

UI and Smart Phone

Term Paper

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Introduction

In today's fast-paced world, there is a group of professionals always found themselves constantly text messaging, writing up mini-emails, or taking notes using a tiny notepad through a smart phone device. These people seems always holding an inseparable smart phone device in their phone. Their smart phones become a necessity to their daily life. In this paper, we will discuss the concern about how smart phone changes our lives, which age group and occupation might expose to HFE injuries, how smart phone physical properties can rise some HFE issues, and finally any HFE countermeasures that we should consider while we are working with a smart phone.

Background

With the last ten years, smart phone technologies changed so rapid, from a water-bottle size cell phone to a 2.5x4 inches or smaller smart phone device, these phones are so trendy, tinny and lovable from their appealing appearance and packed with tons of application including calling, text messaging, email, photo-taking, web-accessing, games, or you-name-it which can probably find on the web to download. This little tool not only increases our accessibility to others, keep us on top of information, but also helps us to increase productivity and efficiency on the job.

As the cell phone technology advanced so much, one of the major influences to the cell phone technology is contributed by the availability of Internet. Internet puts everyone onto the net, and provides easy access to many information. Many professionals find it useful and necessary to their job. With our current Internet solutions, there are many professionals are on the road, and found that they cannot access Internet easily by wireless Internet unless that they are in a café house or remote wireless location. Otherwise, it is difficult to gain Internet access. The only way to get a full Internet access is by using a smart phone. Therefore, many professional found it acceptable and convenient in many ways. Due to this factor, smart phone like blackberry, Treo, iphone, etc becomes so popular. As our life style changes by smart phone technology and higher demand to our job duty, this change also raises some HFE concern of using

smart phone. One of the smart phone related HFE concern is many professional getting some repetitive strain injuries by using a tinny smart phone keyboard.

This usage causes many professional injured with a carpal tunnel syndrome, like “blackberry thumb”.

Blackberry Thumb

Blackberry thumb is a generalization term for repetitive strain injury caused by the frequent overuse of the thumb to press buttons on a smart phone device. It is a collection of symptoms and signs that causes aching and throbbing pain in the thumb, fingers and wrists area. It usually happens to people with age of 40 and above. Since people at age 40 and above have a high tendency of getting arthritis; this repetitive, increasing motion can worsen the chance of getting strain injuries as carpal tunnel syndrome like nintendinitis, wiinjuries, osteoarthritis, tendonitis, tenosynovitis, etc. Therefore, it is important to acknowledge how a poor repetitive force acts by finger tapping, flicking, or any hand-related ailments on a smart phone could result in one of the these injuries.

Business and Professionals

In our rapid world, many found that it is critical to stay on top and in touch with others in this competitive business environment. Whether one is a financial services professional or a law-making professional, the ability to reach to the information; access to internet; setting up meetings on the road; checks news and weather; replying important emails from a client are becoming important factors to a business success. Since smart phone device becomes an indispensable tool to many professionals. It is no doubt that its communication ability makes the business world moves faster and allows decision-maker to make better decision. However the prices that we pay for this instant communication convenience is the health of our hands. As millions of users messaging through a smart phone daily, there are thousands of injuries are caused by blackberry thumb, and these cases for remedies will arise continuously. In 2007, Harris interactive performed a study that found 112 millions smart phones shipped worldwide in 2007, and the expected number of

smart phone to-be-shipped in 2009 will be exceeding 100 million. It is expected that there are 400 millions of smart phones are using worldwide. With an increasing amount of devices in the market, the possibility of getting repetitive strain injuries, like blackberry thumb, arm tendonitis, are also arising.

Communication is an important tool to everyone, including our president Obama. President Obama prior to his presidency found himself inseparable from his smart phone from SMS messaging or Twittering. As we can see, as business demands and new technology comes, many top ranked professionals will put us into the technology edge and urge us to familiarize with the idea of using smart phone communication. Depend to the job functionality, there are a group of professionals will always demand other to use smart phone communication heavily. Within this group of professional, they will have a higher tendency to expose to the HFE injuries.

