A COMPARATIVE STUDY OF STUDENTS' PERCEPTIONS OF EXPECTED ICT USE AND ACTUAL ICT USE IN CLASSROOM PRACTICES AT NAWAMINTHRACHINUTHIT BODINDECHA SCHOOL, THAILAND

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Abstract: The purpose of this study was to determine if students' perceptions of expected Information Communication Technology (ICT) use were being met. This research study examined grade 10 through 12 students' perceptions of expected and actual ICT use in three subjects; English, Mathematics and Science. The research was conducted on 9 different classes at Nawaminthrachinutit Bodindecha: three classes for each grade level. Also, one class in each grade level represented the one of the three main programs of study: English; Mathematics; and Science. Through the use of a questionnaire that was created by the researcher, he compared upper secondary students' perceptions of expected ICT use to their perceptions of actual ICT use. This study is relevant because the Ministry of Education in Thailand is putting forth great effort to implement the curriculum reforms, which emphasize the utilization of ICTs in the teaching and learning process. This research concluded that although the level of upper secondary students perceptions of actual ICT use is high, their perceptions of expected ICT use are not being met in all three subjects examined. Future studies should examine lower secondary students' and teachers' perceptions. Courses should be examined individually instead of grouped together by general subject content. Research should be conducted in rural areas of Thailand where ICT is less prevalent. Finally, when expectations are not met it lowers motivation. Future researcher should examine how unmet expectations of ICT use affect student motivation.

Keywords: Students' Perceptions, Expected ICT Use, Actual ICT Use, Upper Secondary Classroom Practices.

Introduction

One of the essential purposes of the modern educational system is to prepare students to be valuable members of society. To do this effectively, students have to be provided with the preliminary skills the current workforce requires. As each day passes, it is becoming increasingly clear that a basic understanding of information

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communication technology (ICT) is necessary for the majority of jobs. A survey conducted by Madden and Jones (2008) for Pew Research Center concluded that an estimated 62% of employed Americans are considered *Networked Workers*, meaning that they use the Internet daily in their jobs. Moreover, 96% of the employed workers surveyed, admitted to using ICT in some way. As the Internet becomes easier to access and a more integral part of daily life, the demand for employees who are digitally literate is sure to increase. In order to prepare students to be competitive in the work force, schools everywhere must evolve to provide students with the 21st century skills that are necessary in the current society.

The Thai National Education Act (1999) addressed issues that were of consideration concerning the integration of ICT in the public school system in Thailand. The document stated that the State would provide all schools with ICT for the purpose of integrating modern technology into the national curriculum. It also stated that educators would be provided instruction on how to use and utilize the ICT that had been supplied. The decree expressed that all students had a right to learn with ICT and these standards were designed to ensure that all schools in Thailand were using ICT as quickly as feasible. While the Thai National Education Act expressed a need for ICT reform the Basic Education Core Curriculum (Thai Ministry of Education, 2008) implemented the reforms of ICT in Thailand's educational systems. Both of these documents expressed an admitted need for ICT, matching many of the current trends that focus on an emphasis of 21st century skills in the classroom. However, even though the amount of ICT in schools is increasing and teachers are becoming more accepting of the usefulness of ICT, the headway is inching forward slowly (Laohajaratsang, 2010). Recently the International Computer Information Literacy Study (ICILS) ranked Thai students next to last in a study conducted by the International Association for the Evaluation of Educational Achievement (IEA). This substantiated the claim that Thailand was lagging behind other countries when it came to meeting ICT needs in the classroom (Kupferman-Sutthavong, 2014). According to the study Thai students who participated scored 25% below average.

