in education proclaimed the vision and missions of the government to promote ICT in education for the following intentions:

- 1) To surround schools with dynamic and innovative learning environments for students to become more motivated and creative;
- 2) To enable students to gain wider range of knowledge and be able to access to internet for developing a global outlook;
- 3) To nurture students with capabilities of processing information more effectively and efficiently; and
- 4) To develop students with attitudes and capability of life-long learning

The new era of ICT in education should be developed rapidly to appropriate extent in order to matching the capability of students as well as teachers in educational experience due to the development of new information technology. Results of a study by Abd Rahim and Shamsiah (2008) suggest that trainee teachers in Malaysia have confidence to integrate ICT in their teaching practices. And the male teachers are more confident than female teachers in using ICT integration in teaching. Moreover it shows that vocational teachers are more

confident to integrate ICT in teaching, because they can handle technical subjects and their experience enable them to integrate ICT effectively in teaching (Abd Rahim & Shamsiah, 2008; Yunus, 2007). Furthermore, only minority of teachers in Malaysia professionally know the basic of ICT. The majority of them just had average knowledge in ICT, and even a group of the teachers are poor in the related knowledge of ICT in Malaysia (Rosnaini & Mohd Arif, 2010). It indicates that level of ICT knowledge among teachers is one of the key factors for Malaysia society to make successful adoption of ICT in its education.

## The Conceptual Framework

For the purpose of this study in light of ICT integration to enhance a quality teaching and learning experience in schools, two theories of Diffusion of Innovations by Rogers (2003) and Technology Acceptance Model (TAM) by Davis (2003), has been identified and adapted to the research setting as the conceptual framework for this research (Figure 1). Rogers's theory stated as the process by which an innovation is communicated through certain channels and over time among the members of a social system. The process will starts with "knowledge" of the first channel that represents characteristics of the decision making unit by the ICT users in order to integrate the technology. And it ends with "confirmation" by the users to accept the technology and integrate it accordingly. The TAM theory comprises of various parts which is representing the process of ICT acceptance by the users including; behavioral intension, perceived usefulness and perceived ease of use. While, perceived usefulness refers to the degree to which person believes on the benefit from the use of a particular technology by improving the job performance, perceived ease of use refers to the importance of a technology in being user-friendly for the users. Generally, TAM theory was developed to measure the effectiveness or success of a technology in helping understanding the value and efficacy of a particular system. It is also considered as one of the most influential theories in contemporary information systems research. However, the theory has evolved with more specific variables explaining how a user can accept a technology over the years.

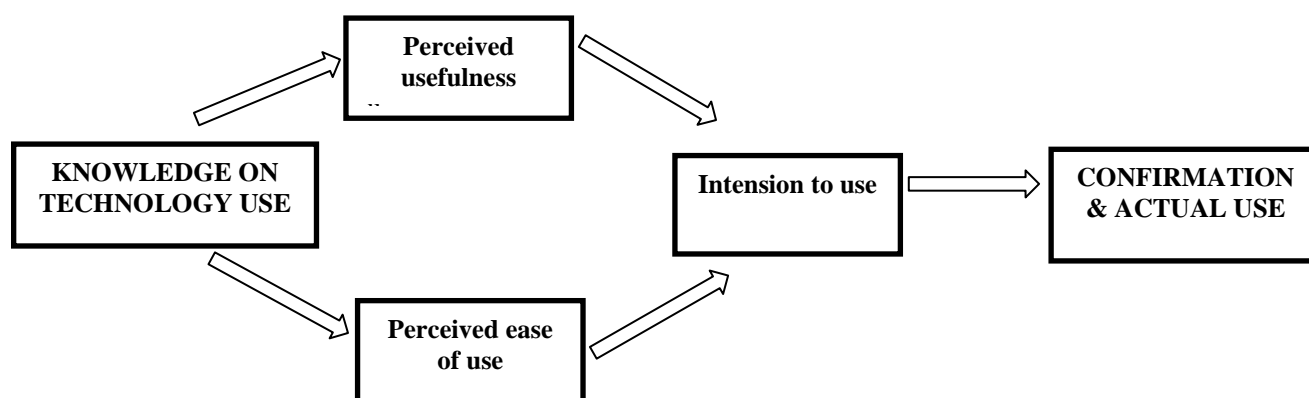


Figure 1. Conceptual framework of study (Davis, 2003; Rogers, 2003)