Some professionals might find themselves easier injured by a smart phone due to their job nature, increasing responsibilities and accessibility needs for the job. These industries and professionals are indicated below:

Industry	Professionals and reason for using smart phone
Financial Services / Accounting Service / Sales	<p>Financial Services Professional.</p> <ul style="list-style-type: none"> • Many found them need the leads and sales data instantly for making decision. • Access to potential investments through web • Easily access and reach client information through address book • Set up meetings
Government and Public Services	<p>Government and public services agent related to law-making.</p> <ul style="list-style-type: none"> • Agent needs current and critical information to deliver top-notch service to your constituents
Higher Education	<p>Professor</p> <ul style="list-style-type: none"> • Increasing ability to communicate with professor anytime and anywhere
Field Service/Inspection	<p>Field service / inspection specialist</p> <ul style="list-style-type: none"> • Wireless field service application through smart phone provides accessibility, productivity and communication on-the-road
Professional Services	<p>Lawyers / Client-based accountant</p> <ul style="list-style-type: none"> • Increasing accessibility and communication on most up-to-dated

	information.
Real Estate	Real Estate agent <ul style="list-style-type: none"> • Increasing accessibility and communication with the clients. • Getting instant most update market information.
IT Professional	Manager and IT Services <ul style="list-style-type: none"> • Increase communication channel and responsibility of the task.
Deaf professional	Deaf professional are increasing getting blackberry thumb due to text messaging practice since 1998

Analysis of smart phone UI and injuries

As the smart phone technology continues to advance and increasing cost of landline phone usage, there is an increasing amount of customers switched from landline phone to cellular smart phone. From Harris Interactive 2008 “cell phone usage” study, it indicates that one in five American now only have cell phone, and cancelled their landline. With increasing dependency on smart phone usage, there are more HFE concerns regarding to the smart phone user interface (UI) and injuries issues. In this section, we will discuss the injuries related to smart phone usage based on age group, its physical size and any other possible injuries.



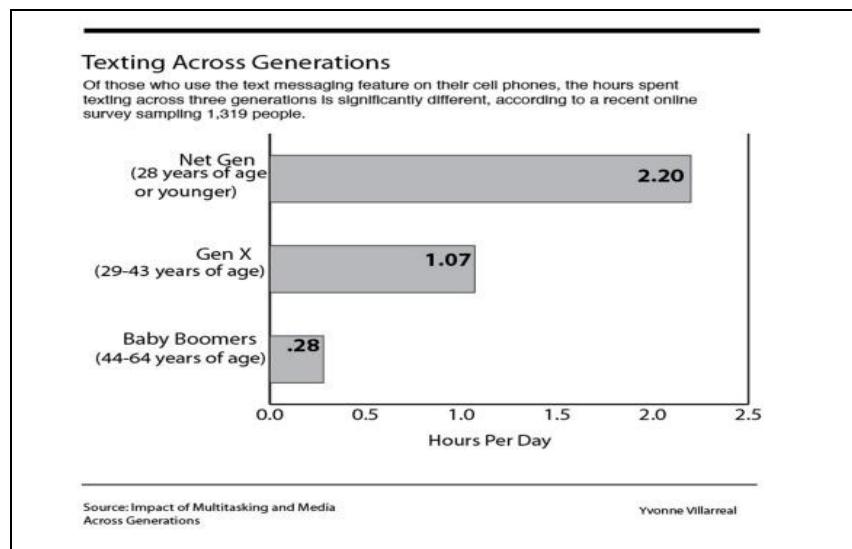
Age group and text messaging

In these days, it is rarely to find a teen without a smart phone in hand; they can text messaging for hours, and seem to be without any health consequences.

