The Study of Internet Use and Academic Achievement of Elementary Students in Bangkok

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Abstract

The purpose of this study is to investigate the relationship between internet usage behavior and academic achievement among elementary school students from grade 4-6 in Bangkok. The researcher employed Multi-stage Sampling to recruit 297 samples. The data was gathered via the following tests: 1) Intelligence tests, namely Colored Progressive Matrices (CPM) for students aged 5-11 year old or Standard Progressive Matrices (SPM) for 12 year old and above, and 2) Academic achievement test, namely Wide Range Achievement Test Thai Edition: WRAT-Thai. The findings revealed that time spent on the internet is negatively correlated to student's reading achievement ($r = -.24$, $p < .001$), spelling achievement ($r = -.26$, $p < .001$), and math achievement ($r = -.20$, $p = .001$). More surprisingly, academic related internet usage was also found to be negatively correlated to math achievement ($r = -.20$, $p < 0.05$). Meanwhile, internet usage for social media has a correlation with academic achievement in math and reading, ($r = -.20$, $p = .001$) and ($r = -.13$, $p < .05$), respectively. Moreover, internet usage for entertainment was found to have a negative correlation with academic achievement in reading, spelling and math, ($r = -.25$, $p < .001$), ($r = -.27$, $p < .001$) and ($r = -.21$, $p < .001$), respectively. Internet usage for online business, however, yielded no correlation to academic achievement. The study concluded that daily internet usage does have an effect on academic achievement in math. Moreover, when used for entertainment and social media, internet usage can pose a negative effect on academic achievement in reading and writing.

Keywords: academic achievement, internet usage, learning disability, elementary students, Thai language

1. Introduction

In the modern days, computers and internet play a major role in our daily lives; this has brought about both the positive and the negative effect upon people, particularly upon children and youth. According to the survey of household acquisition and usage of information and communication technology, from 2011 to 2015, the numbers of computer users among the population, aged 6 and above, have increased from 32% to 34.9% (National Statistics Office—Ministry of Information and Communication Technology, 2015). Mobile users, on the other hand, have increased from 66.4% to 79.3% while internet users have increased from 23.7% to 39.3%. When speculated according to age groups, the group of 15-24 year old was found to have the highest number of internet users, being 76.8% from 51.9%. However, a remarkable growth rate of internet users was also detected for the group of 6-14 year old where the number accelerated from 38.3% to 58% and is likely to continue to do so in an alarming manner. In most cases, the biggest motive for going online is to participate on social media such as Facebook, Twitter, Google+, Line and Instagram. As a matter of fact, social media was reported as the number one online activity (88.6%) ahead of watching movies, listening to music and playing games (87.4%) as well as uploading information and pictures and sharing of photographs and videos (75%) (National Statistics Office—Ministry of Information and Communication Technology, 2015). In addition, the survey of internet usage behaviour in Thailand conducted by the Ministry of Information and Technology in 2014 found internet usage duration to have increased from 4.6 hours per day or 32.3 hours per week in 2014 to 7.2 hours per day or 50.4 hours per week in the

following year, indicating that people spent as much as a third of their day online. Assuming on this given information, if children excessively uses the internet and consume online media without the guidance of adults, there is likely going to be direct effects upon children's development, particularly in learning. Therefore, children and youth should be encouraged to explore both academic and recreational activities. Specifically, the activities should require a combination of skills to promote and cultivate important fundamentals of living such as body movement skills which included both fine and gross motor skills, intellectual skills such as communication, speaking, listening, reading and writing as well as social skills such as social interaction, social adaptation and emotional skills (Ministry of Public Health, 2014).

As the role of technology developed, the changes in society also started to happen in a faster pace. This inevitably affects education and daily lives. The internet has become a part of people's daily lives such that people can instantly pursue their desire, whether for work or entertainment, without having to wait or even dedicate their time to doing just one activity at a time. As children's attention span is shorter than those of adults, the resourcefulness of the internet and its endless interesting information can compete for children's attention, resulting in shorter attention span for each particular information. The use of internet in combination with other activities, especially with doing homework or reading a book can result in as much as 10 points lower in IQ and 40% slower in calculation speed (Ruberstien & Meyer, 2001). Unsurprisingly, it was found that a long duration of multi-tasking could hinder children's learning. Furthermore, studies have shown that concentrating on or learning via a monitor only activated two sensory perceptions, namely sight and hearing, leaving other fundamental skills untouched. More intriguingly, a research have demonstrated that regardless of the motive for using the internet, children who use the internet are likely to have lower interests in learning as well as in self-learning (Liparenko et al., 2014).

