



A CASE STUDY: OBSTRUCTIONS ENCUMBERING THE TEACHER'S INCORPORATION OF ICT IN ENGLISH CLASSROOMS

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Abstract:

The government has declared that all Malaysians that no one; both in rural and urban areas; would be divested from the Information and Communication Technology (ICT) development. This calls for a need for teachers nationwide to make essential adjustments to the teaching and learning process. This paper takes a closer gaze on the obstructions faced by teachers in integrating ICT tools in teaching English language in the classrooms. This study aspires at determining why the teachers do not use ICT in the classrooms even they were utterly encouraged by sufficient technical supports. 10 English teachers from a Secondary School were interviewed and their views and thoughts were discussed. The findings exposed that even the school is highly resourced with ICT tools and facilities, obstructions such as lack of time, amount of workload, lack of ICT skills and teachers' negative attitudes towards ICT were hindering the teachers to incorporate ICT in their teaching. However, the teachers should be competent to shape and systematize their learning environment in non-traditional ways by merging the ICT with new pedagogy.

Keywords:

Information and Communication Technology (ICT), Teachers and ICT, Obstructions encumbering the Teachers' incorporation, teaching, learning process.

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1. INTRODUCTION

Initially a child is brought up with an ability to read, write, and count. However, skills in ICTs are becoming another essential capability for the child to acquire. According to Ferrero (2002), the present young people, the so-called Net Generation usually adapt quickly to technological and are considered to master these technological devices better than adults. Consequently, the Net Generation impacts the situation in the schools. So, the schools also have been faced with a new social and cultural transformation that challenges teachers and students in relation to their technical ability, knowledge and expertise in the use of ICT. Practically the key predictor of student learning is the quality of teachers (Ololube, 2006). Once the Ministry of Education has formulated the policy "ICT for all students" in 2012, the curriculum was transformed and started to emphasize ICT integration in teaching and learning (Chan, 2002). So, teachers must be good



at integrating the ICT into their lessons. On the other hand, the schools are also expanding an extensive part of their annual budget on maintaining the ICT tools.

STATEMENT OF THE PROBLEM

There have been worldwide changes taking place in the teaching and learning process towards the use of ICT tools. However, the success of such innovation depends greatly on teachers' adoption of ICT in English classroom. The school in this case study is an Independent Chinese Secondary School that was set up with lots of facilities for integrating ICT in teacher's teaching and learning. From the observation, although the school was highly resourced with ICT tools, there were numbers of teachers refused to integrate those ICT tools into their teaching and learning.

RESEARCH QUESTION

Why do teachers do not use ICT tools in the English classrooms even the ICT resources are well equipped and maintained in the school?

2. LITERATURE REVIEW

2.1. MEANING OF ICT

ICT stands for information and communication technology and are defined as a diverse set of technological tools and resources such as computers, the Internet, broadcasting technologies (radio and television), and telephone which are used to communicate, and to create, disseminate, store, and manage information (Tinio, 2003). Meanwhile, according to Toomey (2001), the technologies could include hardware (e.g. computers and other devices); software applications; and connectivity (e.g. access to the Internet, local networking infrastructure, and video conferencing) that are used for accessing, gathering, manipulating and presenting or communicating information.

2.2. ICT IN TEACHING

Carmen et al. (2003) stated that integrating ICT tools in teaching could enhance students' learning competencies and provide opportunities for communication. Meanwhile, according to Guha (2003), the teacher becomes a coach and collaborator and not just a dispenser of knowledge. He also asserted that ICT can improve the efficiency and effectiveness of the process of teaching and learning. The use of ICT in teaching and learning is inevitable and must be part of teachers' professional repertoire (Angers and Machtmes 2005).



Besides that, studies of North Central Religion Educational Laboratory (2002) showed that teachers' use application of technology was the key determining factor for improving student performance in knowledge acquisition and skills development enabled by technology. Plomp et.al (1996) identified three objectives which distinguish the use of ICT in education such as, the use of ICT as object of study, an aspect of a discipline or profession and a medium for teaching and learning. Consequently, teachers are expected to adopt and integrate the modern teaching technology and develop effective teaching resources.

