

A Study of Texting, Reading, and Writing Practices and the Development of Literacy in Adolescence

by

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Abstract

Research into literacy development continues to be essential, especially considering the alarmingly high levels of functional illiteracy observed in various contemporary contexts. The primary purpose of the present study was to investigate associations between adolescents' literacy levels and their text messaging, reading, and writing habits. Previous studies have consistently shown positive relationships between literacy attainment and traditional forms of reading and writing, while the research results into the associations between the new-literacy practice of texting and literacy have been decidedly mixed and inconclusive. Uniquely for this area of research, this study distinguished between the potential influences of different types of reading and writing (i.e., texting versus more complex, traditional forms) on literacy development. Consistent with the general trends observed in previous research, the present study found that text messaging practices were not significantly associated with literacy levels in the adolescent sample under investigation; reading, in the traditional sense, exhibited more positive associations with literacy attainment than all the other practices considered.

These findings, similarly to previous research, suggest that the type of reading occurring while texting is substantially different, in terms of its associations with literacy development, from more traditional forms of reading. Yet recent large-scale survey data indicate that while the amount of time spent by young people on new-literacy practices such as texting is rising rapidly, the amount of time spent reading (and writing), in the traditional sense, remains low. In addition to the limited reading quantity, the complexity level of the traditional forms of reading that are occurring in adolescence is often significantly lower than the advanced standard required for post-secondary studies or many careers. Rather than focusing on potential technological solutions, increasing the quantity and complexity level of more traditional forms of reading in adolescence appears to be a more prudent strategy for enhancing functional literacy in society.

Keywords: Literacy; new literacies; texting; reading; writing; adolescence

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List of Acronyms

ACT	American College Testing
ALL	Adult Literacy and Life-skills (Survey)
ANOVA	Analysis of Variance
ATOS	Advantage – TASA Open Standard
ATUS	American Time Use Survey
BC	British Columbia
DRP	Degrees of Reading Power
ELA	English Language Arts
ESL	English as a Second Language
IALS	International Adult Literacy Survey
ICT	Information and Communications Technology
ID	Identification
IEA	International Association for the Evaluation of Educational Achievement
IM	Instant Messaging
MMOG	Massively Multiplayer Online Game
MMS	Multimedia Messaging Service
NAEP	National Assessment of Educational Progress
NEA	National Endowment for the Arts
NGACBP/CCSSO	National Governors Association Center for Best Practices, Council of Chief State School Officers
OECD	Organisation for Economic Cooperation and Development
OR	Odds Ratio
ORE	Office of Research Ethics
PIAAC	Programme for the International Assessment of Adult Competencies
PISA	Programme for International Student Assessment
PRC	People’s Republic of China
REAP	REAders-specific Practice
SAT	Scholastic Assessment Test (previously)
SD	Standard Deviation
SLI	Specific Language Impairment
SMS	Short Message Service
SPSS	Statistical Package for the Social Sciences
UK	United Kingdom
US	United States
VIF	Variation Inflation Factor

Glossary

Basic Literacy:	the ability to read or write at a simple level in at least one language
Deictic:	continuously changing due to ongoing transformations in context
Functional Literacy:	the ability to understand and employ printed information in daily activities at home, at work, and in the community – to achieve one’s goals and to develop one’s knowledge and potential (OECD and Statistics Canada, 1997)
Instant Messaging (IM):	a type of online chat that allows for real-time text transmissions via the Internet, and the most common form of communication on social networking sites
Literacy:	the ability to understand, evaluate, use and engage with written texts (print-based or digital) to participate in society, to achieve one’s goals, and to develop one’s knowledge and potential (OECD, 2013)
New Literacies:	new, multifaceted, and deictic forms of literacy that have arisen in the past few decades as a result of the rapid advancement of digital technologies
Textese (a.k.a. Textisms):	the condensed or abbreviated language forms often used when text messaging (e.g., gr8 to mean ‘great’)
Text Messaging (a.k.a. Texting):	exchange of brief written text (i.e., up to 160 characters) between mobile phones through the use of the SMS function
Twitter:	popular online social networking service that allows registered users to send short messages (i.e., 140-character maximum) called ‘tweets’ to a large audience