The researcher has found through his two years of experience as a teacher at Nawaminthrachinutit Bodindecha that teachers are not utilizing the available ICT, contrary to the directives of the Thai National Education Act (1999) and the Basic Education Core Curriculum (Thai Ministry of Education, 2008) to provide students with ICT experience in the classroom. Through discussion with the students, the researcher observed that many students felt they were lacking the necessary experience with ICT to be prepared for undergraduate studies. Moreover, the students expressed that the lessons were not taught in a way that kept their interest and that they felt they would learn more efficiently if the teachers would incorporate more technology into their pedagogy. Due to these reasons the researcher wanted to conduct research on this topic to identify if there was a misconception in students' perceptions of expected ICT use.

Objectives

The objectives listed below were contemplated when identifying the purpose of this study. The researcher considered them the goals that this research aimed to achieve.

1. To identify the level of upper secondary students' perceptions of expected ICT use in classroom practices.
2. To identify the level of upper secondary students' perceptions of actual ICT use in classroom practices.
3. To determine if there is a significant difference between upper secondary students' perceptions of expected ICT use and actual ICT use in classroom practices.
4. To determine if there is a significant difference between upper secondary students' perceptions of expected ICT use and actual ICT use according to the subjects in classroom practices.
   4.1 To determine if there is a significant difference between upper secondary students' perceptions of expected ICT use and actual ICT use in English in classroom practices.
   4.2 To determine if there is a significant difference between upper secondary students' perceptions of expected ICT use and actual ICT use in Math in classroom practices.
   4.3 To determine if there is a significant difference between upper secondary students' perceptions of expected ICT use and actual ICT use in Science in classroom practices.

Theoretical Framework

The research conducted was based on the following two Theories:

1. Social Development Theory – a theory of learning that stated that people learn through social interactions.
2. Engagement Theory – students learn best when they are engaged in an activity (provided by some form of ICT) that is authentic and is beneficial for society.

Social Development theory was primarily developed by Vygotsky, as a reaction to Piaget's theory of cognitive development. The theory was comprised of three basic components: the role of social interaction in cognitive development; the more knowledgeable other (MKO); and the Zone of Proximal Development (ZPD) (Sincero, 2011).

The social development theory emphasized the importance of social interactions and stated that these interactions are how people learn. Therefore, the role of social interaction in cognitive development referred to the concept that learning (through social interactions) preceded cognitive development (Sincero, 2011).

The MKO is anyone who already understands a concept or skill that the learner has not yet acquired. Generally MKOs are thought of as teachers, mentors or parents; however, they can be anyone who is more knowledgeable (Sincero, 2011). Moreover, physical presence is not necessary for there to be a MKO. A person can convert their thoughts to words and therefore the MKO can refer to text as well (McLeod, 2014). The ZPD alludes to what a person knows, what they do not know and what they can learn with the assistance of an MKO.

Engagement theory stated that students learn most efficiently when they are fully engaged and interacting with others in an authentic activity. The theory suggested that in order for current students to achieve a level of thorough engagement, an element of ICT is likely needed. The theory was based on three principles that thoroughly engage students: *Relate, Create, Donate* (Kearsley & Shneiderman, 1998).

When students relate, they are pooling their experiences together to have a culmination of knowledge and skills. Students collaborate in a variety of learning environments by different means (Kearsley & Shneiderman, 1998). The *Relate* component is not restricted to face-to-face interactions. It extends into the digital world that includes a variety of options for collaborating skills. Not only because the Internet transcends boundaries such as time and space but also because it is an ever-growing source of information.

The *Create* component refers to providing students with problem-based leaning tasks. This is important for students to be engaged because it gives students an outlet for them to apply the information they gathered when they were relating (Kearsley & Shneiderman, 1998). Moreover, it provides an activity that triggers cognitive recollection so they can remember more effectively.

The *Donate* aspect provides purpose to the problem-based learning activities. When students donate, they provide a service to society (Kearsley & Shneiderman, 1998). This ensures that the tasks are grounded in authentic problems, which helps students to see the value of what they are doing.