Teachers' attitude towards the use of technology in teaching and learning process is one of the main factors for achieving a meaningful use of computer technology in the field of education. Albirini (2006), Baylor & Ritchie (2002) stated that the success of technology use in the educational settings largely depends on teachers' attitudes toward technology use. Moreover, teachers' attitudes are considered as a major predictor of the use of new technologies in the educational settings (Albirini, 2006). Therefore, their attitudes towards computer can play an important role in the acceptance and actual use of computers.

Kluever, Lam, Hoffman, Green & Swearinges (1994) also support that the successful utilization of technologies in the classroom depends mainly on the teachers' attitudes toward these tools in adopting and integrating. Hence, it can be concluded that teachers' attitudes have direct impact on the usage frequency of technology and usage amount of the technology.

2.3. BARRIERS IN INTEGRATING ICT

Studies reveal a number of factors which influence teachers' decisions to use ICT in the classroom. According to Schiller (2003), personal characteristics such as educational level, age, gender, educational experience, experience with the computer for educational purpose and attitude towards computers can influence the adoption of a technology. The study conducted by John (2004) discovered 7 barriers affected the integration of ICT into lessons: lack of confidence among teachers during integration, lack of access resources, lack of time for the integration, lack of effective training facing technical problems in use, lack of personal access during lesson preparation and age of the teachers and teaching experiences.

Meanwhile, Kumar et al (2008) found attitude, motivation, gender, age and computer training have effects on the Actual Usage of Computers (AUC) by teachers. According to Sang et al (2009) and Zhao & Cziko (2001), teachers' educational beliefs impact on their use of ICT. Besides, Richardson (2009) claimed that the ICT integration in teaching is still difficult for some teachers due to lack of training and practice.

Jones (2004) and Keong et al (2005) determined that lack of technical support was a barrier to the successful integration of ICT in teaching. Lack of technical support discourages teachers from adopting and integrating technology in classrooms, a study by (Korte & Husing, 2007). Becta (2004) also agreed lack of technical support available in schools and technical



maintenance is the main problem in integrating ICT in classrooms. Thus, there are still several factors hindering the integration of ICT into lessons. Hare (2007) also stated that lack of policy framework, inadequate infrastructure and high cost, and inadequate in-service training on ICT integration in education.

3. THE STUDY

A case study approach is used in this research to identify why teachers do not use ICT tools in their English Language classrooms even though the school is fully resourced with ICT tools. A total of 12 English teachers from an Independent Chinese Secondary School which is highly resourced with ICT tools and facilities were involved in this research. They were interviewed informally and individually. They were asked why they do not use ICT tools in their English classrooms. Their views and reasons were transcribed and analyzed in findings.

4. RESULTS

The respondents shared their reasons and views as in Table 1.

Table 1: Teachers' responses

Teacher 1	I'm teaching English to Form 1. Previously I was keen to use ICT tools especially computers and projectors, videos, audio and so on to create an enjoyable classroom. Once the educational system of Malaysia has changed the assessment styles, I was forced to finish my syllabus and the PBS assessment. There is no time to use ICT tools in the classroom.
Teacher 2	I'm teaching form 3 which the class is going to sit for the PMR examination at the end of the year. So, my concentration was more to the syllabus, exercises and practices. Hence, I think, it is inappropriate to use ICT tools for the examinations classes. In addition, it's very difficult to access students' responses if we use the ICT tools. Smart and easily catch up students could do better. Meanwhile, the slow learners need more guidance. Therefore, I could not use ICT tools in my teaching.
Teacher 3	I have 10 years of teaching experiences. So, I'm very convenient in using my own manual ways and I did not grow up in the technological environment. I prefer