The proposed framework includes various factors directly associated with the core aim of the study that explains how knowledge and perceptions will affect the perceived usefulness and ease of use of ICT integration. The factors embedded in the conceptual framework have been meticulously interlaced, so that the interrelationship among them constitutes to measure their effectiveness on ICT integration by teachers. However, intension to integrate ICT by teachers is the main variable that supports the key elements in the above framework such as ease-of-use, functionality, flexibility, accessibility and integration. In addition, the intention of teachers to use the technology is strongly influenced by their perceptions on usefulness of the system as well as perceived ease of use and determines their actual use of ICT. The proposed framework has guided this research in investigating the factors affecting the technology integration by school teachers.

## Method

### Research Design

In this research, quantitative methodology was used to collect and analyze the data obtained from all the respondents. The researchers developed the questionnaire and finalized it before being distributed to the targeted group of respondents. Few sections on the questionnaire were designed specifically to address research

objectives in regard with the effectiveness of ICT integration for students in learning and effective elements of ICT integration in public school in Kuala Lumpur. Therefore, the questionnaire was distributed to obtain the data from the respondents.

### **Population and Sampling**

The overall total of respondents for this research was 101 teachers from public primary and secondary schools in Kuala Lumpur. The questionnaire was randomly distributed to the respondents with teaching background regardless of gender, race, teaching experience as well as highest teaching experience. There are no preferences set by the researchers as long as the respondents come with teaching background especially in public primary and secondary school in Kuala Lumpur. Since the targeted respondents for this research are meant for individuals with teaching background, the researchers tried to get especially teachers from public primary and secondary schools in Kuala Lumpur to be part of this research. Hence, the questionnaires distributed are not equal in numbers where teachers from secondary schools dominate the overall population as compared to teachers from primary schools.

### **Instrument**

A survey questionnaire with a total of 43 items was used as the main instrument in this study to analyze the effectiveness of ICT integration in teaching and learning in public schools in Kuala Lumpur. A total of 101 questionnaires were distributed where all respondents were asked to read the statements given and choose their answers based on 4-Likert scale ranged from 4= Strongly Disagree, 3= Disagree, 2= Agree and 1= Strongly Agree. The questionnaires consisted of 4 sections. Section A is about the demographic background of the respondents consists of 8 items that includes gender, race, teaching experience, type of school, school area, preference of teaching style, highest academic qualification and the ability of handling ICT in teaching. The other 3 sections in the questionnaire focus more into teacher's perception and the elements of effectiveness of ICT integration in schools. Section B comes with 15 items that looks into teacher's perception of ICT in teaching, section C consists of 10 items that looks into the effectiveness of ICT integration for students in learning meanwhile section D comes with 10 items that looks into the effective elements of ICT integration in teaching. The questionnaire used for this quantitative study was adopted and modified from the original questionnaire designed by Gulbahar and Guven (2008) that is considered suitable for this research. Some of the items are designed and developed by the researchers accordingly with the title chosen so that the items developed are able to provide the answers needed for both research questions.

### **Data Collection Procedure**

The researchers modified the questionnaire before it is being finalized and distributed to the target group of respondents. Then, each researcher takes up 50 and 51 questionnaires respectively that made a total of 101 questionnaires being distributed to all respondents. The data was collected within 2 weeks through random distribution and some of the questionnaires were sent to respondents email. The respondents were given 3-5 days to complete the questionnaire and send it back to the researcher for data analysis. After 2 weeks, all the complete filled-up questionnaires were gathered and collected for further data analysis by the researcher to get the output and findings for the research.

### **Data Analysis Process**

All the data collected from the respondents were gathered together to be analyzed using Statistical Package for the Social Sciences (SPSS) version 21. The analysis includes both descriptive and inferential analysis. The researchers used descriptive analysis to analyze the frequency and percentage of the overall population in the demographic background. Besides, it is also used to determine the mean, standard deviation, frequency and percentage to identify the effectiveness of ICT integration for students in learning as well as the effective elements of ICT integration in teaching in public schools in Kuala Lumpur.

## Results

The findings of this research will give the output needed by the researchers to answer the research questions. The findings are done according to the sections in the questionnaire and some inferential analysis that includes reliability testing and Mann-Whitney U testing is also conducted towards the overall data.