Education is important for people of all genders and ages. As illustrated by a Thai idiom, "Education is the root of the society". However, it is especially significant for children as they are at the very early stage of learning where learning and development can occur very quickly under a nurturing condition. Essentially, children can become highly functioning in whichever essence that was cultivated towards them. *The 11th Economic and Social Development Plan of 2012-2016* have placed the emphasis on cultivating the quality of school children to develop their academic knowledge, skills, and intellectual abilities in order to promote self-learning capabilities as well as to be able to adapt to and comprehend information in this ever-changing information age. Due to government's support for the use of technology in teaching and learning among education institutions in hopes to develop children's and youth's capabilities for information and communication technology, the internet, inevitably, became a major tool for education. Examples of such instance included E-Learning and Cyber Scout program from ICT, which is a government's educational policy to widen educational and technological opportunities (Teenage: Internet and Online Games, 2014). In the year 2012, the government issued "One Tablet Per Child" policy in an attempt to improve the quality of education, hoping to foster reading, writing and math skills as well as to promote fun in learning in an unrestricted context and time (One Tablet Per Child: Tablet PC for Thai Education Project, 2012). Nevertheless, learning via technology must be conducted under teachers' or parents' close supervision and guidance in order to truly elicit benefits for children (Ministry of Public Health, 2014).

At the present, children and youth most often use the internet for entertainment purposes rather than for researching information (The Survey of Internet Usage Behaviour in Thailand in 2014, 2014). A survey of website categories in Thailand in 2011 founded that there were as many as 1,325 educational websites available, however, only 2.11% of the internet user access these websites. In contrary, entertainment, gaming, and social media websites have the highest number of visitors, which were 37.50%, 13.26%, and 10.41%, respectively (Tuntavichien, 2012). Remarkably, despite an increasing consumption of media by children, the only media without any increase in consumption is print. A survey conducted in the United States revealed that, currently, children are spending only 7 minutes a day reading books as compared to 19-20 minutes in the previous years (Rideout et al., 2010). Even when they do read, books of their choice are often entertainment related rather than education related. Meanwhile, 10 percent of children reported reading 21 minutes per day online (Rideout et al., 2010). A survey project in Thailand, "Child Watch", conducted by Thailand Research Fund in 2008-2009 reported Thai children to be spending up to 5-6 folds less time reading books when compared to time spent on other media (Critical Analysis of Children Gaming Addiction Research, 2012). A research conducted in the United States in 2010 compared internet usage behavior among children across socio-economic statuses (Rideout et al., 2010; Kotler, 2008). The study revealed that children of lower SES family often spent more time on the internet and more often visit non-educational websites, rendering their academic skills undeveloped. This may be partly due to parent's lack of time to guide their children when they go online. A similar study also found that children of lower SES family tended to visit websites with pictures rather than with texts, which hindered their opportunity to

develop reading skills (Neuman & Celano, 2006). Additionally, a report from Culture Surveillance Bureau of Ministry of Culture, an academic document from Thai Health Promotion Foundation and ABAC Poll Research Institute of Assumption University all presented similar findings stating that despite having higher and easier accessibility to media, most of the accessible media are low in quality. So much so that, they can be risky towards children's brain development and learning (Nakorntub, 2007).

Accordingly, the researcher of this study is interested in investigating internet usage behaviour and its effect on higher elementary student's academic achievement. In doing so, the researcher aim to examine the relationship between internet usage and academic achievement among higher elementary students as well as to examine, if any, the difference between academic achievement of students who have received the tablet from "One Tablet Per Child" campaign in 2012 and those who did not.

2. Method

The recruitment criteria for this research consisted that participants must be elementary students from grade 4-6 studying in one of the schools under the list of Office of Elementary School in Bangkok. Specifically, they must be enrolled in semester 1 of the 2016 school year. Another recruitment criteria included that the participants must own and use information and communication technology device and are internet users. In selecting the participants, multi-stage sampling was employed.

The exclusion criteria of the recruits consisted that they have the intellectual quotients of lower than 90 or have been diagnosed with disorders such as autism, mental disorder and chronic disease. Students who have been absent from school for more than 20% of the semester or participants who withdrew early from the study were also excluded. The researchers distributed consent forms to the selected recruits. In the case that the participants were unable to consent on their own, assent forms were distributed for their parents to consent on behalves of their children.

Three sets of tests were employed in the study. The following section describes the detail of each test:

2.1 Internet Usage Behaviour Survey for Elementary Students

This questionnaire consisted of three parts including general enquiry, acquisition and usage of information and communication technology devices survey and internet usage behaviour survey.