Chapter 1. Introduction

1.1. Current Literacy Levels: Cause for Concern?

One of the key distinctions often made nowadays when considering levels of literacy or illiteracy in different countries is between ‘basic literacy’ and ‘functional literacy’. ‘Basic literacy’ is usually defined as the ability to read or write at a simple level in at least one language; ‘functional literacy’ is generally defined less precisely but is often characterized as the ability to read and write at some predetermined, beyond-basic level that results in the competent management of daily tasks. The definition of functional literacy varies from country to country, depending on the level of reading and writing that is deemed minimal to adequately function in a particular society. A joint study by the Organisation for Economic Cooperation and Development (OECD) and Statistics Canada (1997) defined functional literacy as “the ability to understand and employ printed information in daily activities at home, at work, and in the community—to achieve one’s goals and to develop one’s knowledge and potential” (p.14).

In modern knowledge-based societies, adults are expected to adapt to ongoing technological change and to develop significant levels of literacy beyond just basic skills. Some of the important functions demanded by such societies include: understanding key concepts, using information and symbols in complex ways, performing analyses, applying theories, and leading an active life in a community (OECD and Statistics Canada, 1997). It is worth noting that functional literacy is considered important not just for personal development, but also for social and economic wellbeing. Moreover, functional illiteracy not only makes it extremely challenging, if not impossible, for an individual to carry out various daily activities and employment tasks, but is also linked to an increased prevalence of poverty and crime (OECD, 2013).

There are a limited number of large-scale adult literacy surveys (i.e., systematic investigations of ‘functional literacy’) that have been done on an international level. The

three main international surveys carried out have been the International Adult Literacy Survey (IALS) in the 1990s, the Adult Literacy and Life-skills Survey (ALL) in 2003 and 2006, and the OECD Programme for the International Assessment of Adult Competencies (PIAAC) in 2013. All these surveys have utilized similar measures for assessing the literacy proficiencies of youths and adults (i.e., 16- to 65-year-olds) across multiple countries. The only significant difference in terms of the measures used was that the PIAAC survey (OECD, 2013) used a broadened definition of literacy more appropriate to the information age, by including computer proficiency as well as reading skills in digital contexts.

In terms of literacy attainment on the various assessments performed, all three of the international surveys mentioned above separated participants into five different levels of literacy, with level one being the lowest and level five the highest. As mentioned in an OECD and Statistics Canada report (2005), the generally accepted skill proficiency standard for functional literacy is at least a *level three*, a level which is purported to provide a good chance of full and productive participation in modern knowledge-intensive societies. Importantly, by using similar measures and standards (i.e., the same five-level system), these three surveys have accumulated both nation-specific and international literacy data over the past few decades that can be readily compared across countries and over time.

The findings in terms of basic illiteracy were consistent with previous studies (e.g., Stedman & Kaestle, 1987). Basic illiteracy in industrialized countries was shown to be very low (i.e., less than one percent of the population in many countries) and also appears to be in significant decline in most parts of the majority world. However, the current rates of functional illiteracy in many industrialized countries, such as Canada and the United States, have been reported to be alarmingly high (OECD and Statistics Canada, 2011).

Among the twenty-three industrialized countries surveyed in the most recent PIAAC study (OECD, 2013), Canada scored near the median level for adult literacy proficiency. Around 52 percent of Canadians achieved level three or higher in literacy proficiency which means almost half (i.e., about 48 percent) were below level three, or

functionally illiterate. Compared to the ALL results from 2003 (OECD and Statistics Canada, 2005), when 59 percent achieved level three or higher, there was an increase in the number of Canadians scoring below a level three. The results were even lower for the United States, where only 45 percent scored at level three or higher for literacy proficiency in the most recent survey, which suggests that around 55 percent of American youth and adults were functionally illiterate in 2013. The findings in terms of literacy proficiency in Americans showed no significant change from the ALL survey performed in 2003. Only around 14 percent of Canadians and 11 percent of Americans scored at level four or five (i.e., advanced levels of literacy involving the ability to evaluate subtle truth claims and arguments, as well as make complex inferences).