Table 1. Demographic background of respondents

Factors	Frequency	Percentage (%)
<b>Gender</b>		
Female	82	81.19
Male	19	18.81
<b>Race</b>		
Malay	36	35.64
Indian	22	21.78
Chinese	39	38.61
Others	4	3.96
<b>Teaching Experience</b>		
<1 year	20	19.8
1-5 years	36	35.64
6-10 ears	34	33.66
>10 years	11	10.89
<b>Type of School</b>		
Primary	37	36.63
Secondary	64	63.37
<b>School Area</b>		
Urban	79	78.22
Rural	22	21.78
<b>Preference of Teaching Style</b>		
Conventional/Traditional	42	41.58
Modern/Contemporary (Use of ICT)	59	58.42
<b>Highest Academic Qualification</b>		
Diploma	10	9.9
Degree	63	62.38
KPLI	19	18.81
Master	9	8.91
<b>The Ability of Handling ICT in Teaching</b>		
High	25	24.75
Medium	67	66.34
Low	9	8.91

From the overall population (n=101) based on gender, there are 82 female respondents with a percentage of 81.19% as compared to only 19 male respondents with 18.81%. From the overall population based on race, the highest frequency of respondents are Chinese with a total 39 (38.61%) followed by Malay with 36 (35.64%), then Indian with 22 (21.78%) and also others with 4 (3.96) specified as 1 Dusun, 2 Iban and 1 Melanau whom referred as an Ethnic race in Sarawak. From the overall population based on teaching experience, most of the respondents have 1-5 years of teaching experience with 36 (35.64) followed by 6-10 years of experience with 34 (33.66%), then < 1 year of teaching experience with 20 (19.8%) and 11 respondents with > 10 years of teaching experience with 11 (10.89%). From the overall population based on type of school, there are 64 respondents who are teaching in secondary school with 64 (63.37%) as compared to primary school with 37 (36.63%). From the overall population based on school area, there are more respondents who are teaching in city school area with 79 (78.22%) as compared to respondents who are teaching in rural school area with 22 (21.78%).



From the overall population based on preference of teaching style, more respondents preferred modern/contemporary teaching style with 59 (58.42%) as compared to respondents who preferred conventional/traditional method of teaching with 42 (41.58%). From the overall population based on highest academic qualification, most of the respondents come with degree qualification with 63 (62.38%), followed by KPLI (Post-Degree Teacher's Training) with 19 (18.81%), then diploma qualification with 10 (9.9%) and respondents with master qualification with 9 (8.91%). From the overall population based on the ability of handling ICT in teaching, most of the respondents believe it that they possess medium ability with 67 (66.34%) followed by high ability in handling ICT with 25 (24.75%) and low ability with 9 (8.91%).

### Teachers' Perception on Technology-based Teaching and Learning

From the data provided in Table 2 about teacher's perception of ICT in teaching, it shows that most teachers are aware of the goodness and usefulness of ICT in teaching. Most teachers realized that the use of ICT helps teachers to improve teaching with more updated materials that shown the lowest mean of 1.70. It is undeniable that teaching resources and materials provided online are more updated and teachers can refer to it in order to design more interesting and engaging lesson for students.

Table 2. Teacher's perception of ICT integration in teaching

NO	ITEMS	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	MEAN	S.D
		Frequency and Percentage (%)					
1.	I feel confident learning new computer skills.	0	6 (5.9%)	70 (69.3%)	25 (24.8%)	1.81	0.52
2.	I find it easier to teach by using ICT	0	12 (11.9%)	70 (69.3%)	19 (18.8%)	1.93	0.55
3.	I am aware of the great opportunities that ICT offers for effective teaching.	0	8 (7.9%)	57 (56.4%)	36 (35.6%)	1.72	0.60
4.	I think that ICT supported teaching makes learning more effective.	1 (1%)	8 (7.9%)	54 (53.5%)	38 (37.6%)	1.72	0.65
5.	The use of ICT helps teachers to improve teaching with more updated materials.	1 (1%)	6 (5.9%)	56 (55.4%)	38 (37.6%)	1.70	0.63
6.	I think the use of ICT improves the quality of teaching.	1 (1%)	8 (7.9%)	61 (60.4%)	31 (30.7%)	1.79	0.62
7.	I think the use of ICT helps to prepare teaching resources and materials.	1 (1%)	10 (9.9%)	59 (58.4%)	31 (30.7%)	1.81	0.64
8.	The use of ICT enables the students' to be more active and engaging in the lesson.	0	9 (8.9%)	58 (57.4%)	34 (33.7%)	1.75	0.61
9.	I have more time to cater to students' need if ICT is used in teaching.	0	26 (25.7%)	55 (54.5%)	20 (19.8%)	2.06	0.68
10.	I can still have an effective teaching without the use of ICT.	3 (3%)	19 (18.8%)	58 (57.4%)	21 (20.8%)	2.04	0.72
11.	I think the use of ICT in teaching is a waste of time.	24 (23.8%)	48 (47.5%)	27 (26.7%)	2 (2%)	2.93	0.76
12.	I am confident that my students' learn best without the help of ICT.	12 (11.9%)	63 (62.4%)	23 (22.8%)	3 (3%)	2.83	0.66
13.	The classroom management is out of control if ICT is used in teaching.	23 (22.8%)	54 (53.5%)	22 (21.8%)	2 (2%)	2.97	0.73
14.	Students' pay less attention when ICT is used in teaching.	24 (23.8%)	54 (53.5%)	23 (22.8%)	0	3.01	0.69
15.	Students' makes no effort for their lesson if ICT is used in teaching.	23 (22.8%)	56 (55.4%)	20 (19.8%)	2 (2%)	2.99	0.71