Literature Review

With a surplus of tools available in schools today many feel it is important to utilize the available resources to provide the best learning experience possible. For example, incorporating ICT into education has been a priority for most schools in Europe for a decade. There is, however, little evidence of significant progress with respect to integrating ICT into the teaching and learning process (Morocco World News, 2014). That being said, schools that are better equipped with ICT generally have higher levels of student achievement, and many teachers have attributed student achievement to ICT accessibility (Morocco World News, 2014).

One major advantage ICT brings to education is that it can extend the learning process into students' homes. Digital platforms and online resources transcend time and space allowing students access to learning resources anytime they want as long as they have an Internet connection (Mohanty, 2011). This provides students with the ability to work on assignments continuously. Consequently it also allows them the time to formulate their ideas and review and edit their work. Freedman (2011) suggested that ICTs are great tools for improving student achievement because they allow students to revise their work until they are satisfied with its quality. This is consistent with the findings of a recent study in Canada, which concluded that laptops helped students in primary school with their writing performance in terms of speed, quantity and quality (Karsenti et al., 2012).

Time and space are not the only boundaries that are transcended with ICT. Access to the Internet provides students and teachers with an abundance of learning materials from which to choose, which is especially useful for people in developing

countries that do not have access to updated resources (Mohanty, 2011). Digital devices such as laptops, tablets and smartphones bypass locational obstacles allowing students to connect with peers and teachers, promoting social learning opportunities (Papic & Bester, 2012).

As can be seen, a strong argument is made for the many benefits of ICT in education. However, although it is becoming apparent that digital literacy skills are a necessity for future workers, some are not convinced of the effectiveness of ICT educational benefits (Livingstone, 2012). Livingstone (2012) argued that even though there were many studies that had shown positive perceptions of ICT effectiveness, few of these studies had provided a control group that followed more traditional teaching approaches and therefore were not valid. Furthermore, the independent studies that did conduct valid research saw little difference.

Evidence for Livingstone's assertions comes in a two-year case study, supported by The World Bank, which found that placing computers in public schools in Colombia failed to provide a measureable increase in test scores (World Bank, 2011). They continued with an explanation that the lack of results might be due to lack of training in ICT pedagogy. Nevertheless, the results did not support the claim that being able to access the Internet improves test scores.

Research conducted by Hall (2015) yielded similar results. Hall (2015), evaluated the effects of traditional and technology based math proficiency practice of 4th grade students. The study aimed to measure student achievement and motivational levels when using iPad applications versus flash cards when practicing math facts. The results indicated that there was no difference in achievement levels between the traditional and technologically based protocols. Furthermore, there was no significant difference in motivation either (Hall, 2015).

Salehi and Salehi (2012) suggested that while ICTs may be helpful in student achievement, they also might be more trouble than they are worth. Before effective instruction with ICTs can take place teachers must cross certain barriers that they many times do not get support for. Some of these barriers include time for using ICTs, time for learning about ICTs, little access to the Internet, professional development and technical support (Salehi & Salehi, 2012). Nevertheless, they did mention that teachers should be aware of the current trends so that they can be ready to make a future switch to ICT if it is necessary.

Research conducted on Nigerian higher educational institutions (HEI) back up Salehi and Salehi's claims of issues concerning ICT in schools. Academic staff listed time and training as the two largest barriers keeping teachers from effectively teaching with ICT. Other issues that are worth mentioning are a lack of technical support and no incentive for making the change in pedagogy. Still, 89% of participants marked that ICT is mandatory.

Conceptual Framework

Figure 1 shows the conceptual framework of this study. As can be seen, the grade 10 – 12 students' perceptions of expected ICT use and actual ICT use were measured separately. The researcher then compared the level of the upper secondary students' perceptions of expected ICT use and their perceptions of actual ICT use. Then the researcher compared the students' perceptions of expected ICT use and their

perceptions of actual ICT use according to the three core subjects in Nawaminthrachinuthit Bodindecha's curriculum: English, Math and Science.