	reality experiences rather than looking at monitors. So, applying ICT tools in English classrooms is not effective. However, traditional forms are more effective.
Teacher 4	I am too old to adapt to the new teaching styles and I am happy with my own teaching style. Actually, I don't like to use computers. Let the young people learn about it. It won't be use to me anymore.
Teacher 5	Some of my students like to chit-chat with their friends whenever I use the computer in the classroom. I could not pay full attention to all the students at one time because I have about 55 students in each class. So, the students took this as their advantage and lost their concentration on studies. Besides, I'm busy with completing the syllabus and other administrative tasks. So, I don't have enough time to go through the lessons via ICT tools.
Teacher 6	I'm teaching form 5 classes. I think, using images, colours and music to create an interactive classroom is not applicable for 17 years old students. They are matured enough and they need to prepare themselves for examinations. So, I'm glad with my traditional method and in fact traditional methods of teaching are effective than the modern methods. Moreover, I'm not a fancy of computers or other ICT tools. So, I do not to prefer to attend any ICT training.
Teacher 7	I am just trapped whenever preparing the lesson materials and question paper because I'm very poor in using the tools in computer. Moreover, it takes long time for typing. So, not enough of ICT competence and knowledge is my problem. I should go for more ICT trainings to develop my skills.
Teacher 8	I am young and I'm proficient enough to use ICT tools. But, using ICT in English classes is really time consuming. There is no time to finish up the syllabus and prepare the students for examination. I need to mark all their grammar,



	vocabulary, composition, literature, comprehension and additional exercise books. So, it's hard for language teachers to incorporate the ICT tools in their teaching and learning activities.
Teacher 9	My age is 53 and I have been teaching English more than 25 years. I think this is not the time for ICT integration in my teaching. I believe in traditional method which let the students touch, feel and learn. I could make interactive lesson without using the ICT tools.
Teacher 10	I have more than 50 students in each class. I am tired of marking the student's books and examination papers plus writing the record book every day. Integrating ICT tools in teaching and learning is really headache and so much of burden.
Teacher 11	I have no enough skills to incorporate ICT tools in my teaching because I did not attend any ICT training. I really need more guidance and help from the other teachers in preparing examination papers itself. So, I don't think so it's easy for me to integrate the ICT tools in teaching and learning process.
Teacher 12	There is no any problem in using ICT but using ICT tools in English lessons is waste of time. Because, 1 period is just 40 minutes and the limited time is really not enough to set up all those ICT tools and start the lesson.

4. DISCUSSION

Eventually, the voices brought up several important issues as the barriers for the ICT adoption and integration into the English language classroom.

4.1. LACK OF TIME

One of the factors that influence on the teachers' decision to integrate ICT was the availability of time. Out of 12 teachers, 4 teachers (33.33%) affirmed that lack of time as a barrier to integrate



ICT in the classrooms. They felt that there was no time given for them to plan and to integrate ICT into the lesson since they were extremely busy in achieving the goals of syllabus.

According to Dang (2011), the lesson preparation using ICT is time consuming because as the rule of thumb, one hour of ICT- enhanced lesson requires about 3 to 4 hours preparation. Thus, the teachers faced problem either in preparing the lessons or in conducting the lessons in the limited time. Moreover, the teachers need additional time to set up all those ICT tools in the classrooms. So, the teachers felt that they could accomplish their tasks in their periods instead of setting up the ICT tools.

Kozma et al. (2004) also claimed that the biggest barriers to the use of computers by teachers were the lack of time available in classes and in their own schedules for planning.

4.2.WORKLOADS

Meanwhile, 4 teachers (33.33%) highlighted the workloads problem. The teachers said that they are over-loaded with administrative tasks such as preparation of report cards, making attendance reports, filling the record book and form. The teachers also do not wish to incorporate ICT tools into lessons because of their concentrations on examinations and syllabus. Some teachers were afraid that they could not finish the syllabus in time. They also revealed that ICT is difficult to integrate in the classes which consist of large number of students. The teachers were stuffed with the tasks of marking examination papers, students' exercise books and workbooks. Therefore, the teachers are stressed that workload is a major barrier for them to integrate ICT tools in the English language classrooms. Similar problem was highlighted by Abuhmaid (2011), the teachers were already overloaded and they could not cope with the pressure to prepare and practice the ICT integration into lessons.

Moreover, the transformation and innovation of national educational system and the independent school's syllabus increases the teachers' workload. They have to prepare different assessment and worksheets for students in their midst of busy working schedule.

4.3.TEACHING EXPERIENCES AND AGE

There are several studies found that teaching experiences and age influence the successful use of ICT in classrooms (Wong & Li, 2008; Giordano, 2007; Hernandez-Ramos, 2005). Similar findings can be found in the research carried out by Gorder (2008) which was reported that teacher experience is significantly correlated with the actual use of technology. She discovered that effective use of computer was related to technological comfort levels and the liberty to shape instruction to teacher-perceived student needs.