Besides, most teachers agreed that the use of ICT will definitely provide lots of opportunities for an effective teaching as well as ICT supported teaching makes learning more effective with the sharing mean of 1.72. This situation shows that teachers view the use of ICT in teaching and learning process as something positive where ICT is the aid needed by teachers to ensure the effectiveness of both teaching and learning process. Next, from the data obtained, it also shows that the use of ICT in teaching enable the students to be more active and engaging in the lesson prepared by the teachers with score mean of 1.75. This is because students are familiar with ICT and they find it easier learning by ICT and allows them to be engage more in the lesson.

Teacher's familiarity and competency in handling ICT also obtained from the data where the mean of 1.81 shows that most teachers feel confident learning new computer skills and they are able to use ICT to find teaching materials and resources. In this context, it shows that teachers are open towards the use of ICT in teaching, not being resistant and feels comfortable in learning new things. Other than that, teachers believe that it is easier to teach by using ICT with the mean score of 1.93 but at the same time, they still believes in the conventional way of teaching where teachers are the center of learning and stated that they can still have an effective teaching without the use of ICT with recorded mean of 2.04.

On the other hand, most teachers disagrees that the use of ICT allows them to cater to students need with score mean of 2.06 because of clerical works and other works that needs to be completed other than teaching responsibility. The use of ICT just makes it easier for them to teach but other things in school remain the same. Most teachers believe that the use of ICT benefits teaching and learning in various ways and saying that ICT integration is not a waste of time with total mean of 2.93. However, there are also negative part of ICT integration where the result shows that classroom management is out of control when ICT is used in teaching with mean of 2.97, followed by students make no efforts for their lesson and learning process with score mean of 2.99 and most teachers agreed that the use of ICT in teaching only cause students' to pay less attention with the highest mean recorded of 3.01 which shows teacher's less acceptance towards ICT integration due to student's attitude whom being too dependent on ICT and not taking responsibility for their own independent learning which frustrating and disappointing the teachers.

### **Effectiveness of Technology-based Teaching and Learning for Students**

The results obtained from Table 3 that would want to examine the effectiveness of ICT integration for students in learning shows that the use of ICT promotes active and engaging lesson for students' best learning experience with recorded of the lowest mean score of 1.67. In the previous section, most teachers agreed that the use of ICT enables the students to be more active and engaging in the lesson. This shows that both teachers and students agreed that the use of ICT provide the chances for students to be active and take more parts or roles for their best learning experience.

The use of ICT also helps to broaden student's knowledge paradigm with mean score of 1.69 where students are able to integrate their prior knowledge into the current learning systems as well as sharing and exchanging point of view with the teachers and classmates. ICT helps to provide latest and current issues where students can obtain it very easily and integrate it into their learning process.

Besides, ICT helps students to learn more effectively as well as it helps students to find related knowledge and information for learning with shared mean of 1.71. The technology always acts as a medium for students to find related knowledge and information for their learning. It is best when the students are able to gather information, relate it back with what they have learnt and have a discussion on the information with teachers and their classmates so that they can see the relation of what is new and what the latest issues they need to catch up for effective learning.

