Effectiveness of ICT Integration in Malaysian Schools: A Quantitative Analysis

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Abstract
The rapid global technological advancement and development of ICT (Information, Communication, and Technology) has placed education into a more challenging profession where teachers are required to replace the traditional teaching methods with a technology-based teaching and learning tools and facilities. This is because ICT integration supports students’ learning performance in terms of critical thinking, problem solving and practicing the lessons main focus through surfing in online resources. In Malaysia, ICT has been included as one of the main elements in transform shift in the latest Malaysian Education Blueprint (2013-2025) as the national education that focuses on quality education for the future development. The main focus of this paper is to identify the effectiveness of ICT integration for teachers and students in teaching and learning process in public secondary schools.

A survey questionnaire was distributed randomly to the total of 101 teachers from 10 public secondary schools in Kuala Lumpur, Malaysia. The overall findings show that ICT integration has great effectiveness for both teachers and the students. Results indicate that teachers should always be prepared and well-equipped in terms of ICT competencies and positive attitude to provide quality education opportunities for students to improve their academic outcomes. 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.

Keywords: ICT integration, 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 to all human beings. Nowadays, majority of people from all age groups know how to use at least a basic form of technology. Technology tools and equipment have become the main medium of connectivity all over the world and we have the urge and tendency to be connected online8, 9.

In education, integration of Information, Communication, and Technology (ICT) refers to the use of computer-based communication that incorporates into daily classroom instructional process. The aim of ICT integration has been pointed to improve and increase the quality, accessibility and cost-efficiency of the delivery of education while taking advantage of the benefits of networking learning communities together to equip them to face the challenges of global competition3, 19, 20. Usually, it included computer hardware and software application to fully support teaching and learning and information resources.

Process of adoption of ICT is not a single step but it is an ongoing and continuous process23, 30. As we are heading into the 21st century education, ICT use in school more specifically in the classroom is crucial because students are familiar with this technology and they will learn better within this environment. ICT integration in education generally means technology-based teaching and learning process that is closely related to the utilization of learning technologies in schools37.

This is due to the result of ICT integration in enhancing effectiveness of teaching and learning process. Moreover, 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 of the ICT elements and components18, 28. It is right to say that almost all ranges of subjects start from mathematics, science, languages, arts and humanistic and other major fields can be learnt more effectively through technology-based tools and equipment.

In addition, ICT provides the help and complementary supports for teaching and learning for both teacher and students where it involves effective learning with the aid of the computers to serve the purpose of learning aids19, 29. Computers and technology do not act as replacing tools but instead they are considered as an add-on to teachers in which it is the supplement needed for better teaching and learning. The use of ICT in education will greatly help the development of teachers as well as the students in terms of attitudes, abilities and skills related to effective use of ICT.

The need for ICT integration in education is crucial because information and communication technology can be used in million ways where it helps both teacher and students to learn about their respective subject area in school as well as own learning can be amended at home with condition that the students really master what they have learnt at school32. It is not one-stop learning but it is a
continual process of learning that discovered a lot of use and benefits from the technology provided.\textsuperscript{18}

A technology-based teaching and learning offers various interesting ways which include educational videos, stimulation, storage of data, the usage of databases, mind-mapping, guided discovery, brainstorming, music, worldwide web (www) and it will make the learning process more fulfilling and meaningful\textsuperscript{17}. On the other hand, students will benefit from ICT integration where they are not bound to the limited curriculum and resources, instead hands-on activities in the lesson designed for them to be able to stimulate their understanding about the lesson. It also helps teachers to design lesson plans in an effective, creative and interesting approach that would result in students’ active learning. Use of ICT in teaching for sure will enhance the learning process and maximize the students’ abilities in active learning.

Hermans, Tondeur, Van-Braak and Valcke\textsuperscript{16} 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 Power Point 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 allows 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\textsuperscript{16}.

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\textsuperscript{13} 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\textsuperscript{6}.

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 easily access to ICT tools whenever needed.\textsuperscript{18} 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 revealed that the schools with ICT infrastructure are supported by parents’ initiative or community power\textsuperscript{7}.