However, it is not true. Based on a study we found that it indicated that teenager could get tendonitis if he continues a text messaging behavior for hours per day, this habit will eventually cause him carpal tunnel syndrome like older adult. This symptom is referring as “Texting Teen Tendonitis” in 2009.

When people got close to age 40 and above, they tends to be easier to get arthritis. If one of the older people attempted to spend the day emailing and text messaging, or surfing the web whole day, it is very easy to find him getting repetitive stress injuries to their thumb, fingers or wrists. The reason that it is easier to injury older folk is because arthritis can start commonly around age 40s. Therefore, it is easily to turn arthritis into any tendonitis at age 40 and older. In this case, smart phone repetitive keying behavior puts older folk into the risky rank of getting repetitive stress injuries.

Beside blackberry thumb there are other smart phone related injuries could happen, for example back, neck, arm injuries due to its weight and size. However, these injuries are age independent.



Blackberry thumb injuries

Based on a study from “PracticeSafeTexting” from Virgin UK, it indicates that there are about 93.5 millions people are sending text everyday in UK. With an increasing text communication habit on short or long messages, there are

about 3.8 million users are suffering injuries by repetitive stress motion on thumb, finger and wrists. From 2004 to 2008, it indicates that there is an increase of 38% of sore wrist, thumb injuries by text messaging. Therefore it is wise to understand how to prevent it.

Smart phone physical properties and HFE concern

a. Qwerty keyboard and touch screen keyboard

Qwerty keyboard and touch screen keyboard are widely used in different type of smart phone. For blackberry thumb, it is more common to find it happened on a qwerty keyboard (for example: blackberry or treo) than a touch screen keyboard (for example: iPhone). However, tendonitis can still occur on arm, wrist, and finger due to repetitive stress motion by working with any smart phone by excessive pressing key buttons. When tendonitis occurs, it will have pain come from bending the affected body part. In order to recover the affect body part, it might take up to 10 to 14 days for recovery by relaxing the affect body part in a stretch position. For example, if there is a “finger tendonitis”, it will require the swelling finger to stretch in an extended, relaxing position for 2 weeks.

With the consideration of HFE to choose a safer keyboard entering method between a qwerty keyword and touch screen, it is better to work with a touch screen than a qwerty keyboard because there is lesser finger force applied by pressing down the hard button keys.



b. Screen size and contrast level

Another consideration of smart phone UI would be the screen size and contrast level. There are numerous professionals worked in both indoor and outdoor, for example: real estate agent, field service / inspection specialist, executive and lawyer. These professionals have heavy communication with their clients and found them constantly on the smart phone either texting, scheduling meeting, etc. Beside the possibility of getting repetitive strain injuries, one might receives eyestrain and eye fatigue by staring at the screen too long. Therefore, as a good practice, a good large screen and a proper contrast level are important key to protect their eyes.