Accordingly, 3 teachers (25%) indicated that their age and teaching experiences were the barriers to adopt the ICT integration into their lessons. The older teachers with more experience in teaching did not prefer to use ICT tools in their English classes.

In the past years, the educational system was entirely different compared to this net era. The curriculum emphasized the traditional method in conventional ways such as the use of textbook learning, rote learning, spoon feeding technique, rote memorization, and learning which is limited to the two covers of the books and the four walls of the room (PAFTE 2004). Therefore, the teachers who were used to the traditional method do not desire to use the modern tools into their lessons.

Besides, some older teachers critiqued themselves too old to adapt to the new ICT tools and do not want to accept the new methods of teaching. It can clearly see that the older and more experienced teachers do not acquire the new skills because of their impatience and tenacity towards the technologies.

4.4.LACK OF ICT SKILLS

Among the 12 teachers, 2 teachers (16.67%) brought up the issue of poor ICT skills as an obstacle for them to incorporate the ICT tools in English language classrooms. They did not get proper training on ICT tools, therefore, they could not feel confident or competence in using the ICT. The teachers did not receive any ICT training at the teachers' training colleges or universities where they trained and therefore, they did not get chances to understand the significant roles of the ICT tools. Moreover, the teachers do not take any initiative to learn and improve their ICT competence. Knezek and Christensen (2002) stated that teachers' competence with computer technology is a key factor of effective use of ICT in teaching. So, the teachers who do not have ICT competence could not integrate the ICT tools in their teaching.

Some other research studies such as Albalat & Tarrago, 1995; Braak, 2001; Chu, 2000; Hodgson, 1995; Vanderlinde, Braak & Hermans, 2009; Venezky, 2004 also agreed that effective use of computers is reliant on the teachers' ICT skills as well as their intentions towards ICT use (Divaharan and Ping, 2010).

Divaharan and Koh (2010) also claimed that teachers' professional development has to concentrate on both ICT skills training and appropriate ICT integration strategies in the curriculum. Therefore, the teachers need knowledge of appropriate ICT integration approaches and ICT skills to successfully incorporate the ICT tools into their lessons.

4.5.NEGATIVE ATTITUDE OF TEACHERS

According to Jones (2001), the attitudes of teachers towards technology greatly influence their adoption and integration of computers into their teaching. Interviews with the teachers revealed



that their negative attitude towards the use of ICT is a major barrier for ICT integration and utilization in the English language classrooms. All of them are using the traditional method for teaching English language in their classroom because of their less motivation, acceptance and readiness towards the ICT integrating and adoption in teaching and learning process. According to the respondents' feedback, attitudes such as listed below are the major obstacles for teachers to integrate ICT tools in their lessons.

- i) Focusing on syllabus and rushing to finish it
- ii) Concentrating on fulfilling the teachers' tasks and responsibilities
- iii) Examination classes like PMR and SPM students should not enjoy the ICT integration into the lessons
- iv) Students are matured enough, so they do not need audio or visual strategies for teaching
- v) Classrooms with large number of students are not suitable for ICT incorporation
- vi) Difficult to manage students if ICT was used in the classrooms
- vii) Older or experienced teachers should not accept and adapt to the changes because they are old
- viii) Older or experienced teachers do not want to receive any training on ICT in order to improve their ICT competence
- ix) View as traditional method is always effective ways

In view of that, Hennessy et al. (2010) indicated teachers' attitudes, expertise, lack of autonomy, and lack of knowledge to evaluate the use of and role of ICT in teaching (technophobia in teachers) that are the prominent factors hindering teachers' readiness and confidence in using ICT support.

Some of the teachers were enthusiastic to integrate IT tools in English teaching and learning but during the implementation stage their keenness decrease and they fall back to their traditional mode of teaching. It is very to change the teachers' mindset but, at the same time the teachers should aware and update their professional development.

In sum, once the teachers were asked why they do not use ICT tools in their English classrooms even though the school is fully supported with highly resourced technical and maintenance, some major barriers were found such as, lack of available time, workloads, teaching experiences and age, lack of ICT skills and the negative attitudes of teachers.