2.2 Intellectual Test: Colored Progressive Matrices (CPM) for Children Aged 5-11 or Standard Progressive Matrices (SPM) for Children Aged 12 and Above

The tests were multiple choice questions in which the participants were to select the correct answers and put them on the given blank space. Each test comprised of 3 sets and each set comprised of 12 questions, making a total of 36 questions. The tests were conducted via a computer program.

2.3 Academic Achievement Test: Wide Range Achievements Test WRAT-Thai

The test comprised of 3 dimensions including writing, reading and math. For writing section, which consisted of 50 questions, the participants were required to write the words as dictated onto the given blank space. For reading section, which consisted of 60 questions, the participants were to read the selected passage out loud. Lastly, for math section, which consisted of 44 questions, the participants were to solve the problems and write down the answers on the given blank space.

All the tests employed in this research were done under the supervision of professional psychologists. Prior to the research, the researcher was trained to operate the tests under the supervision of clinical psychologists. Pilot training were conducted with elementary students from grade 4-6 to identify students with learning disabilities.

The analysis of data was separated into two sections, consisting of descriptive statistics and analytic statistics. Descriptive statistics were used in order to describe the characteristics of the sampling group such as number of participants, percentage, average and standard deviation; all of which are depicted in a table. Analytic statistics, on the other hand, were used to test the hypotheses. The researchers used Pearson's correlation to test the relationship between internet usage behaviour and academic achievement and used T-test statistic to examine, if any, differences in academic achievements between students who did receive tablet from "One Tablet Per Child" policy for education in 2012 and those who did not.

3. Results

Table 1. Demographic and characteristics of participants

	Characteristics	N	%
Gender	Boy	165	55.6
	Girl	132	44.4
Age	8-9 years old	81	27.3
	10-11 years old	194	65.3
	12 years old	22	7.4
School Grade	Grade 4	98	33
	Grade 5	87	32.7
	Grade 6	102	34.3
School	Wat Somanus School	60	20.2
	Wat Parinayok Kindergarten School	69	23.2
	Rajvinit School	113	38.0
	Wat Wetawantummawas School	55	18.5

The acquired sample groups were recruited via multi-stage sampling from schools under the list of Office of Elementary School in Bangkok. Participants were students enrolled in semester 1 of the 2016 school year. There were an initial total of 367 participants; out of which 297 participants were selected after reviewing the recruiting and exclusion criteria. The selected participants group comprised of 55.6% male and 44.4% female. When distributed according to age groups, it was found that 65.3% were 10-11 years old, 27.3% were 8-9 years old and 7.4% were 12 years old. Random sampling of participants was also done proportionally to the school sizes. Specifically, small sized school selected for this study was Wat Somanus School where 20.2% of participants were derived; medium sized school was Wat Parinayok Kindergarten School where 23.2% of participants were derived; and lastly, there were two large size schools, Rajvinit School and Wat Wetawantummawas School, where 38% and 18.5% of participants were derived, respectively. When distributed according to school grades, 33.0% of participants were from grade 4; 32.7% were from grade 5 and 34.3% were from grade 6 (Table 1).

Table 2. Information and communication technology devices and internet use

	Characteristics	N	%
Electronic devices	Smartphone or iPhone	211	71.0
	Tablet or iPad	151	50.8
	Computer or Laptop	129	43.3
	MP3 or iPod	50	16.8
	Mobile game (Nintendo and PSP)	71	25.9
	Cell phone	226	76.1
Rules	Have rules	192	64.6
	No rules	105	35.4
Devices access the Internet	Smartphone or iPhone	231	77.8

		Tablet or iPad	170	61.6
		Computer or Laptop	183	57.2
Weekdays				
-	Days	Not using internet	24	8.1
		1 day	11	3.7
		2 days	26	8.8
		3 days	45	15.2
		4 days	21	7.1
		5 days	170	57.2
-	Time	Not using internet	24	8.1
		30 mins -2 hours	134	45.1
		2 hours 30 mins-4 hours	83	27.9
		4 hours and above	56	18.9
Weekends				
-	Days	Not using internet	5	1.7
		1 days (only Sat or Sun)	76	25.6
		2 days	216	72.7
-	Time	Not using internet	5	1.7
		30 mins-2 hours	114	38.4
		2 hours 30 mins – 4 hours	92	31.0
		4 hours and above	86	29.0

Data derived from acquisition and usage of information and communication technology devices survey, which include internet accessibility, revealed that 71% of participants own mobile phones that allow internet connectivity such as smart phones or iPhone; 50.8% own tablet or iPad; 43.4% own computer or laptop; and 16.8% own mp3 player or iPod; and 25.9% own portable gaming devices such as PSP and Nintendo. Meanwhile, 76.1% of participants reported owning traditional mobile phones that do not allow internet connectivity. In addition, it was also found that 64.6% do have a term of agreement with their parents in regards to the internet usage while 35.4% do not.