c. Smart Phone weight

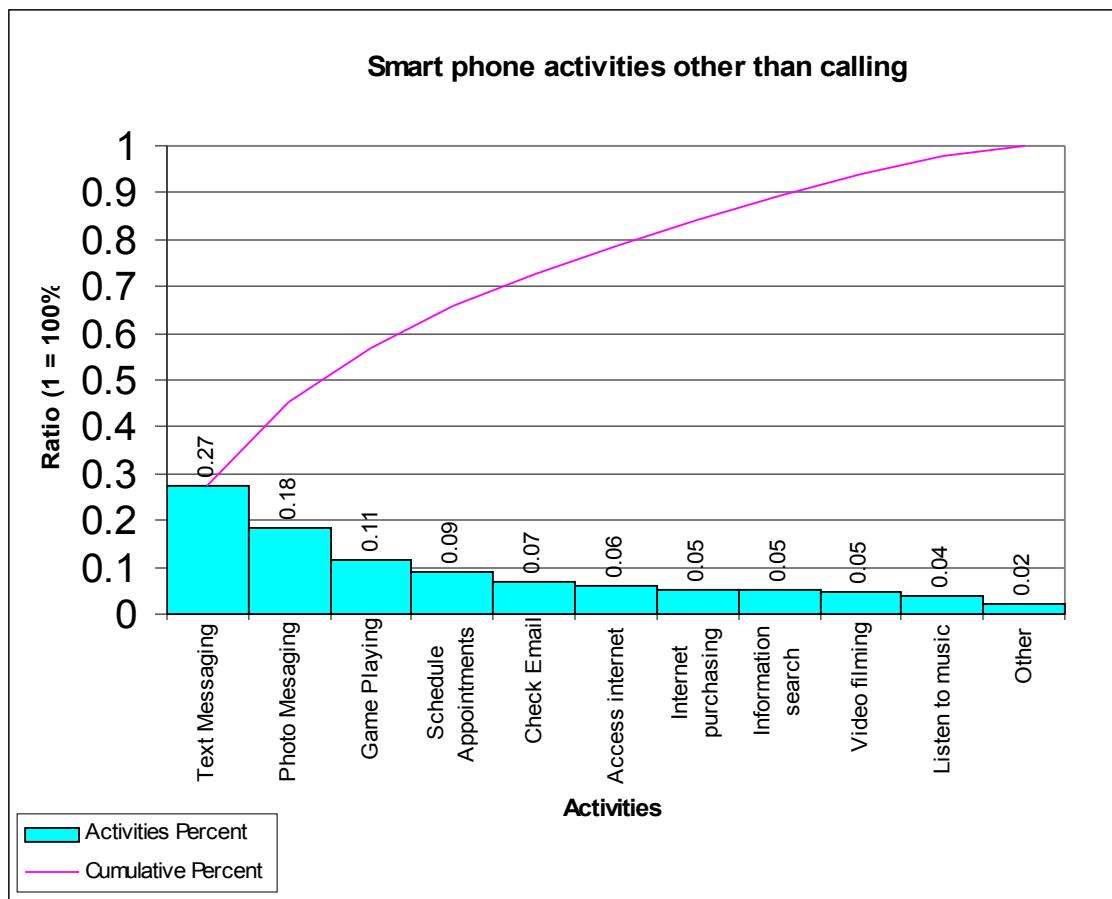
In general, a smart phone can weight somewhere around 200g (For example, a blackberry model 8520 is about 130g, a treo model 630 is about 200g, and a iphone is about 140g). Its weight mainly is coming from the device and the battery. Some bigger battery can weight little more. Most professional would like to have a lightweight smart phone to carry around. Since it is common to put the smart phone in the front or back pocket. However, putting phone in the back pocket is a poor way to keep the phone around. Especially, if a professional puts this device in the back pocket and sit on it, it can cause back injuries due to repetitive muscle strain around the lower back area. Therefore, while one is sitting, he should remove the phone from the pocket and prevent from sitting on it. This prevention can save many from getting back injuries.



d. Common application in smart phone

Based on a recent study for cell phone activities usage in 2007 (with a 95% confidence level with +/- 2 % error). The survey is conducted with 3546 individuals. On 2007, it found out that 49% user is using smart phone more than just calling. As HFE concern, it is important to understand what type of smart phone functions will contribute 80% of non-calling activities. At below, there is a Pareto chart to indicate what type of activities conducted with a smart phone (other than just calling).

Based on the following Pareto chart, it indicates that 80% smart phone activities are contributing from text messaging, photo-taking, game play, schedule meetings, check emails and access internet. By reviewing these common activities, we can realize that these activities required repetitive finger motion on the qwerty or touch screen keyboard. If we do this type of repetitive motion excessively, it will cause carpal tunnel syndrome to arm, waists, fingers, and thumbs area.



f. Other possible injuries related to smart phone usage

Technology changes our lives so much easier to connect with other, making our lives efficient and fun. However, many have found themselves becoming a smart phone addict. Either from waking up at the morning, going to bed, during eating a meal, or talking to friend, one might find himself constantly working with smart phone. While one constant working with smart phone, he might forget his proper posture. He might hold the device too close to his eyes or hold the device in a twisted body position. Poor body posture can contribute some body injuries to their back or eye fatigue. Some teenager sits on sofa and text messaging whole day with a poor posture. His posture becomes a significant factor to cause back, chest and arm area pains. Therefore, it is important for one to recognize and take a break from preventing any unnecessary injuries.