In most schools, technical difficulties sought to become a major problem and a source of frustration for students and teachers and caused 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\textsuperscript{18}. 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\textsuperscript{26} 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\textsuperscript{29}.

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 function 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\textsuperscript{16}. According to Winzenried, Dalgarno and Tinkler,\textsuperscript{28} 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\textsuperscript{16}.

Beyond basic skill training, schools had used a variety of strategies to provide further professional development for teachers. According to Warwick and Kershner,\textsuperscript{27} 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, followed by the supplement of all the ICT hardware and software facilities, continued by readiness and skills of teacher to integrate it into pedagogical process. 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 advanced in technology.

The main purpose of this study is to analyze the effectiveness of ICT integration. 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 provided 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 equipments 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. This has become a serious matter as many previous researches have proven that the usage of ICT in teaching and learning process could improve students’ achievement.

Many researchers have taken an effort to analyze the factors affecting teachers’ acceptance of ICT usage in the classrooms. It shows that the major barrier of the implementation was the teachers’ belief as the teachers are the persons who implement the change in their teaching and learning process. Moreover, previous research shows that the correlation of teachers’ belief and the uses of ICT are high. Teacher’s 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 has shown that students in school are having high expectation on ICT integration in classroom as the new generation is born and grown with technologies and could be defined as the digital – native phenomenon. The younger are the students, the higher their expectations are on ICT integration in classroom. It also proved that the integration of ICT is mostly dependent on the personal factors defined as self-perceptions. This research also shows 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. 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 show 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 represent 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 reformed 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. It shows that the teachers’ efficacy is decreasing as the years of experience and age increase 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 can 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 teacher’s efficacy belief is dependent on the school management and culture. Therefore, if the school has always implanted 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 stimulate 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.

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
producing critical thinking workforce to face and involve
the country in the global economy. 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 utilizing by ICT. As a
developing country, exploration of the factors 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
21. 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 7th 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 201321. 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 21. It
indicates that the ICT culture in schools should be
improved with using ICT among teachers in terms of
training 17. 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 to be creative;

2) To enable students to gain wider range of knowledge and
to 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 match the
capability of students as well as teachers in educational
experience due to the development of new information
technology. Results of a study 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 1,31.

Furthermore, only minority of teachers in Malaysia
professionally knows the basic of ICT. The majority of
them just had average knowledge in ICT. 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.

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.
Questionnaire was 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 questionnaire consists 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 look into teacher’s perception of ICT in teaching, section C consists of 10 items that look into the effectiveness of ICT integration in teaching for students in learning meanwhile section D comes with 10 items that look 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 Guven14 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.

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

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 referred as an Ethnic race in Sarawak.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Demographic Background of Respondents</th>
</tr>
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<tbody>
<tr>
<td>Factors</td>
<td>Frequency</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>82</td>
</tr>
<tr>
<td>Male</td>
<td>19</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>Malay</td>
<td>36</td>
</tr>
<tr>
<td>Indian</td>
<td>22</td>
</tr>
<tr>
<td>Chinese</td>
<td>39</td>
</tr>
<tr>
<td>Others</td>
<td>4</td>
</tr>
<tr>
<td>Teaching Experience</td>
<td>Frequency</td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>20</td>
</tr>
<tr>
<td>1-5 years</td>
<td>36</td>
</tr>
<tr>
<td>6-10 ears</td>
<td>34</td>
</tr>
<tr>
<td>&gt;10 years</td>
<td>11</td>
</tr>
<tr>
<td>Type of School</td>
<td>Frequency</td>
</tr>
<tr>
<td>Primary</td>
<td>37</td>
</tr>
<tr>
<td>Secondary</td>
<td>64</td>
</tr>
<tr>
<td>School Area</td>
<td>Frequency</td>
</tr>
<tr>
<td>Urban</td>
<td>79</td>
</tr>
<tr>
<td>Rural</td>
<td>22</td>
</tr>
<tr>
<td>Preference of Teaching Style</td>
<td>Frequency</td>
</tr>
<tr>
<td>Conventional/Traditional</td>
<td>42</td>
</tr>
<tr>
<td>Modern/Contemporary (Use of ICT)</td>
<td>59</td>
</tr>
<tr>
<td>Highest Academic Qualification</td>
<td>Frequency</td>
</tr>
<tr>
<td>Diploma</td>
<td>10</td>
</tr>
<tr>
<td>Degree</td>
<td>63</td>
</tr>
<tr>
<td>KPLI</td>
<td>19</td>
</tr>
<tr>
<td>Master</td>
<td>9</td>
</tr>
<tr>
<td>The Ability of Handling ICT in Teaching</td>
<td>Frequency</td>
</tr>
<tr>
<td>High</td>
<td>25</td>
</tr>
<tr>
<td>Medium</td>
<td>67</td>
</tr>
<tr>
<td>Low</td>
<td>9</td>
</tr>
</tbody>
</table>