Majority of the participants, precisely 77.8%, go online via smart phones or iPhone, followed by computers or laptops (61.6%) and tablets or iPad (57.2%). On weekdays, 57.2% of participants reported going online every weekday (Monday-Friday). Majority, 45.1%, reported using the internet for 30 minutes to 2 hours per day while 27.9% reported using 2 hours and 30 minutes to 4 hours per day and 18.9% reported using for more than 4 hours per day. On weekends (Saturday and Sunday), internet usage rose to 72.7% where 38.4% reported using for 30 minutes to 2 hours per day while 31.0% reported using 2 hours and 30 minutes to 4 hours per day and 29% reported using for more than 4 hours per day. Furthermore, hours spent on the internet per week were reported as follows: grade 4 students spent an average of 19 hours and 30 minutes per week; grade 5 students spent an average of 20 hours and 50 minutes per week and grade 6 students spent an average of 21 hours and 10 minutes per week online (Table 2).

Table 3. Purposes of using the internet

Purposes	(N) %
Academic	
-Academic researching	(284) 95.6
Not using internet	4.4
30 mins-2 hours	74.4
2 hours 30 mins-4 hours	18.5
4 hours and above	2.7
-Communication	(256) 86.2
Not using internet	14.7
30 mins-2 hours	73.7
2 hours 30 mins-4 hours	11.8
4 hours and above	0.0
-An Academic topic interest	(275) 92.6
Not using internet	37.4
30 mins-2 hours	66.7
2 hours 30 mins-4 hours	0.0
4 hours and above	0.0
Entertainment	
-Listen to the music online	(263) 88.6
Not using internet	11.4
30 mins-2 hours	56.6
2 hours 30 mins-4 hours	21.9
4 hours and above	10.1
-Watching movie online	(262) 88.2
Not using internet	11.8
30 mins-2 hours	45.5
2 hours 30 mins-4 hours	28.6
4 hours and above	14.1
-Playing games online	(266) 89.6
Not using internet	9.8
30 mins-2 hours	41.1
2 hours 30 mins-4 hours	25.6
4 hours and above	23.6
-Researching anything of interest	(262) 88.2

	Not using internet	11.8
	30 mins-2 hours	60.9
	2 hours 30 mins-4 hours	21.2
	4 hours and above	6.1
Social online		(249) 83.8
	Not using internet	16.2
	30 mins-2 hours	32.0
	2 hours 30 mins-4 hours	29.6
	4 hours and above	22.2
Online Business		(56) 18.9
	Not using internet	81.1
	30 mins-2 hours	13.5
	2 hours 30 mins-4 hours	4.7
	4 hours and above	0.7

The motive and duration of internet usage reported for the past month demonstrated that as much as 95.6% of usage were for academic or homework researching; 86.2% was for communicating for school project and 92.6% was for further researching an academic topic of interest. In regards to entertainment, 88.6% reported using the internet to listen to the music online, 88.2% for watching movie online; 89.6% for playing games online; 88.2% was for researching anything of interest and lastly 83.8% used to participate on social media. As for online business, which involved online shopping and selling, only 18.9% of the participants engage in the activity. Majority of the participants reported spending 30 minutes to 2 hours online (Table 3).

Table 4. Test results

Result			Score (SD)
Intellectual tests			
	Grade 4		106 (10.55)
	Grade 5		108 (11.12)
	Grade 6		107 (9.09)
	Average		107 (10.26)
	Result		N (%)
Academic Achievement Tests			
	Reading	Normal	109 (73.2)
		Below Average	40 (26.8)
	Spelling	Normal	61 (40.9)
		Below Average	88 (59.1)
	Math	Normal	128 (85.9)
		Below Average	21 (14.1)

The results of intellectual tests, Colored Progressive Matrices (CPM) or Standard Progressive Matrices (SPM), determined the average IQ score to be 107 ± 10.26. Data collected from academic achievement test, Wide Range Achievement Test; WRAT-Thai, revealed that out of 297 participants, 23 were diagnosed with learning disability by clinicians. Moreover, 149 participants scored below the standards of their current school grade level. Specifically, in reading section, 40 participants have scored substandard of their school grade; in spelling, 88 participants scored substandard; and in math, 21 participants scored substandard (Table 4).