Specific placement in the international rankings aside, the results for all the IALS and ALL surveys have showed very similar trends to what has been observed in the most recent PIAAC survey. Each survey has shown that a significant proportion, i.e., around half, of both Canadians and Americans are not achieving the standard for functional literacy. Industrialized countries outside of the North American context also have a significant percentage of their population scoring below the level three threshold, including nations that consistently rank high on these surveys. The most recent PIAAC survey (OECD, 2013) discovered that even in the highest-ranking countries in terms of literacy proficiency, namely Japan and Finland, 28 percent and 38 percent of the populations, respectively, were below the standard of functional literacy. Significant levels of functional illiteracy have been found across all age groups; in most countries, including Canada and the United States, 16- to 24-year-olds scored lower in literacy than 25- to 44-year-olds, but higher than 45- to 65-year-olds (OECD, 2013).

In addition to these international surveys, there has also been much written about problems connected with low literacy levels in secondary schools in the United States and other nations. For example, the Alliance for Excellent Education (as cited in Joftus, 2002) has found that around six million secondary students in the US have a reading proficiency well below grade level. It has been estimated that *every day*, around three thousand students drop out of high school in the United States alone (Joftus & Maddox-Dolan, 2003); one of the most frequently cited reasons for this high dropout rate is the lack of required literacy skills to keep up with the curriculum at the secondary level

(Snow & Biancarosa, 2003). Furthermore, students who are poor readers that do manage to stay in school struggle in courses that incorporate complex texts and are often denied access to intellectually challenging courses (Au, 2000).

Lower levels of literacy continue to negatively affect those students who graduate from high school and go on to college or university. A study (Ferguson, 2006) that analyzed the test scores for the 2005 ACT (i.e., an annual, comprehensive college readiness assessment) found that 49 percent of American high school graduates are not prepared for university-level reading. The National Center for Education Statistics (Sparks & Malkus, 2013) has found that approximately 20 percent of students entering US post-secondary institutions are required to enrol in remedial reading courses. Of those students who do take one or more courses in remedial reading, 70 percent do not complete a degree or certificate within eight years of starting their studies (Adelman, 2004). Such a low success rate for students entering post-secondary studies with insufficient levels of literacy highlights the enormous impact reading and writing skills have on educational attainment.

To sum up, even though basic literacy is nearly universal in Western society, the high levels of functional illiteracy are definitely an area of concern. It appears that the reading and writing skills of a large proportion of the population are not advanced enough to adequately handle the complex literacy demands of modern society. Further investigations that could help elucidate ways in which the literacy levels of youth and adults can be improved upon are imperative. The present study will examine the associations between adolescent literacy development and various activities, including the digital practice of text messaging, and more traditional forms of reading and writing.

1.2. Literacy: An Evolving Concept

The term 'literate' derives from the Latin *litteratus* which Cicero, the Roman statesman and philosopher, defined as a 'learned person'. In English, for a large part of the long history of the word, 'literate' meant a person who was generally well educated and knowledgeable about literature. More recently, literacy has been variably defined as the ability to read and write at some basic or functional level, as opposed to an

advanced level. The converse term, illiteracy, has been used, often in a disparaging way, to describe the inability to read and write at the prescribed level of a particular time period (Harman, 1987).

Although the various definitions of literacy appear quite simple, the concepts involved are complex. Depending on one's perspective, there has often been and continues to be disagreement as to what constitutes the basic components of reading and writing. The divergent points of view are not just connected with what the processes of reading and writing are *per se*, but also with how they can be developed, learned, taught, and assessed. Moreover, there are various levels of literacy that are assumed in different definitions, based on factors such as the complexity level of the written material used to determine the required literacy standard (Verhoeven, 1994).