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%).

### Table 2
Teacher’s Perception of ICT Integration in Teaching

<table>
<thead>
<tr>
<th>S. N.</th>
<th>STATEMENT</th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
<th>MEAN</th>
<th>S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency and Percentage (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>I feel confident learning new computer skills.</td>
<td>0 (5.9%)</td>
<td>6 (11.9%)</td>
<td>70 (69.3%)</td>
<td>25 (24.8%)</td>
<td>1.81</td>
<td>0.52</td>
</tr>
<tr>
<td>2.</td>
<td>I find it easier to teach by using ICT</td>
<td>0 (11.9%)</td>
<td>12 (19.8%)</td>
<td>70 (69.3%)</td>
<td>19 (18.8%)</td>
<td>1.93</td>
<td>0.55</td>
</tr>
<tr>
<td>3.</td>
<td>I am aware of the great opportunities that ICT offers for effective teaching.</td>
<td>0 (7.9%)</td>
<td>8 (13.6%)</td>
<td>57 (56.4%)</td>
<td>36 (35.6%)</td>
<td>1.72</td>
<td>0.60</td>
</tr>
<tr>
<td>4.</td>
<td>I think that ICT supported teaching makes learning more effective.</td>
<td>1 (1% )</td>
<td>8 (8.9%)</td>
<td>54 (53.5%)</td>
<td>38 (37.6%)</td>
<td>1.72</td>
<td>0.65</td>
</tr>
<tr>
<td>5.</td>
<td>The use of ICT helps teachers to improve teaching with more updated materials.</td>
<td>1 (1%)</td>
<td>6 (11.9%)</td>
<td>56 (55.4%)</td>
<td>38 (37.6%)</td>
<td>1.70</td>
<td>0.63</td>
</tr>
<tr>
<td>6.</td>
<td>I think the use of ICT improves the quality of teaching.</td>
<td>1 (1%)</td>
<td>8 (15.9%)</td>
<td>61 (60.4%)</td>
<td>31 (30.7%)</td>
<td>1.79</td>
<td>0.62</td>
</tr>
<tr>
<td>7.</td>
<td>I think the use of ICT helps to prepare teaching resources and materials.</td>
<td>1 (1%)</td>
<td>10 (18.8%)</td>
<td>59 (57.4%)</td>
<td>31 (30.7%)</td>
<td>1.81</td>
<td>0.64</td>
</tr>
<tr>
<td>8.</td>
<td>The use of ICT enables the students’ to be more active and engaging in the lesson.</td>
<td>0 (9.9%)</td>
<td>9 (16.7%)</td>
<td>58 (57.4%)</td>
<td>34 (33.7%)</td>
<td>1.75</td>
<td>0.61</td>
</tr>
<tr>
<td>9.</td>
<td>I have more time to cater to students’ need if ICT is used in teaching.</td>
<td>0 (25.7%)</td>
<td>26 (54.5%)</td>
<td>55 (54.5%)</td>
<td>20 (19.8%)</td>
<td>2.06</td>
<td>0.68</td>
</tr>
<tr>
<td>10.</td>
<td>I can still have an effective teaching without the use of ICT.</td>
<td>3 (18.8%)</td>
<td>19 (10.9%)</td>
<td>58 (34.7%)</td>
<td>21 (20.8%)</td>
<td>2.04</td>
<td>0.72</td>
</tr>
<tr>
<td>11.</td>
<td>I think the use of ICT in teaching is a waste of time.</td>
<td>24 (23.8%)</td>
<td>48 (47.5%)</td>
<td>27 (26.7%)</td>
<td>2 (2%)</td>
<td>2.93</td>
<td>0.76</td>
</tr>
<tr>
<td>12.</td>
<td>I am confident that my students’ learn best without the help of ICT.</td>
<td>12 (11.9%)</td>
<td>63 (62.4%)</td>
<td>23 (22.8%)</td>
<td>3 (3%)</td>
<td>2.83</td>
<td>0.66</td>
</tr>
<tr>
<td>13.</td>
<td>The classroom management is out of control if ICT is used in teaching.</td>
<td>23 (22.8%)</td>
<td>54 (53.5%)</td>
<td>22 (21.8%)</td>
<td>2 (2%)</td>
<td>2.97</td>
<td>0.73</td>
</tr>
<tr>
<td>14.</td>
<td>Students’ pay less attention when ICT is used in teaching.</td>
<td>24 (23.8%)</td>
<td>54 (53.5%)</td>
<td>23 (22.8%)</td>
<td>0 (0%)</td>
<td>3.01</td>
<td>0.69</td>
</tr>
<tr>
<td>15.</td>
<td>Students’ makes no effort for their lesson if ICT is used in teaching.</td>
<td>23 (22.8%)</td>
<td>56 (55.4%)</td>
<td>20 (19.8%)</td>
<td>2 (2%)</td>
<td>2.99</td>
<td>0.71</td>
</tr>
</tbody>
</table>
Teachers Perception on Technology-based Teaching and Learning: From the data obtained above 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 showing 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.