Table 5. Correlations between internet usage duration and academic achievement

Academic Achievement Scores	Internet Usage Duration	
	r	Sig
Reading	-.24**	.000
Spelling	-.26**	.000
Math	-.20**	.001

*** $p < 0.000$.

As depicted in Table 5, the analysis of internet usage duration and academic achievement revealed that hours spent on the internet per week has significant correlations to reading (r = -.24, $p < .001$), spelling (r = -.26, $p < .001$) and math (r = -.20, $p = .001$).

Table 6. Correlations between internet usage behaviour and academic achievement

Motive for using the internet	Academic Achievement Scores					
	Reading		Spelling		Math	
	r	Sig	r	Sig	r	Sig
For academic purposes	-.09	.141	-.01	.889	-.20**	.008
For entertainment	-.25**	.000	-.27**	.000	-.21**	.000
For social media participation	-.13*	.031	-.06	.338	-.20**	.001
For online business	-.04	.493	-.04	.493	-.11	.054

**$p < 0.01$, * $p < 0.05$.

Regarding the relationship between time spent on the internet for each usage motive and academic achievement, as shown in Table 6, the results showed that academic achievement in reading has a significant correlation to entertainment usage (r = -.25, $p < .001$) and social media usage (r = -.13, $p < .05$). No significant correlations, however, were yielded for academic related usage (r = -.09, $p < .05$) or online business usage (r = -.04, $p < .05$).

Similarly, significant correlation was found between spelling and entertainment usage (r = -.27, $p < .001$). However, no significant correlations were detected for spelling and academic usage (r = -.01, $p > .05$), or social media usage (r = -.06, $p > .05$) or online business usage (r = -.04, $p > .05$).

Furthermore, significant correlation was also found between academic achievement in math and academic usage (r = -.20, $p < .05$), entertainment usage (r = -.21, $p < .001$) and social media usage (r = -.20, p = .001). No relationship, however, was found for online business usage (r = -.11, $p > .05$).

Table 7. Differences in academic achievement scores in spelling between students who received tablet and those who did not

Group Types	Number of samples	$\bar{X}$ (SD)	t	df	p
Those received the tablets	98	84.29 (11.40.)	2.09*	252.08	.037
Those that did not receive the tablets	197	87.62 (15.51)			

* *p < 0.05*.

Table 7 depicts the differences in academic achievement scores in spelling between students who received tablets from One Tablet Per Child educational campaign in 2012, specifically grade 4 student samples and those who did not, which were grade 5 and 6 student samples. The results exposed a significant difference between the two groups in regards to spelling scores (t = -2.09, df = 252.08, *p* < .05).

Table 8. Differences in academic achievement scores in reading between students who received tablet and those who did not

Group types	Number of samples	$\bar{X}$ (SD)	t	df	p
Those received the tablets	98	92.46 (13.08)	.195	251.56	.845
Those that did not receive the tablets	197	92.10 (17.76)			

Conversely, the results, demonstrated in Table 8, showed no significant differences in academic achievement in reading between students who did received the tablets and those who did not (t = -2.09, df = 252.08, *p* > .05).

Table 9. Differences in academic achievement scores in math between students who received tablet and those who did not

Group types	Number of samples	$\bar{X}$ (SD)	t	df	p
Those received the tablets	98	96.86 (8.16)	1.383	287.26	.168
Those that did not receive the tablets	197	95.05 (14.23)			

Finally, as seen in Table 9, the results also revealed no significant differences in academic achievement scores in math between those who did receive the tablets and those who did not (t = -2.09, df = 252.08, *p* > .05).

4. Discussion

According to the findings, the top three most popular information and communication technology devices owned by the samples in this study were traditional mobile phones without internet connectivity feature (75%), followed by mobiles phones that do allow internet connection such as smartphones or iPhones (71%), and tablets (50.8%). This particular finding is consistent to the report from the survey of household acquisition and usage of information and communication technology among population aged 6 year old and above from 2009 to 2015 which affirmed the rising number of mobile phone users from 66.4% to 79.3% as well as internet users from 23.7% to 39.3%. Despite a constant increase in information and communication technology usage among the population, the use of computer is actually on the decline from previous years (National Statistics Office—Ministry of Information and Communication Technology, 2015). As information and communication technology devices have become more readily accessible for children, including both using and owning, connecting to the internet has never been easier. Supporting this notion, the findings in this study showed that majority of elementary student samples from grade 4-6 are connecting to the internet via their smartphones and iPhone (77.8%), followed by tablet or iPad (57.2%) and computers or laptops (61.6%). Consistently, Thailand Internet User Profile survey conducted by Electronic Transactions Development Agency [ETDA] in 2015 indicated that despite a variety of devices and methods to connect to the internet, smartphones was found to be the main device to which Thai people use for