Other than that, there a lot of educational videos provided for students online which it helps to improve student's ability in language learning skills such as reading, writing, listening and speaking with total mean of 1.72. It is good for students to watch videos and learn from it so they can gather the confidence needed when it comes to argumentative issues in the classroom where they are able to provide clear clarification and their judgments on certain issues. The use of ICT also allows students to be more creative and imaginative with mean score of 1.80 followed by their ability to express their ideas and thoughts better with mean of 1.81. This shows that the use of ICT enhances students thinking and enables them to think out of the box and make the best use of their learning process.

Table 3. Effectiveness of ICT integration for student's learning

NO	ITEMS	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	MEAN	S.D
		Frequency and Percentage (%)					
1.	ICT allows students' to be more creative and imaginative.	1 (1%)	7 (6.9%)	64 (63.4%)	29 (28.7%)	1.80	0.60
2.	The use of ICT helps students to find related knowledge and information for learning.	1 (1%)	4 (4%)	61 (60.4%)	35 (34.7%)	1.71	0.59
3.	The use of ICT encourages students to communicate more with their classmates.	11 (10.9%)	0	63 (62.4%)	27 (26.7%)	1.84	0.60
4.	The use of ICT increases students' confidence to participate actively in the class.	10 (9.9%)	0	65 (64.4%)	26 (25.7%)	1.84	0.58
5.	I think students learn more effectively with the use of ICT.	6 (5.9%)	0	60 (59.4%)	35 (34.7%)	1.71	0.57
6.	I think the use of ICT helps to broaden students' knowledge paradigm.	8 (7.9%)	0	54 (53.5%)	39 (38.6%)	1.69	0.61
7.	I think the use of ICT helps to improve students' ability specifically in reading, writing.	10 (9.9%)	0	53 (52.5%)	38 (37.6%)	1.72	0.63
8.	The students' are more behaved and under control with the use of ICT.	2 (2%)	16 (15.8%)	51 (50.5%)	32 (31.7%)	1.88	0.74
9.	The use of ICT enables students' to express their ideas and thoughts better.	3 (3%)	13 (12.9%)	47 (46.5%)	38 (37.6%)	1.81	0.77
10.	The use of ICT promotes active and engaging lesson for students' best learning experience.	1 (1%)	6 (5.9%)	53 (52.5%)	41 (40.6%)	1.67	0.63

The result shows that the effectiveness of ICT for students in learning are it encourages students to communicate more with their classmates as well as it increase the students confidence to participate actively in the class with shared mean of 1.84. It is effective in a sense that students are occupied with adequate knowledge that enables them to be more confident in sharing and exchanging their opinion with their classmates. Lastly, it shows that students are more behaved and under control with the use of ICT in learning but it is also considered as fewer acceptances by teachers as the score mean is the highest of all with 1.88. This might give the ideas to teachers that students are a little bit out of control when ICT is used in teaching as teachers are not the main focus of learning process.

### Effective Elements in Technology-based Teaching and Learning in Schools

From the data obtained, it shows that teaching time are not enough for teachers to use the ICT for teaching and learning purposes with score mean of 1.97. It means there is no unhurried times provides for teachers so that teachers can at least use ICT for effective teaching and learning process. It is good if teachers are given more time to teach so that ICT integration in teaching can be a success. Most teachers agreed that all ICT tools provided for their school goes to waste with mean of 1.98 due to teachers lack of knowledge and skills in using it. Sometimes, ICT facilities are completely provided but little access to ICT prevents teachers from using it in teaching with score mean of 2.02.

Some teachers feels the urge and motivated to use ICT in teaching but there is lack of supports from the school top management that hinder and discourage them from using ICT with mean of 2.08. The school top management must provide an encouragement for teachers to use ICT in teaching and convince them that ICT can benefits both teaching and learning process. Besides, teachers are not given the freedom they need to design their own teaching with the helps they received from ICT with a total mean of 2.75. Some schools are not provided with at least computer laboratory in which students will get the chances to integrate the use of ICT in

their learning process that shown mean score of 2.79. Teachers must be given the freedom to design their own teaching and make full use of ICT but they must be remembered to keep it in track with the curriculum designed by the Ministry of Education (MOE).