5. CONCLUSION AND IMPLICATIONS

In order to overcome the barriers, the teachers should capable to form and organize their learning environment in non-traditional ways by merging the ICT with new pedagogy. So, the teachers



need a very different shape of classroom management skills to be developed. Moreover, they should learn and acquire the innovative ways of integrating ICT to enhance teaching and learning process. The teachers who rooted in the traditional method should accept the technological changes and need to develop their teaching professionalism.

Meanwhile, ongoing training, flexible time and task arrangement for teachers are necessary in order to provide opportunities for them to incorporate ICT resources into their teaching. The schools should play an important role in reducing teachers' burdens and workloads by structuring the administrative tasks and teachers' tasks. According to the respondents' responses, the school managements can hire some clerks in order to manage the academic administrative tasks. In addition, trainings, motivation and encouragement should be given to the teachers to diminish their negative attitudes towards the ICT. The changes and development of ICT is skyrocketing. The young have already mingled with this digital world. So, the teachers should realize this reformation and should be more advanced than the students to perform along with the students' expectations.

6. REFERENCES

- [1] Abuhmaih, A. (2011). *ICT training courses for teacher professional development in Jordan. Turkish Online Journal of Educational Technology, vol .10, no. 4, pp. 195-210.*
- [2] Albirini, A. A. (2004). *An exploration of the factors associated with the attitudes of high School EFL teachers in Syria toward information and communication technology. Unpublished thesis The Ohio State University.*
- [3] Albirini, A. A. (2006). *Teacher's attitudes toward information and communication technologies: the case of Syrian EFL teachers. Journal of Computers and Education, 47, 373-398.*
- [4] Angers, J., & Machtmes, K. (2005). *An ethnographic-case study of beliefs, context factors, And practices of teachers integrating technology. The Qualitative Report, 10(4), 771-794.*
- [5] Baek, Y.G., Jong, J., & Kim, B. (2008). *What makes teachers use of technology in the classroom? Exploring the factors affecting facilitation of technology with a Korean sample. Computers and Education, vol.50, no 8, pp. 224-234.*
- [6] Bloom, R. (2003). *Teachers, computes and curriculum. Microcomputers in the classroom. Needham Heights, Mass: Simon & Shuster Co.*
- [7] Boakye, K.B., Banini, D.A. 2008. *Teacher ICT Readiness in Ghana. . In K. Toure, T.M.S. Tchombe, & T. Karsenti (Eds.), ICT and Changing Mindsets in Education. Bamenda, Cameroon*
- [8] Bordbar, F. (2010). *English teachers' attitudes toward computer-assisted language learning. International Journal of Language Studies, vol. 4, no. 3, pp. 27-54*
- [9] Carmen et al. (2003) *Use of ICTs and the Perception of ELearning among University Students: A Differential Perspective according to Gender and Degree Year Group in Interactive Educational Multimedia, No 7 pp. 1328*