going online. Furthermore, internet connections made by smartphones were always reportedly the highest in number at any time of the day. In fact, it was found that Thai people spent an average of 5.7 hours per day online via their smartphones (Office of Electronic Transaction Commission, 2015). Children and parents: media use and attitudes report by Ofcom Journal, a survey conducted amongst children and youth aged 5-15 in 2013, found that the number of smartphones and tablets users have tripled. Specifically, majority of children aged 8-11 years old were using tablets while majority of youth aged 12-15 years old were using smartphones to go online (The Communications Act, 2013). The reason why it's easier for people to own technology devices and go on the internet nowadays may be due to the declining price of information and communication technology as well as the increasing abundance of wireless internet packages. As a result, the internet has become more accessible to people of all socio-economic statuses, allowing people to both own and use the internet. Most of the samples in our study (91.46%) reported using the internet for academic purposes; that is to research homework related topics, communicate about academic projects and research academic topic of interest for approximately 30 minutes to 2 hours. Meanwhile, 88.65% of our sample used the internet for entertainment purposes; that is to listen to music online, watch movie online, play games online and research anything of interest for approximately 30 minutes to 2 hours. In addition, 83.8% of our samples used the internet to participate on social media; that is to chat and communicate for approximately 30 minutes to 2 hours. Lastly, a minority of our samples reported using the internet for online business that is to buy or sell things online. Such findings are slightly inconsistent with the survey report of National Statistics Office in 2015 which reported the number one online activity to be social media at 88.6% (Facebook, Twitter, Google+, Line and Instagram), followed by downloading, gaming, watching movie and listening to music at 87.4%, and uploading information such as pictures, photographs and/or videos to share online at 59.1% (National Statistics Office—Ministry of Information and Communication Technology, 2015). Similar findings were reported by Kaiser Family Foundation which revealed the top three most popular online activities for children aged 8-18 years old to be social media, online gaming and watching YouTube, respectively (Rideout et al., 2010).

Hypothesis 1: There is a relationship between internet usage duration and academic achievement.

The analysis of relationship between internet usage duration per week and academic achievement showed that amount of time spent on the internet per week do have significant relationships to reading ($r = -0.24$, $p < 0.001$), spelling ($r = -0.26$, $p < 0.001$) and math performance ($r = -0.20$, $p = 0.001$). This finding reflected that spending a lot time on the internet per week can result in worse performance in all aspects of academic achievement. Consistently, Displacement Theory have stated that the increasing amount of time spent on technology are displacing the time for studying, resting and body movement activities as well as direct social interaction (Anderson & Bushman, 2001; Huston et al., 1999). Similarly, a study by Policy Information Centrer (1998) found a negative relationship between frequency and duration of computer usage at home and at school for grade 4 students and their academic performance. In addition, Cranfield School of Management reported language deficiency and learning disability among children who over consumed technology and internet. Furthermore, a survey by Japanese government revealed that children who spent more than 4 hours a day on their phone were more likely to score lower in their exams than those who spent just 30 minutes a day. Even more so, every 1 in 9 students who spent more than 4 hours a day on their phone were likely to perform 14% substandard in their overall academic performance and up to 18% substandard in math (Post Today Online Newspaper, 2013).

Hypothesis 2: The motive for using the internet has a relationship with academic achievement.

The results presented that there is a negative significant relationship between academic achievement in reading and time spent on the internet for entertainment ($r = -0.25$, $p < 0.001$) and social media participation ($r = -0.13$, $p < 0.05$). Essentially, this finding reflected that the more time children spent on the internet for entertainment such as listening to music, watching movies, or playing games as well as for social media, the lower their academic achievement in reading become. Consistent to this finding, a research conducted by Neuman and Celano (2006) indicated that most of the content on websites nowadays are images not texts, thus undersupplied in opportunities for children to practice their reading skills when visiting such websites. Conversely, it was found that children who used the internet for academic purposes such as researching homework, communicating for project or researching academic related topics yielded higher scores in reading. Jackson and colleague (2006) pointed out that the reason for such occurrence is due to the fact that educational websites often consisted of texts content which, indeed, reflected in more time spent in reading when visiting such websites.