Table 4. Effective elements in ICT integration in teaching and learning in public schools

NO	ITEMS	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	MEAN	S.D
		Frequency and Percentage (%)					
1.	The ICT facilities in my school are well-functioning and can be used.	34 (33.7%)	36 (35.6%)	22 (21.8%)	9 (8.9%)	2.94	0.96
2.	The technical supports are provided if teachers are faced with difficulties.	29 (28.7%)	36 (35.6%)	26 (25.7%)	10 (9.9%)	2.83	0.96
3.	Little access to ICT prevents me from using it in teaching.	3 (3%)	16 (15.8%)	62 (61.4%)	20 (19.8%)	2.02	0.69
4.	Lack of supports from the school top management discourages me from using ICT.	6 (5.9%)	20 (19.8%)	51 (50.5%)	24 (23.8%)	2.08	0.82
5.	Teaching time are not enough for me to use the ICT for teaching and learning purposes.	1 (1%)	21 (20.8%)	53 (52.5%)	26 (25.7%)	1.97	0.71
6.	There is enough training and professional development provided for teachers about ICT use in teaching.	19 (18.8%)	57 (56.4%)	17 (16.8%)	8 (7.9%)	2.86	0.81
7.	All ICT tools in my school go to waste and less used by teachers.	6 (5.9%)	21 (20.8%)	39 (38.6%)	35 (34.7%)	1.98	0.89
8.	Teachers are given more time to learn and be comfortable with the use of ICT in teaching.	25 (24.8%)	55 (54.5%)	17 (16.8%)	4 (4%)	3.00	0.76
9.	There is computer lab in my school in which I can bring students there to watch educational videos.	28 (27.7%)	34 (33.7%)	29 (28.7%)	10 (9.9%)	2.79	0.96
10.	Teachers' are given the freedom to design their own teaching with the helps from the ICT.	26 (25.7%)	33 (32.7%)	33 (32.7%)	9 (8.9%)	2.75	0.94

Technical supports if teachers are faced with difficulties as well as training and professional development are less provided for teachers about ICT use in teaching with the score mean of 2.83 and 2.86 respectively. The school top management must find ways to provide enough technical supports as well as training and professional development for teachers in order to ensure success implementation of ICT in teaching. Other than that, ICT facilities provided in school are not well functioning and in not a good condition as it is not being used by teachers with the mean of 2.94 and there is no maintenance to make sure the facilities are well taken care of by the schools management.

Finally, the worst findings shows that teachers are not given enough time to learn and to be comfortable with the use of ICT in teaching with the highest mean recorded at 3.00. It is better if teachers are given time to learn and be comfortable with ICT for them to explore its use and make the best use of it. The overall findings shows that there is none effective elements identified from the data collected regarding the effective elements of ICT integration in teaching and learning in public schools in Kuala Lumpur. However, the researchers made up of some suggestions and recommendations for teachers and school top management to cater to this issue found from the research conducted towards teachers.

### Reliability Testing

The Cronbach's Alpha reliability testing is used to test the internal consistency of an instrument and its items (see Table 5). It is also considered as a measurement for scale reliability. For this study, the scale used is Likert scale ranged from 4= strongly disagree, 3= disagree, 2= agree and 1= strongly agree. According to Kline (1999), the most generally accepted value of alpha value is something greater than 0.7 and alpha value greater than 0.6 is ranged acceptable. For this research, reliability test is done accordingly by section that includes in section B, C and D of the questionnaire.

Table 5: The reliability test for teacher's perception of ICT integration in teaching

	Corrected Item-Total Correlation	Cronbach's		N of Items
		Alpha if Item Deleted	Cronbach's Alpha	
-I feel confident learning new computer skills.	0.32	0.59	0.61	15
-I find it easier to teach English language by using ICT	0.39	0.58		
-I am aware of the great opportunities that ICT offers for effective teaching.	0.48	0.56		
-I think that ICT supported teaching makes learning more effective.	0.55	0.55		
-The use of ICT helps teachers to improve teaching with more updated materials.	0.48	0.56		
-I think the use of ICT improves the quality of teaching.	0.42	0.57		
-I think the use of ICT helps to prepare teaching resources and materials.	0.54	0.55		
-The use of ICT enables the students' to be more active and engaging in the lesson.	0.38	0.58		
-I have more time to cater to students' need if ICT is used in teaching.	0.11	0.62		
-I can still have an effective teaching without the use of ICT.	0.40	0.57		
-I think the use of ICT in teaching is a waste of time.	-0.13	0.66		
-I am confident that my students' learn best without the help of ICT.	0.17	0.61		
-The classroom management is out of control if ICT is used in teaching.	0.07	0.63		
-Students' pay less attention when ICT is used in teaching.	-0.07	0.65		
-Students' makes no effort for their lesson if ICT is used in teaching.	-0.16	0.66		

In Table 5, the reliability test shows the result of alpha value greater than 0.6 which means that the items are acceptable and it can be considered as an instrument for the respondents. However, the researcher can take note of this and improvise the items in order to increase the alpha value and make it more reliable as an instrument.