The way we define literacy as a concept has been heavily influenced by its historical, societal, and even academic context. Indeed, literacy is a relatively recent innovation in the evolution of human beings. Contrary to our innate ability for speech, evolved over millions of years of natural selection, the ability to read and write is a learned behaviour (Havelock, 1976). To place the advent of literacy into an evolutionary perspective, *Homo sapiens* as a species first appeared about half a million years ago; the evolution of modern humans occurred about 200,000 years ago. When we take these time frames into account, the invention of writing (about 5000 years ago) and the origins of Western literacy in ancient Greece (about 2600 years ago) appear very new. Even more recent is Gutenberg's invention of moveable typographic printing (in the 1450's) which brought on the mass production of books. The widespread use of electronic and digital media barely registers onto the timeline of human evolution.

From the time of ancient Greece onward, the history of literacy in the Western world has been closely intertwined with the history of formal education. Formal education, with its systematic methods of teaching and learning, has relied heavily on the use of written text. Until the relatively recent onset of mass schooling, occurring in Western nations during the Industrial Revolution of the 18th and 19th centuries, only a relatively small minority of ruling (and mostly male) elites received such a formal education. Gutenberg's printing press made it possible for books to be produced on a

much larger scale than before and literacy rates increased as a result (Harman, 1987). However, it was not until the Industrial Revolution, with the introduction of mass education, that the majority of the populace in the Western world finally received an opportunity to become literate.

Since the advent of mass schooling, the standard used to define a functionally literate person has followed four general stages of historic evolution, as outlined by Resnick and Resnick (1977, as cited in Christenbury, Bomer, & Smagorinsky, 2011): a) the ability to sign one's name, even with just an X; b) the ability to read, or recite from memory, selected passages of text; c) the ability to read and understand selected passages; and d) by the 1970s, the ability to read, comprehend and critically analyze selected passages. Currently, as evidenced by the most recent definition of functional literacy (OECD, 2013), cited above, literacy skills connected with the use of digital technology have also now been incorporated into the prevailing standard.

In terms of formal educational discourse in Western society, the term 'literacy' did not make a significant appearance until the 1970s. Rather, scholars in education up until that time focused on 'reading and writing' as a *means* for learning, as opposed to an *end* itself. It was not until the 1970s that literacy emerged as a key focus of formal education.

Lankshear and Knobel (2003) identify three key reasons for this shift in the 1970s toward making literacy the new 'bottom line': a) Paulo Freire's work (see Freire, 1985) that was aimed at promoting critical social praxis and associating literacy and education with power relations; b) the discovery of ostensibly widespread functional illiteracy in many Western nations; and c) the increasing popularity of the sociocultural perspective in the social sciences. In short, reading and writing started to be seen more as sociological processes, as opposed to purely psychological ones, which gave birth to new perspectives and a new focus on literacy in educational discourse.

By the 1980's and 1990's, with the development of multiple lenses through which it was viewed, literacy was receiving an ever-greater emphasis in the field of education. As theorists started to make more associations between the concept of literacy and that of education itself, views on literacy evolved and expanded. Novel forms of literacy emerged, such as E.D. Hirsch's (1988) controversial 'cultural literacy', which melded

cultural knowledge with literacy and has had a significant influence on educational theory and practice. Other forms that arose include critical literacy, higher order literacies, powerful literacies, technoliteracies, and multiliteracies (Lankshear & Knobel, 2003). Various challenges (Gee, 2007; Street, 1993) to the idea of a single literacy emerged, mostly from a critical and/or feminist perspective, suggesting that such an autonomous model unfairly privileges the culturally dominant form to the exclusion of others.

Skepticism also arose regarding the way oral and literate practices were traditionally distinguished, with the recognition that in most societies what is involved is a complex interplay between orality and literacy. Prominent scholars in the field (e.g., Ong, 2012) moderated their previous conclusions about the superiority of literacy, and stressed the significant overlap between oral and literate cultures. The continued importance of orality in literate cultures was now emphasized, as well as the notion that writing brings not only significant gains to a society, but certain losses as well.