Academic achievement scores in spelling was found to also have a negative significant relationship to time spent on the internet for entertainment ($r = -0.27$, $p < 0.001$). In other words, spending a lot of time on the internet for

entertainment purposes such as listening to music, watching movies, or playing games resulted in lower academic achievement scores in spelling. An article about typing and writing by American psychologists, Pam A. Mueller of Princeton University and Daniel M. Oppenheimer of the University of California (2014) reported an experiment involving students typing up notes during classes. While students were able to note down everything in class, the psychologists explained that the process of typing did not involve critical thinking process which result in insufficient stimulation in the language part of the brain (Baer, 2014). Furthermore, the effect could be worsen when children used the internet in ways that do not promote their spelling skills, which is reflected in our findings indicating that quite a number of students do perform substandard in their academic achievement in spelling. As a matter of fact, the survey of satisfaction of One Child Per Tablet policy reported that 53% agreed that using tablet reduced hand-written skill (The survey of satisfaction of tablet distribution policy for first graders, 2013). Moreover, a study by Washington University stated that getting an easy access to information and skimming through contents on the internet do not benefit children's learning and can actually hinder children's writing skill. Consistently, a study by David found that more than 1 in 3, precisely 39.3%, of American youth admitted to writing and spelling difficulties resulted from frequent use of abbreviated words (Mayer, 2011).

A negative significant relationship was found between academic achievement in math and time spent on the internet for academic purposes ($r = -0.20$, $p < 0.05$), entertainment ($r = -0.21$, $p < 0.001$) and social media ($r = -0.20$, $p = 0.001$). Such finding indicated that using the internet for a long duration for the mentioned purposes can result in lower academic achievement scores in math. A plausible explanation may be that skills related to math were not involved in those activities, thus no practice or development for math skill.

Hypothesis 3: The test for differences in academic achievement between group of students who received the tablets in 2012 (Grade 4 participants) and those who did not (Grade 5 and 6 participants).

The test for differences in academic achievement between those who received the tablet from One Tablet Per Child campaign in 2012 and those who did not revealed a significant difference in spelling ($t = -2.09$, $df = 252.08$, $p < 0.05$) between the two groups. The survey of satisfaction of tablet distribution policy for first graders in 2013 under the educational campaign One Tablet Per Child enquired for teachers' opinion on the campaign to find several drawbacks mentioned (The survey of satisfaction of tablet distribution policy for first graders, 2013). All in all, they found the tablet to be unbeneficial, inappropriate for children's maturity and appear to be causing a lag in hand-written skills to as high as 53.2% of the students who received the tablets. A number of experts have, in fact, shared their opinions on Saperstien Associates (2012) agreeing that despite being an important skill to technology age, typing skill is not necessary for education; as writing is actually the essential element of language skill development. Therefore, as writing is getting replaced by typing, children in the modern days, as a result, are experiencing deficiencies in several necessary skills. Correspondingly, Dr. Virginia (2012), an educational psychologist from University of Washington studied groups of students in grade 2, 4 and 6 and discovered that children who frequent writing by hand have better writing skills than students who often typed using keyboard. As a matter of fact, it was found that writing by hand produced stimulation on parts of the brain directly related to language memory while typing does not. Hence the warning of a French psychologist, Stanislas Dehaene, who warned parents to keep their children away from the keyboards as typing does not allow the brain to memorize letters and vocabularies unlike when they are hand written (Baer, 2014). Nonetheless, our findings did not indicate any differences in academic achievement in reading and math between the groups that received the tablets and those that did not which is consistent to the survey of satisfaction for One Tablet Per Child policy where teachers reported higher endorsement in reading among children and better English learning for as high as 69.5% (The survey of satisfaction of tablet distribution policy for first graders, 2013).

As can be seen in the present, there is an abundance of information and communication technology devices and internet available to which users can choose to their liking. However, it is necessary for people to manage their usage appropriately to ensure benefits, especially for children and youth whom are the key force behind the country's future development. As children of this generation will unavoidably be involved with the internet, it is essential for them to adapt and learn how to make use of the internet properly. Many children are being supported by their parents to research on the internet as parents believe that doing so would help increase children's knowledge so much so that parents can become unalarmed of the possible effects the internet has upon their children. Therefore, it is critical to note that if children are using the internet for purposes unrelated or unhelpful to academic knowledge, there will be effects on academic performance. This particular research serves as another evidence to help parents, teachers, and whoever that is concerned to be aware of the effects that can occur. However, it does not dictate that using the internet will cause learning problems and it also cannot state whether reading, spelling and math problems found among children in this study occurred prior or after the use of internet.