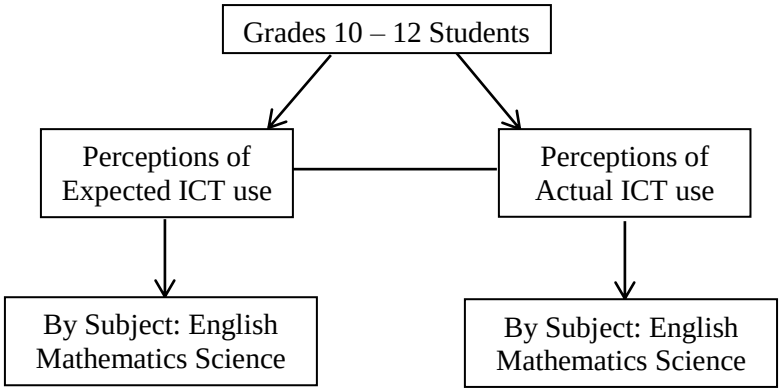

Figure 1: Conceptual Framework of The Study

Method

Population and Sample

The population of this study were all of the grade 10 – 12 students of Nawaminthrachinuthit Bodindecha School which consisted of 1048 students. The population was split into three grades. 350 students were from grade ten; 325 students were from grade eleven; and 373 students were from grade 12. The sample group were three classes from each grade level which consisted of 247 students.

Table 1: Population and Sample Size of The Study

Grade Level	Population	Sample
10	350	91
11	325	78
12	373	78
Total	1048	247

Instrument

The researcher developed the instrument himself. It is a questionnaire with four sections. The first and the third sections are identical and were used to determine the following three demographics: gender, grade level and program of study. The second section was designed to measure the level of upper secondary students' perceptions of expected of ICT use in classroom practices in English, Mathematics and Science classes. The fourth section was designed to measure the level of students' perceptions

of actual ICT use in classroom practices in English, Mathematics and Science classes. Sections two and four are nearly identical. Section four modified the items so that they were relevant to the perceptions of actual ICT use.

Sections one and three of the questionnaire were designed to collect descriptive data. All items on the second and fourth sections of the questionnaire were created by the researcher and foundationally derived from the theories listed in the theoretical framework in chapter one. The Engagement Theory was used in this research as a theory that supported the use of ICT in the learning process. The following items were based on this theory: 2, 3, 5, 6, 7, 8, 12, 13, and 14. The Social Development Theory, which states that people learn through social interactions, was used in developing the following items of the questionnaire: 1, 4, 6, 8, 9, 10, 11, 13, and 15. The following table (Table 2) correlates each item with the appropriate theory.

Table 2: Theoretical Support for Items on Sections 2 and 4 of the Questionnaire

	Social Development Theory	Engagement Theory
Number of item that each theory supports from section 2 and 4 of the questionnaire	1, 4, 8, 9, 10, 11, 15	2, 3, 5, 6, 7, 8, 12, 13, 14

The researcher based the items of the questionnaire on the ICT available to the school with the exception of smartphones, which are a common accessory for all students in the school.

The second and fourth section used a six-point Likert scale as its means of measurement. The researcher used a six-point Likert scale to encourage students to answer that they either agree or disagree to each of the items. Table 3 provides the point values attributed with each choice of response on the questionnaire.

Table 3: Six-Point Likert Scale

Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1 point	2 points	3 points	4 points	5 points	6 points

Table 4 shows how the researcher interpreted the results of section two and section four of the questionnaire.

Table 4: Interpretation Scale

Very Low	Low	Moderate	High	Very High
1.00 – 1.20	1.21 – 2.00	2.01 – 3.60	3.61 – 4.80	4.81 – 6.00

Procedure

The researcher distributed and collected all of the questionnaires himself. The first and second sections were administered at the beginning of the first semester in the 2015 – 2016 academic school year. The third and fourth sections of the questionnaire were administered after midterm examinations during the first semester of the 2015

– 2016 academic school year. All of the questionnaires that were distributed were valid and returned to the researcher immediately after completion.