Recent many state implements the law to ban cell phone usage during one's driving. From HFE concern, driving and text messaging is an irresponsible behavior. It is good to see how legislature to implement his regulation to prevent many unnecessary accidents from smart phone texting-and-driving behavior.

Another minor HFE concern with smart phone usage is the noise pollution with a speakerphone. One might find himself work effectively with a speakerphone; other might find it annoyed by the loud voices.

HFE Countermeasure

After our analysis of smart phone physical properties, popular non-calling activities, and the general smart phone usage per generation; we noticed that the generations (from gen-net and gen-x) has a habit tendency to rely on text messaging for their social life and work life. It is obvious that we can expect this trend to continue in the next 5 years. With HFE concerns about the interaction between human and smart phone usage, we should focus on any HFE countermeasures on smart phone usage so that we can educate ourselves and prevent other from getting any unnecessary injuries from excessive smart phone usage. At the same time, technology will continue to evolve; therefore, it is necessary for every professional to review, study and improve the HFE countermeasure continuously.

There are several HFE countermeasures that can help and reduce the injuries from repetitive stress motion on smart phone usage.

1. Reduce text-messaging habit. Text messaging is a social networking method. One can change this habit by calling their client, friend and family directly. Changing life style can eliminate this type of unnecessary repetitive strain motion on finger by using a smart phone.
2. With the driving-and-text-messaging law changes, there is a concern of safety on the road. At the same time, we have some application to handle voice-text-messaging nowadays. It translates voice into SMS messaging. Without any finger pressing, a voice activating text-messaging application can help one eliminate the possibility of getting blackberry thumb.

3. Stop taking note from a smart phone. Write it down on paper and enter it later in computer, for example, schedule a meeting, add address contact, take notes. Avoid using the smart phone keyboard can reduce unnecessary finger strain of getting any carpal tunnel syndrome.
4. Take a short-break from long smart phone activities, and give finger and hand stretching exercise.
5. Work with a larger touch screen, and brighter smart phone device. With a brighter touch screen, it will prevent eye strain and lesser strain applied to fingers.
6. Keep a better posture while one is text messaging. Stay away from sitting too long in one posture, change posture from time to time, and take some breaks. Make sure that the back and arm position has a proper distance.
7. Keep a proper eye distance of 10-15 inches away from eyes while working with a smart phone. It can reduce eyestrain and eye fatigue.
8. When there is a pain, go and get diagnosis from a health professional.
9. As technologies evolve constantly, text messaging might be outdated in some nearby future. Therefore, it is necessary to continuously review any HFE issues related to smart phone usage.
10. Educated Gen-Net on HFE and smart phone. Based on the study, they have an increasing habit of using smart phone to keep contact with friend and family. This behavior have a higher tendency of getting repetitive strain injuries.