Future study should control for other possible intervening factors such as socio-economic statuses, home and school environment, learning ability and other possible related psychological conditions. Further study on the relationship between internet usage and academic performance should also be explored to serve as a profound evidence for future studies.

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References

Amornwit Nakorntub. (2007). *Media and quality of Thai youngsters*. Thai Health book No.335 issue March 2550.

Berninger, V. (2012). *Evidence-Based, Developmentally Appropriate Writing Skills K–5: Teaching the Orthographic Loop of Working Memory to Write Letters So Developing Writers Can Spell Words and Express Ideas*. Proceedings of Handwriting in the 21st Century, Washington, D.C..

Children and Parents: Media Use and Attitudes Report. (2013). The Communications Act.

Craig, A. A., & Brad, J. B. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. In *Psychological Science* (Vol. 12, No. 5). Iowa state university.

Critical Analysis of Children Gaming Addiction Research. (2012). Retrieved November 14, 2015, from http://www.healthygamer.net

Drake, B. (2014). *Here's Why Writing Things out By Hand Makes You Smarter*. Retrieved March 1, 2015, from http://uk.businessinsider.com/handwriting-helps-you-learn-2014-12?r=US&IR=T 2016

Huston, A., Wright, J. C., Marquis, J., & Green, S. B. (1999). How young children spend their time: Television and other activities. *Developmental Psychology*, *35*(4), 912-925. http://dx.doi.org/10.1037/0012-1649.35.4.912

Kotler, J. (2008). *Sesame Workshop utilization study*. New York: Sesame Workshop.

Linda, A. J., Alexander, V. E., Frank, A. B., Gretchen, B., Zhao Y., & Hiram, E. (2006). Does Home Internet Use Influence the Academic Performance of Low-Income Children? *Fitzgerald Michigan State University in Developmental Psychology*, *42*(3).

Liparenko, S., Kharkiv, G., & Scovorod, S. (2014). *The negative influence of the technical means on children's development*. National pedagogical university: Ukraine.

Mayer David. (2011). *Net effect: Abuse, dependency & addiction to technology*.

Ministry of culture worried about youngsters addicted to mobile phones. (2015). Retrieved August 27, 2015, from http://www.posttoday.com/social/general/244381

Ministry of Information and Communication Technology. (2015). *The survey of household acquisition and usage of information and communication technology*. National Statistical Office. Retrieved February 6, 2016, from http://service.nso.go.th/nso/nsopublish/themes/files/icthh58.pdf

Ministry of Public Health. (2014). *Child Development*. Retrieved on December 2, 2015, from Ministry of Public Health. Retrieved from http://www.moph.go.th/moph2/show_hotnew.php?idHot_new=4820

National Statistical Office. (2013). *The survey of satisfaction of tablet distribution policy for first graders*. Ministry of Information and Communication Technology.

National Statistical Office. (2014). *Teenage: Internet and Online Games*. National Statistical Office. Retrieved February 20, 2015, from http://service.nso.go.th/nso/web/article/article_47.html

Neuman, S. B., & Celano, D. (2006). The knowledge gap: Effects of leveling the playing field for low-and middle-income children. In *Reading Research Quarterly* (pp. 176-201). http://dx.doi.org/10.1598/RRQ.41.2.2

Office of Electronic Transaction Commission. (2014). *The survey of internet usage behaviour in Thailand in 2014: Ministry of Information and Communication Technology*.

Office of Electronic Transaction Commission. (2015). *Thailand internet user 2015*. Ministry of Information and Communication Technology. Retrieved February 6, 2016, from http://www.it24hrs.com/2015/thailand-internet-user-profile-2015-2558/

One Tablet Per Child; Tablet PC for Thai Education Project. (2012). Retrieved from http://www.otpc.in.th/aboutus.html

Piya Tuntavichien. (2012). *Research Center Innovation "The overview and trends of the Internet"*. Retrieved November 27, 2015, from http://truehits.net/graph/graph_stat.php

Policy Information Center. (1998). *The Relationship between Educational Technology and Student Achievement in Mathematics*. Research Division Educational Testing Service Princeton, New Jersey.

Rideout, V., Foehr, U. G., & Roberts, D. (2010). *Generation M^2: Media in the lives of 8-to 18-year-olds: Kaiser family foundation study*.

Ruberstien, J. S., & Meyer, D. E. (2001). Executive control of cognitive processes in task switching. *Journal of Human Experimental Psychology-Human Perception and Performance*, *27*(4), 763-797. http://dx.doi.org/10.1037/0096-1523.27.4.763

Saperstien Associates. (2012). *A Summary of Research Presented at Handwriting in the 21st Century*? An Educational Summit.

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