Findings

Three classes from each grade level participated in the survey. Each class represented one of the programs of study for each particular level. The following tables illustrate the descriptive statistics of the questionnaire.

Table 5: Program of Study of the Respondents

Program of Study	Number	Percentage
Foreign Language	81	32
Mathematics	96	31.2
Science & Mathematics	70	36.8
Total	247	100

As can be seen in table 5, all students belonged to one of three programs: 70 students from the Science and Mathematics Program; 81 from the Foreign Language Program; and 96 from the Mathematics Program.

Table 6: Gender of the Respondents

Gender	Number	Percentage
Male	106	42.9
Female	141	57.1
Total	247	100

As can be seen in table 6, of the 247 students in the sample group, 106 were male and 141 were female.

Table 7: Mean and Standard Deviation of Students' Perceptions of Expected ICT Use for English, Math and Science (n = 247)

Subject	Mean	Standard Deviation	Interpretation
English	4.93	.66	Very High
Math	4.53	.86	High
Science	4.89	.68	Very High
Total	4.78	.69	High

Table 7 illustrates the level of upper secondary students' perceptions of expected ICT use in classroom practices. The mean of English was 4.93 and can be interpreted as a very high level of expected ICT use. The mean of Mathematics was 4.53 and can be interpreted as a high level of expected ICT use. The mean of Science was 4.89 and can be interpreted as a very high level of expected ICT use. The total of these subjects combined has a mean of 4.78. Therefore, the level of upper secondary students' perceptions of expected ICT use in classroom practices was high.

Table 8: Mean and Standard Deviation of Students' Perceptions of Actual ICT Use for English, Mathematics and Science

Class	Mean	Standard Deviation	Interpretation
English	3.92	1.05	High
Mathematics	3.29	1.27	Moderate
Science	4.01	1.01	High
Total	3.71	1.00	High

Table 8 illustrates the level of upper secondary students' perceptions of actual ICT use in classroom practices. The mean of English was 3.92 and can be interpreted as a high level of actual ICT use. The mean of Mathematics was 3.29 and can be interpreted as a moderate level of actual ICT use. The mean of Science was 4.01 and can be interpreted as a high level of actual ICT use. The total of these subjects combined has a mean of 3.71. Therefore, the level of upper secondary students' perceptions of actual ICT use in classroom practices was high.

Table 9: Paired Samples t-test (Two-tailed) of Students' Perceptions of Expected ICT Use and Actual ICT Use in Classroom Practices

	Mean	Standard Deviation	t	Sig. (2 – tailed)
Expected ICT Use	4.78	.69	12.857	.000
Actual ICT Use	3.71	1.00		

As can be seen in Table 9, the mean of the second section of the questionnaire, which measured students' perceptions of expected ICT use, was higher than the mean of the fourth section of the questionnaire, which measured students' perceptions of actual ICT use. Therefore, the results indicated that student's perceptions of expected ICT use are higher than their perceptions of actual ICT use. Furthermore, as Sig. (2 tailed) was .000, which is less than .05, the comparison can be interpreted as significant.

Table 10: Paired Samples t-test (Two-tailed) of Students' Perceptions of Expected ICT Use and Actual ICT Use According to Subject in Classroom Practices.

	Mean	Standard Deviation	t	Sig. (2 – tailed)
Expected ICT Use in English Classes	4.93	.67	12.81	.000
Actual ICT Use in English Classes	3.88	1.04		
Expected ICT Use in Math Classes	4.52	.87	12.05	.000
Actual ICT Use in Math Classes	3.26	1.25		
Expected ICT Use in Science Classes	4.89	.69	11.20	.000
Actual ICT Use in Science Classes	3.97	.99		

As can be seen in Table 10, the mean of the expected ICT use in all three classes (English, Mathematics and Science) were higher than the mean of the actual ICT use in these classes. Therefore, students' perceptions of expected ICT use were higher

than their perceptions of actual ICT use in English, Mathematics and Science classroom practices. Furthermore, being that Sig. (2 tailed) were .000 in all tests, which is less than .05, the comparison can be interpreted as significant.