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 were 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 they feel 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 believe in the conventional way of teaching where teachers are the centre 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 need 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 in 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 is 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 making 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 causes 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 being too dependent on ICT and not taking responsibility for their own independent learning which frustrates and disappoints the teachers.

Effectiveness of Technology-based Teaching and Learning for Students: The results obtained from the data 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. Previously, 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 provides 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, a lot of educational videos were provided for students online helping 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 to make the best use of their learning process.

The result shows that the effectiveness of ICT for students in learning is that it encourages students to communicate more with their classmates as well as it increases the
student’s 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

<table>
<thead>
<tr>
<th>S.N.</th>
<th>STATEMENT</th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
<th>MEAN</th>
<th>S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ICT allows students’ to be more creative and imaginative.</td>
<td>1 (1%)</td>
<td>7 (6.9%)</td>
<td>64 (63.4%)</td>
<td>29 (28.7%)</td>
<td>1.80</td>
<td>0.60</td>
</tr>
<tr>
<td>2</td>
<td>The use of ICT helps students to find related knowledge and information for learning.</td>
<td>1 (1%)</td>
<td>4 (4%)</td>
<td>61 (60.4%)</td>
<td>35 (34.7%)</td>
<td>1.71</td>
<td>0.59</td>
</tr>
<tr>
<td>3</td>
<td>The use of ICT encourages students to communicate more with their classmates.</td>
<td>11 (10.9%)</td>
<td>0</td>
<td>63 (62.4%)</td>
<td>27 (26.7%)</td>
<td>1.84</td>
<td>0.60</td>
</tr>
<tr>
<td>4</td>
<td>The use of ICT increases students’ confidence to participate actively in the class.</td>
<td>10 (9.9%)</td>
<td>0</td>
<td>65 (64.4%)</td>
<td>26 (25.7%)</td>
<td>1.84</td>
<td>0.58</td>
</tr>
<tr>
<td>5</td>
<td>I think students learn more effectively with the use of ICT.</td>
<td>6 (5.9%)</td>
<td>0</td>
<td>60 (59.4%)</td>
<td>35 (34.7%)</td>
<td>1.71</td>
<td>0.57</td>
</tr>
<tr>
<td>6</td>
<td>I think the use of ICT helps to broaden students’ knowledge paradigm.</td>
<td>8 (7.9%)</td>
<td>0</td>
<td>54 (53.5%)</td>
<td>39 (38.6%)</td>
<td>1.69</td>
<td>0.61</td>
</tr>
<tr>
<td>7</td>
<td>I think the use of ICT helps to improve students’ ability specifically in reading, writing.</td>
<td>10 (9.9%)</td>
<td>0</td>
<td>53 (52.5%)</td>
<td>38 (37.6%)</td>
<td>1.72</td>
<td>0.63</td>
</tr>
<tr>
<td>8</td>
<td>The students’ are more behaved and under control with the use of ICT.</td>
<td>2 (2%)</td>
<td>16 (15.8%)</td>
<td>51 (50.5%)</td>
<td>32 (31.7%)</td>
<td>1.88</td>
<td>0.74</td>
</tr>
<tr>
<td>9</td>
<td>The use of ICT enables students’ to express their ideas and thoughts better</td>
<td>3 (3%)</td>
<td>13 (12.9%)</td>
<td>47 (46.5%)</td>
<td>38 (37.6%)</td>
<td>1.81</td>
<td>0.77</td>
</tr>
<tr>
<td>10</td>
<td>The use of ICT promotes active and engaging lesson for students’ best learning experience.</td>
<td>1 (1%)</td>
<td>6 (5.9%)</td>
<td>53 (52.5%)</td>
<td>41 (40.6%)</td>
<td>1.67</td>
<td>0.63</td>
</tr>
</tbody>
</table>
Table 4  
Effective Elements in ICT Integration in Teaching and Learning in Public Schools