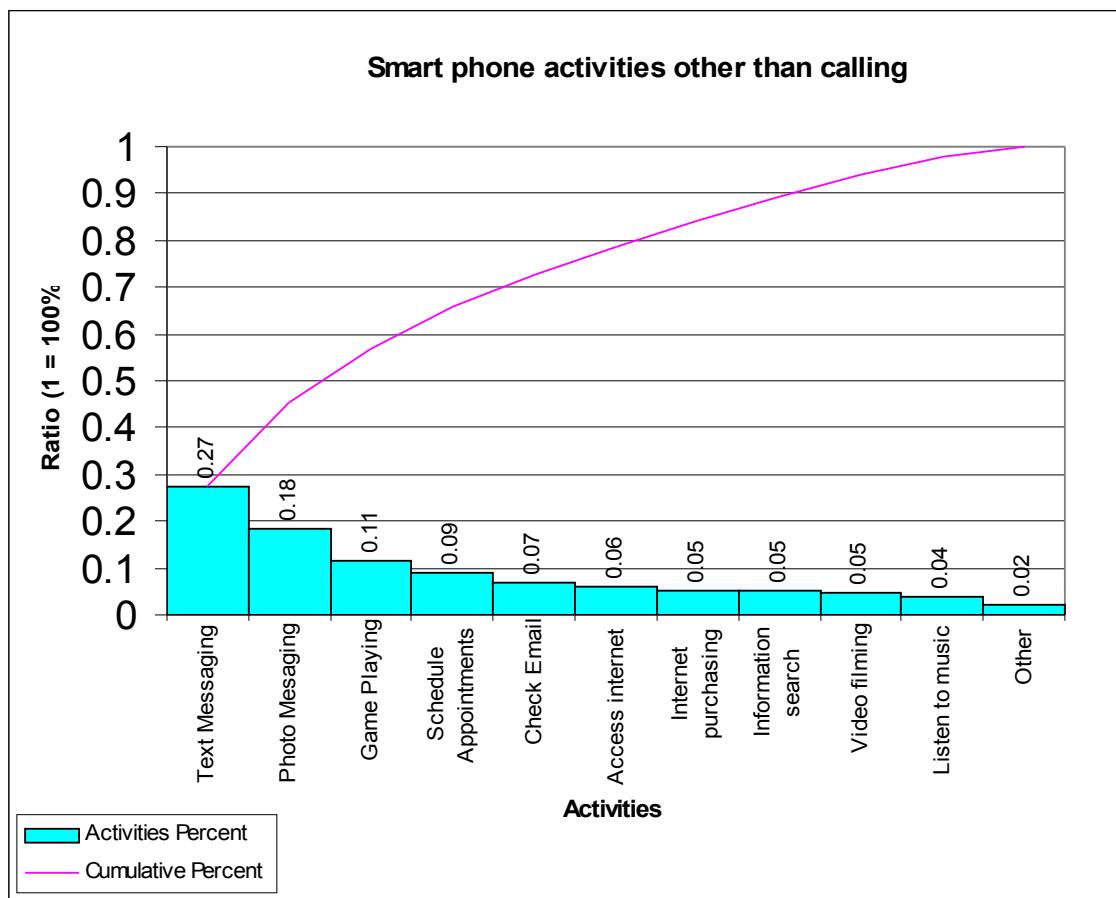
Conclusion

Many loves smart phone technology because it gives us more in work and life in term of flexibility, productivity, accessibility and ease-of-use. But if one abuses with this technology without HFE concerns, it will produce other negative results to one's health like causing some carpal tunnel syndrome. Working hard, keeping on top of information and in touch with other are important keys to everyone's job and personal life. However, if we can find a balance by learning job-related safety issues, and work around any potential HFE risks, it will prevent many unnecessary injuries. Abusing a technology like teen text messaging might not be a good practice in keep a social relationship. At the same time, addicting to smart phone usage to keep a client happy and be productive on job might also not a good practice to a business success and personal life. Both are eventually trading the success with the price of their time, values and health. Finding a well-balanced life style is the most important key to succeed in nowadays fast-paced world.

In conclusion, smart phone technology adds so much quality values to our daily life, and it becomes a part of daily accessory. Without knowing the HFE concerns, one might abuse the technology with the price of personal health. While we are working closely with smart phone in our job, we should consider the potential HFE related risk factors like carpal tunnel syndrome and other fatigue issues. By knowing that age, phone physical size, user activities on phones, and job nature might acknowledge one from preventing repetitive strain injuries. Generation-Net (age 27 and below) has a high tendency of using text messaging heavily, and it is necessary to educate them to reduce the use of smart phone in social relationship. As times goes, Generation-Net will become the professionals in next 10 years. This repetitive strain injuries could more likely happened to this generation-net. Therefore, be educated, be aware and take preventive action, continuously review and improve the smart phone usage practice is necessary for every generation from getting any repetitive strain injury.