Discussion

Examining the results of this study shows that the level of upper secondary students' perceptions of expected ICT use is significantly higher than the level of their perceptions of actual ICT use in classroom practices. However, when interpreted using the five-point interpretation scale listed in chapter three, both the levels are interpreted as high. While the level of students' perceptions of expected ICT use was not met, maintaining a high level of perceived actual ICT use in classroom practices shows that teachers are able to effectively implement ICT use into their pedagogy. This argues against Livingstone's (2012) claim that teachers do not know how to use ICT when teaching. Moreover, these results suggest that the teachers of these classes have received a sufficient amount of training to use ICT when teaching, which disputes other researchers' suggestions (Raboca & Carbunarean, 2014).

A more detailed analysis shows the three different subjects that were examined in this research were English, Mathematics, and Science. The level of upper secondary students' perceptions of expected ICT use was high in Mathematics and very high in both English and Science. Their perceptions of actual ICT use is moderate for Mathematics and high for English and Science. While the results are consistent for all three subjects, students' perceptions of Mathematics are significantly lower than the other subjects. A possible explanation for this is that students perceive Mathematics as a subject that is less conducive to teaching approaches that use ICT.

The results of this research focus on the students' perceptions and therefore directly relate to motivation. As can be seen, the level of upper secondary students' perceptions of expected ICT use is significantly higher than their perceptions of actual ICT use. When students have higher expectations than what they perceive actually happens in the classroom their motivation lowers. Motivation is an essential element of student learning (Santrock, 2011). Regardless of extrinsic or intrinsic motivation, the more motivated students are to learn, the greater the probability they will learn. Keeping that in mind, intrinsic motivation is harder to achieve in students at the upper secondary level, and that is the type of motivation that is believed increases when using ICT in classroom practices (Santrock, 2011). Therefore, it may be inferred that not meeting upper secondary students' perceptions of expected ICT use lowers their intrinsic motivation.

This research only examined the perceptions of students and not the perceptions of teachers. Because of this, the reasons upper secondary students' perceptions of expected ICT use were not met can only be speculated. One possible reason is that the upper secondary students did not consider the amount of time needed to properly implement changes to the curriculum. More likely, they are not aware of the curriculum changes or that educational use of ICT in the government schools in Thailand is relatively recent. As can be seen in the results, the level of upper secondary students' perceptions of expected ICT use in classroom practices was high. The Basic Core Curriculum began to implement the reforms of ICT on a national

level only seven years prior to this research (Thai Ministry of Education, 2008). When structural changes are implemented there should be an amount of time that is expected for troubleshooting. Perhaps more time must pass before teachers use ICT more frequently when teaching.

A contrasting speculation could be drawn that teachers do not perceive ICT as necessary as students do. ICTs are tools that teachers use to engage students but they are not the only tools in a trained teachers' arsenal. The majority of current teachers in Thailand did not have the same digital resources that students have when they were students themselves. As this is a new aspect of teaching that has the potential to revolutionize the educational system, a certain amount of trial and error time can be expected. As teachers become more familiar and trusting of ICTs the frequency of using them in classroom practices may increase.

References

Freedman, T. (2011). 13 Reasons to Use Educational Technology in Lessons. *ICT & Computing in Education.* Retrieved from http://www. ictineducation.org/home-page/2011/3/3/13-reasons-to-use-educational-techno logy-in-lessons.html

Hall, M. M. (2015). *Traditional vs. technology based math fluency practice and its effect on student achievement and motivation in mathematics* (Doctoral Disertation). Retrieved from ProQuest Dissertations & Theses Global. (Order No. 3686997)