<table>
<thead>
<tr>
<th>S.N.</th>
<th>STATEMENT</th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
<th>MEAN</th>
<th>S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The ICT facilities in my school are well-functioning and can be used.</td>
<td>34 (33.7%)</td>
<td>36 (35.6%)</td>
<td>22 (21.8%)</td>
<td>9 (8.9%)</td>
<td>2.94</td>
<td>0.96</td>
</tr>
<tr>
<td>2.</td>
<td>The technical supports are provided if teachers are faced with difficulties.</td>
<td>29 (28.7%)</td>
<td>36 (35.6%)</td>
<td>26 (25.7%)</td>
<td>10 (9.9%)</td>
<td>2.83</td>
<td>0.96</td>
</tr>
<tr>
<td>3.</td>
<td>Little access to ICT prevents me from using it in teaching.</td>
<td>3 (3%)</td>
<td>16 (15.8%)</td>
<td>62 (61.4%)</td>
<td>20 (19.8%)</td>
<td>2.02</td>
<td>0.69</td>
</tr>
<tr>
<td>4.</td>
<td>Lack of supports from the school top management discourage me from using ICT.</td>
<td>6 (5.9%)</td>
<td>20 (19.8%)</td>
<td>51 (50.5%)</td>
<td>24 (23.8%)</td>
<td>2.08</td>
<td>0.82</td>
</tr>
<tr>
<td>5.</td>
<td>Teaching time are not enough for me to use the ICT for teaching and learning purposes.</td>
<td>1 (1%)</td>
<td>21 (20.8%)</td>
<td>53 (52.5%)</td>
<td>26 (25.7%)</td>
<td>1.97</td>
<td>0.71</td>
</tr>
<tr>
<td>6.</td>
<td>There is enough training and professional development provided for teachers about ICT use in teaching.</td>
<td>19 (18.8%)</td>
<td>57 (56.4%)</td>
<td>17 (16.8%)</td>
<td>8 (7.9%)</td>
<td>2.86</td>
<td>0.81</td>
</tr>
<tr>
<td>7.</td>
<td>All ICT tools in my school go to waste and less used by teachers.</td>
<td>6 (5.9%)</td>
<td>21 (20.8%)</td>
<td>39 (38.6%)</td>
<td>35 (34.7%)</td>
<td>1.98</td>
<td>0.89</td>
</tr>
<tr>
<td>8.</td>
<td>Teachers are given more time to learn and be comfortable with the use of ICT in teaching.</td>
<td>25 (24.8%)</td>
<td>55 (54.5%)</td>
<td>17 (16.8%)</td>
<td>4 (4%)</td>
<td>3.00</td>
<td>0.76</td>
</tr>
<tr>
<td>9.</td>
<td>There is computer lab in my school in which I can bring students there to watch educational videos.</td>
<td>28 (27.7%)</td>
<td>34 (33.7%)</td>
<td>29 (28.7%)</td>
<td>10 (9.9%)</td>
<td>2.79</td>
<td>0.96</td>
</tr>
<tr>
<td>10.</td>
<td>Teachers’ are given the freedom to design their own teaching with the helps from the ICT.</td>
<td>26 (25.7%)</td>
<td>33 (32.7%)</td>
<td>33 (32.7%)</td>
<td>9 (8.9%)</td>
<td>2.75</td>
<td>0.94</td>
</tr>
</tbody>
</table>