In Table 6, the reliability shows the result of alpha value are more than 0.7 which it shows good and satisfactory reliability of the items and accepted as research instruments to the respondents.

Table 6. The reliability test for the effectiveness of ICT integration in learning (for students)

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha	N of Items
-ICT allows students' to be more creative and imaginative.	0.61	0.86	0.87	10
-The use of ICT helps students to find related knowledge and information for learning.	0.49	0.87		
-The use of ICT encourages students to communicate more with their classmates.	0.61	0.86		
-The use of ICT increases students' confidence to participate actively in the class.	0.59	0.86		
-I think students learn more effectively with the use of ICT.	0.53	0.87		
-I think the use of ICT helps to broaden students' knowledge paradigm.	0.55	0.86		
-I think the use of ICT helps to improve students' ability in reading, writing and speaking English.	0.63	0.86		
-The students' are more behaved and under control with the use of ICT.	0.60	0.86		
-The use of ICT enables students' to express their ideas and thoughts better.	0.73	0.85		
-The use of ICT promotes active and engaging lesson for students' best learning experience.	0.60	0.86		

As presented in Table 7, the reliability test shows the result of alpha value greater than 0.6 which means that the items are acceptable and it can be considered as an instrument for the respondents. However, the researcher can take note of this and improvise the items in order to increase the alpha value and make it more reliable as an instrument.

Table 7. The reliability test for the effective elements of ICT integration in teaching(for teachers)

	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha	N of Items
-The ICT facilities in my school are well-functioning and can be used.	0.54	0.54	0.63	10
-The technical supports are provided if teachers are faced with difficulties.	0.59	0.53		
-Little access to ICT prevents me from using it in teaching.	0.05	0.65		
-Lack of supports from the school top management discourage me from using ICT.	0.01	0.66		
-Teaching time are not enough for me to use the ICT for teaching and learning purposes.	-0.08	0.67		
-There is enough training and professional development provided for teachers about ICT use in teaching.	0.60	0.54		
-All ICT tools in my school go to waste and less used by teachers.	-0.17	0.70		
-Teachers are given more time to learn and be comfortable with the use of ICT in teaching.	0.59	0.55		
-There is computer lab in my school in which I can bring students there to watch educational videos.	0.44	0.57		
-Teachers' are given the freedom to design their own teaching with the helps from the ICT.	0.50	0.55		

## Hypothesis Testing

In this study, the Mann-Whitney U Test is used to test the hypothesis developed by the researcher (see Table 8). The test is used to compare the differences between two independent groups towards one dependent variable. Mann-Whitney U Test is used as an inferential analysis by the researcher to test the null hypothesis created by the researcher. Mann-Whitney U Test is used for comparing the efficacy of two treatments in clinical trials where it often presented as an alternative to a t-test when the data are not normally distributed (Hart, 2001).

*H01 - There is no significance difference between teachers' perception of ICT in teaching with the type of school (Primary & Secondary)*

Table 8. Mann-Whitney U-test between teacher's perception of ICT integration and school's type

	Type of School	N	Median	Range	Mean Rank	Mann-Whitney U	p
Score_B	Primary	37	2.33	2.20-2.33	59.89	855.00	0.02**
	Secondary	64	2.20	1.95-2.33	45.86		

\*\* Significant  $P < 0.05$

From the result in Table 9, it shows that there is significance difference between teachers' perception of ICT with type of school (Mann-Whitney  $U = 855$ ,  $P = 0.02$ ) where primary school scored higher median (2.33) and mean rank (59.89) as compared to the secondary school with median (2.20) and mean rank (45.86). Hence, the null hypothesis is rejected and alternative hypothesis is accepted.