Karsenti, T., Collin, S., Dupuis, A., Villeneuve, S., Dumouchel, G., & Robin, J.-P. (2012). *Benefits and challenges of using laptops in primary and secondary schools: Results of the second investigation at the Eastern Townships School Board. Summary of main results.* Montreal, QC: CRIFPE. Retrieved from http://www.academia.edu/2258757/Benefits_and_challenges_of_using_laptops_in_primary_and_secondary_schools_Results_of_the_second_investigation_at_the_Eastern_Townships_School_Board._Summary_of_main_results

Kearsley, G., & Shneiderman, B. (1998). Engagement theory: A framework for technology based technology-based teaching and learning. *Educational Technology*, 38(5), 20. Retrieved from http://c3.ort.org.il/APPS/Public/GetFile.aspx?inline=yes&f=Files/ba3c28fc-8c3e-46d9-b4f3-effda4c7e27b/2a3cd87c-fcdd-4edc-8279-d967fc824a34/3a35cbf4-6fd2-4314-ad99-8e2101acf3b9/5c2319a3-c2ba-4b1d-be29-d2cdc6ff9ede.htm

Krataytong, A and Lakasana, S. (2015) *Development of Total Quality Management Model for Management of International Kindergartens in Bangkok*, Vol. 7 No.2, 2015, 230-249

Kupferman-Sutthavong, A. (2014, November 22). Study finds students' ICT skills lacking. *The Bangkok Post*. Retrieved from: http://www.bangkokpost.com/Print/444715

Laohajaratsang, T. (2010). *E-Education in Thailand: Equity, Quality and Sensitivity for Learners and Teachers.* Paper presented at International Conference Global Learn 2010 on Learning and Technology, Penang, Malaysia. Retrieved from http://thanompo.edu.cmu.ac.th/load/research/Eeducation.doc.pdf

Livingstone, S. (2012). Critical reflections on the benefits of ICT in education. *Oxford Review of Education, 38*(1), 9-24. Retrieved from http://www.tandfonline.com/doi/abs/10.1080/03054985.2011.577938#.VTCSPJTF_3o

Madden, M., & Jones, S. (2008). Networked Workers. *Pew Research Center.* Retrieved from http://www.pewinternet.org/2008/09/24/networked-workers/

McLeod, S. A. (2014). Lev Vygotsky. *Simply Psychology.* Retrieved from http://www.simplypsychology.org/vygotsky.html

Mohanty, R. (2011, February 19). Introduction to ICT. *ICT Advantages & Disadvantages*. Retrieved from http://ict-adv-disadv.blogspot.com/

Morocco World News. (2014). Advantages of Using ICT in Learning-Teaching Process. *Morocco World News*. Retrieved from http://www.moroccoworldnews.com/2014/06/122206/advantages-of-using-ict-in-learning-teaching-process/

Papic, M., & Bester, J. (2012). Trends in ICT and multimedia supported education. *Organizacija, 45*(3), 131. doi: Retrieved from http://dx.doi.org/10.2478/v10051-012-0014-4

Raboca, H. M., & Carbunarean, F. (2014). *ICT in Education – Exploratory Analysis of Students' Perceptions Regarding ICT impact in the Educational*. Paper presented at the Managerial of the Contemporary Society, *7*(2) 59-66. Retrieved from http://search.proquest.com/docview/1637637203?accountid=8401

Salehi, H., & Salehi, Z. (2012). Challenges for using ICT in education: Teachers' insights. *International Journal of e-Education, e-Business, e-Management and e-Learning, 2*(1), 40. doi:http://dx.doi.org/10.7763/IJEEEE.2012.V2.78

Santrock, J. W. (2011). *Educational Psychology*. (Chapter 1 – 13). New York: McGraw-Hill.

Sincero, S. (2011). Social Development Theory. *Explorable.com.* Retrieved from https://explorable.com/social-development-theory

Thai Ministry of Education (2008). *Basic Education Core Curriculum*. Retrieved From http://www.act.ac.th/document/1741.pdf

World Bank (2011) *Can Computers Help Students Learn.* Retrieved from https://openknowledge.worldbank.org/handle/10986/10455