Indeed, the waves of post-structural, post-colonial, and post-modern thought enveloping higher learning in recent decades have challenged many of the assumptions of modernity and transformed many disciplines of study. The relatively stable structures and terminologies of various academic fields, including education, were (and continue to be) thoroughly critiqued and reconceptualized. Concepts such as literacy have been identified as fluid social constructs that are subject to ongoing change. Although not all scholars ascribe to such a post-modern/post-structural perspective, it must be acknowledged that its influence has been far-reaching throughout many fields of study, including education.

The introduction of sociocultural constructions of literacy has also led to literacy being recognized as variable in different social contexts, with a subsequent differentiation of the term into categories such as, for example, in-school literacy and out-of-school literacy. In addition, the meaning of literacy has become so altered in certain cases that it has lost its direct association with language, and taken on the basic meaning of being proficient in a certain skill. Examples of this are concepts such as computer literacy (Van Dyke, 1987), mathematics literacy (Papanastasiou & Ferdig, 2006), and environmental literacy (Disinger & Roth, 1992).

More recently, notions of literacy connected with making meaning from various signs, codes, and graphic images have emerged. These include visual literacy, media literacy, oral literacy, and information literacy (Lankshear & Knobel, 2003). Some theorists have utilized other labels such as digital literacies, new media literacies, and 21st century literacies, but, by and large, the default term for all of these has now become 'new literacies' (Leu, Everett-Cacopardo, Zawilinski, Mcverry, & O'Byrne, 2007).

1.3. New Literacies

In a broad sense, 'new literacies' can be viewed as the new form(s) of literacy that have arisen in the past few decades as a result of the rapid advancement of digital technologies in our society. Digital technologies, in the form of computers, cell phones, iPods, tablets and the like can be found almost everywhere. The mass marketing drive of multinational technology companies is also ensuring that those spaces that are not yet digitized become so in the near future. This rapid technological transformation of our society can be felt strongly in all spheres of life, including of course the educational.

The stress on new literacies in recent years highlights the changes that have occurred, and continue to occur, in our understanding of the concept of literacy. Indeed, the new, digital technologies have disrupted previous notions of literacy. There are a number of theories that have arisen in the emerging field of 'new literacies' that have attempted to make sense of this rapidly evolving definition of literacy.

As outlined by Leu et al. (2007), the concept of 'new literacies' is highly complex and means different things to different researchers. Some see them as new social practices (Street, 2003), others as required online literary strategies (Coiro, 2003; Leu, Kinzer, Coiro, & Cammack, 2004), still others as discourses (Gee, 2008) or new semiotic contexts (Lemke, 2002) that new technologies make possible. Others (Lankshear & Knobel, 2003) see this concept as some sort of combination of the above definitions.

Although the varied definitions paint a highly convoluted picture, there are some key characteristics that these constructs of 'new literacies' appear to share. A 'new literacies' approach provides not just a new perspective on the nature of literacy but,

according to the researchers in this field, a potentially powerful reframing of what it means to be literate in the new millennium. Coiro, Knobel, Lankshear, and Leu (2008) have come up with four defining characteristics of 'new literacies' that they feel other researchers in this multidisciplinary field could agree on: a) new skills and strategies are required in order to effectively use the new digital technologies; b) full personal, civic, and economic participation in our globalized communities requires the development of 'new literacies'; c) these 'new literacies' are *deictic*, which means they change continuously as new technologies arise and older ones disappear; and d) these literacies are multiple, multifaceted, and highly complex and are therefore best studied through an interdisciplinary approach. The varied theoretical frameworks and approaches prevalent in the field of new literacies research in general will be expanded on in Chapter Three.