Appendix A**Worksheet – Case Study about Cell Phone Usage from Harris Interactive**

	Percent (multiple allow)	Number of response	cum response	cum %	% response
Text Messaging	0.36	1294.2	1294.2	0.272727	0.272727273
Photo Messaging	0.24	862.8	2157	0.454545	0.181818182
Game Playing	0.15	539.25	2696.25	0.568182	0.113636364
Schedule Appointments	0.12	431.4	3127.65	0.659091	0.090909091
Check Email	0.09	323.55	3451.2	0.727273	0.068181818
Access internet	0.08	287.6	3738.8	0.787879	0.060606061
Internet purchasing	0.07	251.65	3990.45	0.840909	0.053030303
Information search	0.07	251.65	4242.1	0.893939	0.053030303
Video filming	0.06	215.7	4457.8	0.939394	0.045454545
Listen to music	0.05	179.75	4637.55	0.977273	0.037878788
Other	0.03	107.85	4745.4	1	0.022727273
	3595		4745.4		



References

1. Gordon, Serena, U.S. News, "Beware the blackberry thumb"
<http://health.usnews.com/articles/health/healthday/2008/06/15/beware-the-blackberry-thumb.html>
2. DeNoon, Daniel, Web MD, "BlackBerry Thumb: Real Illness or Just Dumb?"
<http://arthritis.webmd.com/news/20050126/blackberry-thumb-real-illness-just-dumb>
3. M.D. Avitzur, Orly, ConsumerReports.org, "Rx for Blackberry thumb"
<http://www.consumerreports.org/cro/electronics-computers/news-electronics-computers/2009/1/rx-for-blackberry-thumb/overview/blackberry-thumb-ov.htm>
4. Associated Press, Wired.com, "The Agony of BlackBerry Thumb"
<http://www.wired.com/science/discoveries/news/2005/10/69294>
5. Fish, Donna, HuffingtonPost, "How much is too much Pre-Teen Text"
http://www.huffingtonpost.com/donna-fish/how-much-is-too-much-pre_b_171509.html
6. Harris Interatice Public Relations Resarch, "A Study about Cell Phone Usage"
<http://www.resourcesshelf.com/wp-content/uploads/2007/06/ingenio.pdf>
7. Villarreal, Yvonne, Impact of multitasking and media across generation
http://bp0.blogger.com/_mY5qMd2DfoM/SBS66L5e_KI/AAAAAAAATE/Hflz0VN6tNY/s1600-h/Text+Message+by+Age.jpg
8. Articlesbase, "Statistics and CellPhones"
<http://www.articlesbase.com/computers-articles/statistics-and-cell-phones-538109.html>
9. Knolb, Liz, cellphonesinlearning.com, "New Statistics on Teen Cell Phone Use"
<http://www.cellphonesinlearning.com/2008/09/new-statistics-on-teen-cell-phone-use.html>
10. Harris Poll, Harris Interactive, "Cell Phone Usage Continues to Increase"
http://www.harrisinteractive.com/harris_poll/index.asp?PID=890
11. Virgin UK corporation, "Practice Safe Text"
<http://www.practisesafetext.com/>
12. Hall, Leonard, HearingLossWeb.com, "Blackberry thumb strikes"
<http://www.hearinglossweb.com/Medical/bbthumb.htm>
13. jkOnTheRun, "Texting teen Tendonitis – Another Technology Abuse"
<http://jkontherun.com/2009/07/23/texting-teen-tendonitis-another-technology-abuse-ailment/>