*H02 - There is no significance difference between the effectiveness of ICT integration for students in learning with the school area (City & Rural)*

Table 9. Mann-Whitney U-test between the effectiveness of ICT integration for students in learning with school area

	School Area	N	Median	Range	Mean Rank	Mann-Whitney U	p
Score_C	Urban	79	1.60	1.40-2.00	46.92	547.00	0.01**
	Rural	22	2.00	1.60-2.35	65.64		

\*\* Significant  $P < 0.05$

From the result, it shows that there is significance difference between the effectiveness of ICT integration for students in learning with school area (Mann-Whitney  $U = 547$ ,  $P = 0.01$ ) where school in rural area scored higher median (2.00) and mean rank (65.64) as compared to the school in city area with median (1.60) and mean rank (46.92). Hence, the null hypothesis is rejected and alternative hypothesis is accepted.

## Discussion and Conclusion

The results of this study show that technology-based teaching and learning is more effective in compare to traditional classroom. This is because, using ICT tools and equipment will prepare an active learning environment that is more interesting and effective for both teachers and students. The results are in line with a research findings by Macho (2005) that proved using ICT in education would enhance students' learning. However, most of teachers in this study agree that ICT helps to improve classroom management as students are well-behaved and more focused. Moreover, this study proved that students learn more effectively with the use of ICT as lesson designed are more engaging and interesting. Accordingly, the participants agreed that integrating ICT can foster students' learning.

Results of a study by Zhang (2013) show that the Internet Use in EFL Teaching and Learning in Northwest China and the findings indicated that teachers have positive attitude regarding the use of Internet in teaching and learning; teachers have some knowledge about Internet use in teaching and learning; they have not well integrated Internet into teaching and learning so far; teachers' knowledge about ICT and network technology is very limited. Likewise, the first two points were similar to the findings of this research, which most of teachers think ICT integration for students in learning is effective. Because students can develop the confidence to have better communication and able to express their thoughts and ideas; ICT helps students to be more creative and

imaginative as their knowledge paradigm expand; and ICT helps students to possess all four skills in learning when they are able to acquire necessary information and knowledge. However, this study finds that public school teachers in Kuala Lumpur, Malaysia are not given enough time to learn and be comfortable with ICT.

In compare to a study conducted by Tazci (2011) that shows most of pre-service teachers indicated that they only implicate elementary ICT tools for educational use, this study found that most teachers think ICT integration is effective, but ICT tools provided in school are not enough nor in good condition; training and professional development are not adequately provided for teachers; technical supports are somehow provided but can be improved from time to time; and not very good condition of computer lab in school with well-functioning tools and facilities.

In conclusion, the very first stage of ICT implementation must be effective to make sure that, teachers and students are able to make the best use of it. Thus, preparations of a technology-based teaching and learning begin with proper implementation and supports by the school top management. If the implementation process of technology integration in schools take place appropriately from the very beginning stage and the continuous maintenance are adequately provided, ICT integration in schools will result in a huge success and benefits for both teachers and students. The use of ICT especially in teaching and learning is more about practicality as compared to theories and that is why teachers must be given time to learn and explore it, face the “trial-and-error” phase before they are completely comfortable with its usage and able to make use of it for teaching and learning.

Finally, the integration of ICT in classroom needs serious consideration in order to increase the competency of the country's education system. This will help in increasing the world ranking of the national education and produce the better future work force. In order to enhance the use of ICT in classroom, the government needs to improve and change the teachers' belief about the integration of ICT in classroom. As the teachers' role is the key role in making any of the new policy to be implemented efficiently and successfully. The changes that is taking place is driven by advanced technology and communication devices that should be available to students wherever they are either at school or home. In addition, the needs for teachers to be literate and have good skills and knowledge in using ICT to improve their teaching methods and approach is desired to promote effective learning as well as to meet the demand of the 21st century teaching skills.

## Recommendations

It might be too common for issues and challenges of ICT integration to be discussed but in-depth study of ICT integration in core subjects in schools is least discussed. It is good if further studies can be made based on what barriers teachers are facing in using ICT in their daily classrooms in schools. Besides, rather than just focusing in public schools, it is best if this study can be conducted in 3 major schools we have in Malaysia that includes public schools, Chinese school as well as Indian school. This is because some schools might have more funding that makes ICT implementation much faster and easier. It is good if comparison can be made between different schools in which it can take the good side as examples and make improvements needed from the flaws identified.

Other than that, it is highly recommended for comparison studies about ICT integration in teaching and learning to be done between public and private schools. This is because most private schools permit students to bring gadgets to school and teaching and learning process takes place within the use of ICT. It would be exciting to see the findings between the effectiveness of ICT integration in public and private schools.

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