Some teachers feel the urge and motivation to use ICT in teaching but there is lack of support from the school top management that hinders and discourages 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 benefit both teaching and learning process.

Besides, teachers are not given the freedom; they need to design their own teaching with the help 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 chance to integrate the use of ICT in their learning process that shows 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 remember to keep it in track with the curriculum designed by the Ministry of Education (MOE).

Technical supports are not at par if teachers 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 successful 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 finding 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 to be comfortable with ICT for them to explore its use and make the best use of it.

The overall findings show that there are no 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 some suggestions and recommendations for teachers and school top management to cater to this issue found from the research conducted towards teachers.

**Hypothesis Testing**

In this study, the Mann-Whitney U Test is used to test the hypothesis developed by the researcher. 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.

**H0**: There is no significance difference between teacher’s perception of ICT in teaching with the type of school (Primary and Secondary).

From the result, 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.

**Discussion and Conclusion**

The results of this study show that technology-based teaching and learning is more effective in comparison 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 previous research findings 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 lessons designed are more engaging and interesting. Accordingly, the participants agreed that integrating ICT can foster students’ learning.

<table>
<thead>
<tr>
<th>Type of School</th>
<th>N</th>
<th>Median</th>
<th>Range</th>
<th>Mean Rank</th>
<th>Mann-Whitney U</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score_B Primary</td>
<td>37</td>
<td>2.33</td>
<td>2.20-2.33</td>
<td>59.89</td>
<td>855.00</td>
<td>0.02**</td>
</tr>
<tr>
<td>Secondary</td>
<td>64</td>
<td>2.20</td>
<td>1.95-2.33</td>
<td>45.86</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6**

Mann-Whitney U-test between The Effectiveness of ICT Integration for Students in Learning with School Area

<table>
<thead>
<tr>
<th>School Area</th>
<th>N</th>
<th>Median</th>
<th>Range</th>
<th>Mean Rank</th>
<th>Mann-Whitney U</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score_C City</td>
<td>79</td>
<td>1.60</td>
<td>1.40-2.00</td>
<td>46.92</td>
<td>547.00</td>
<td>0.01**</td>
</tr>
<tr>
<td>Rural</td>
<td>22</td>
<td>2.00</td>
<td>1.60-2.35</td>
<td>65.64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 5**

Mann-Whitney U-test between Teacher’s Perception of ICT Integration and School’s Type

**Table 6**

Mann-Whitney U-test between The Effectiveness of ICT Integration for Students in Learning with School Area

<table>
<thead>
<tr>
<th>School Area</th>
<th>N</th>
<th>Median</th>
<th>Range</th>
<th>Mean Rank</th>
<th>Mann-Whitney U</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score_C City</td>
<td>79</td>
<td>1.60</td>
<td>1.40-2.00</td>
<td>46.92</td>
<td>547.00</td>
<td>0.01**</td>
</tr>
<tr>
<td>Rural</td>
<td>22</td>
<td>2.00</td>
<td>1.60-2.35</td>
<td>65.64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**** Significant P < 0.05
Results of a previous study\textsuperscript{33} 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 where 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 expands 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 comparison to previous study,\textsuperscript{25} it shows that 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 neither 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 conditions of computer lab are not very good in school with well-functioning tools and facilities.

In conclusion, the very first stage of ICT implementation must be effective to make sure that teacher 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 takes place appropriately from the very beginning stage and the continuous maintenance is 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. Teachers’ role is the key role in making any of the new policy to be implemented efficiently and successfully. The change 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.

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