- [10] Dang, X.T. (2011) *Factors Influencing Teacher's Use of ICT in Language Teaching: A Case Study of Hanoi University Vietnam, International Conference "ICT for Language Learning"*.
- [11] Divaharan, S. & Koh, J. H. L. (2010). *Learning as students to become better teachers: Pre-service teachers' IWB learning experience. In M. Thomas & A. Jones (Eds), Interactive whiteboards: An Australasian perspective. Australasian Journal of Educational Technology, 26(Special issue, 4), 553-570.*
- [12] Divaharan, S. & Ping, L. C. (2010) *Secondary School Socio- Cultural Context influencing integration: A case study approach. Australian Journal of Education Technology, 26(6), 741-763*
- [13] Giordano, V. (2007). *A professional development model to promote internet integration into P- 12 teachers' practice: A mixed method study. Computers in the schools, vol.24 no.3/4, pp.111-123*
- [14] Guha, S. (2003). *Are we all technically prepared? Teachers' perspective on the causes of comfort or discomfort in using computers at elementary grade teaching. Information Technology in Childhood Education Annual, 317-349.*
- [15] Hare, H. (2007) *'ICT in education in Tanzania', in G. Farrell, S. Isaacs & M. Trucano (ed.), Survey of ICT and Education in Africa: 53 Country Reports, DC: infoDev / World Bank Washington.*
- [16] Hennessy, S. Harriossn, D. Wamakote, L. (2010) *Teacher Factors Influencing Classroom use of ICT in Sub- Saharan Africa, Itupale Online-Journal of African Studies, 39-54*
- [17] Hernandez-Ramos, P. (2005). *If not here, where? Understanding teachers use of technology in Silicon valley schools. Journal of Research on Technology in education, vol. 38, no. 1, pp. 39-64.*
- [18] Jones, C.A. (2001) *Teach Support: Preparing teachers to use technology. Principal Leadership, vol. 1, no. 9, pp. 35-39.*
- [19] Jones, A. 2004. *A Review of the Research Literature on Barriers to the Uptake of ICT by Teachers. UK: Becta.* Jung, I. (2001). *Singapore's approach to preparing new teachers to use technology in the classroom. Jurong: SUNY Press.*
- [20] Keong, C.C, Horani, S. and Daniel J. (2005). *A Study on the Use of ICT in Mathematics Teaching. Malaysian Online Journal of Instructional Technology. 2(3), pp. 43-51.*
- [21] Kozma, R. B. & McGhee, R. (2003). *ICT and innovative classroom practices. In R. B. Kozma (Ed.), Technology, innovation, and educational change: A global perspective (pp.40–80). Eugene, OR: International Society for Educational Technology.*
- [22] Knezek, G., & Christensen, R. (2002). *Impact of new information technologies on teachers and students. Education and Information Technologies, 7(4), 369–376.*
- [23] Kumar, N., Rose, R.C. and D'Silva, J.L. 2008. *Teachers' Readiness to Use Technology in the Classroom: An Empirical Study. European Journal of Scientific Research. 21(4), pp. 603-616.*



- [24] *National Report of the Syrian Arab Republic on Education for All. (2000). Year 2000 Evaluation, Part I. EFA FORUM, Education for All, UNESCO.*
- [25] *North Central Regional Educational Laboratory (NCREL). (2003). Technology connections for school improvement:planners_ handbook.*
- [26] *Norhayati Abd. Mukti. (2000). Computer technology in Malaysia: Teachers' background characteristics, attitudes and concerns. The Electronic Journal on Information Systems in Developing Countries.*
- [27] *PAFTE, 2004: Looking into the Future of Education, 33rd Annual Convention, Philippines*
- [28] *Plomp, T., Brummelhuis, A. C. A. & Rapmund, R. (1996). Teaching and learning for the future. Report of the Committee on MultiMedia in Teacher Training. Den Haag: SDU.*
- [29] *Sang, G., Valcke, M., Van Braak, J. and Tondeur, J. (2009). Factors support or prevent teachers from integrating ICT into classroom teaching: A Chinese perspective. Proceedings of the 17th International Conference on Computers in Education. Hong Kong: Asia-Pacific Society for Computers in Education.], pp. 808-815.*
- [30] *Schiler, J. (2003). Working with ICT: Perceptions of Australian principals, Journal of Educational Administration, vol. 41, no. 3, pp. 171-185.*
- [31] *Shaft, T. & Sharfman, M. (2001). A reliability and validity assessment of the attitude toward computers instrument. Unpublished manuscript. University of Oklahoma.*
- [32] *Shamsuddin Hassan: Integrating ICT in Teaching and Learning: Country Report: Malaysia, Educational Technology Division Ministry of Education Malaysia*
- [33] *Sia, P.W. (2000). Computer anxiety and computer literacy among urban secondary school teachers in Miri. Unpublished master's thesis. Kota Samarahan: University Malaysia of Sarawak.*
- [34] *Wong, S.L., Kamariah, A.B., Ramlah, H., & Rohani, A.T. (2002). Malaysian in-service teachers: An assessment of their IT preparedness. In L.R. Kinshuk, K. Akohori, R. Kemp, T.Okamoto, L. Henderson, & C.H. Lee (Eds.). Proceedings in the International Conference on Computers in education (ICCE), Auckland: University of Massey*
- [35] *Wong, E.M.L. & Li, S.C. (2008). Framing ICT implementation in a context of educational change: a multilevel analysis. School effectiveness and school improvement, 19(1), 99-120.*
- [36] *Zhao, Y., Cziko, G.A. 2001. Teacher Adoption of Technology: A Perceptual Control Theory Perspective. JI. Of Technology and Teacher Education, 9(1), pp. 5-30.*