In the field of study connected to new literacies, not only are the perspectives extremely diverse but so are the new literacy practices that can be studied. This ever-evolving list of practices includes: instant messaging (IM), text messaging, emailing, photo and video creation and sharing, social networking, web designing, blogging, participating in online discussions, video casting, podcasting, digital storytelling, creating and commenting on online fan fiction, using wikis, playing video games, creating digital mash-ups, conducting online searches, evaluating online information, reading online, and so on. This far from exhaustive list of practices will continue to expand as newer technologies continue to appear on an essentially ongoing basis.

1.4. Literacy Defined: The Present Study

As outlined above, literacy is a complex, evolving concept that has been, and continues to be, profoundly influenced by its sociocultural context. Performing research into literacy, and especially new literacies, inevitably leads to an initiation into the multifaceted complexity of this field of research. Nevertheless, and especially so if one uses a quantitative approach as done for this study, one needs to make a decision on the definition of literacy, at least in a tentative sense, that will be utilized.

The focus of this particular study is on the relationships between some key habits, including reading, writing, and the new-literacy practice of texting, and literacy

development in adolescence. Literacy will be defined in the more standard sense for this study, with an inclusion of but not a specific focus on digital skills, similarly to the way it has been described in recent international surveys into functional literacy (OECD, 2013): “Literacy is defined as the ability to understand, evaluate, use and engage with written texts to participate in society, to achieve one’s goals, and to develop one’s knowledge and potential...Texts are characterized by their medium (print-based or digital)” (p. 59).

Although all definitions, especially relating to rapidly developing concepts such as literacy, should be viewed as impermanent and malleable, this particular definition appears adequate for the time being. For one, this definition takes into account the importance of digital media in contemporary society, as well as the continuing prominence of written texts in general. Such a definition of literacy also, importantly, relates literacy attainment to the requirements of the society (i.e., implies a ‘functional literacy’ standard). Finally, this working definition aligns well with the relevant curricular aims of the educational jurisdiction under which the school and participants in this study fall (see Chapter Three for a more detailed description of these curricular aims).

It should be noted, however, that such a definition, indeed any definition, also carries with it some inherent biases. The specific assessment tools used to evaluate the standard of literacy outlined above will inevitably place greater value on particular types of literacy-related practices over others. Therefore, it is possible that some individuals will bring in relevant skill sets that will not be sufficiently recognized by this specific definition of literacy. Conversely, there could be some inflation of the literacy level of individuals who engage more in the literacy-related practices valued by the proposed standard. Nonetheless, even though these limitations need to be acknowledged, it seems that ultimately a quantitative study such as this one benefits from an elucidation of the specific conception of literacy being applied.

Contrary to much new literacies research, the digital practice in question, namely texting in this case, will not be the primary focus of this investigation. Rather, it will be included as an important potential influence on literacy skills in addition to other key practices such as traditional forms of reading and writing. In short, this study will

investigate the associations between varied reading and writing formats (i.e., involving both print-based and digital media) and the development of literacy.

After all, as the literature review in Chapter Two will show, exposure to print (i.e., reading in the traditional sense) has been shown to have predominantly positive links with literacy development and other cognitive skills. Research into the potential impact of texting on literacy development, on the other hand, has been far more mixed, and it would be premature to make any conclusive claims regarding a potential relationship. On the whole, the associations between both reading and writing, in the traditional sense, and literacy attainment, appear to be far more evident at this point than those between digital practices (such as texting) and literacy. Therefore, in researching the associations between certain practices and literacy, it seems only reasonable, although many studies into new-literacy practices have failed to do so, to differentiate between the specific media, and formats, of reading and writing being utilized.

It is worth noting that research into the associations between texting (as well as print exposure) and literacy has generally applied a similar, more traditional definition of literacy. Moreover, defining literacy in the 'new literacies' sense would not only be problematic, but perhaps even impossible for this type of quantitative study. Suffice it to say, a more standard definition of literacy, albeit undeniably contentious, at the very least provides a clear frame of reference and contrary to a 'new literacies' characterization, a temporarily static target.

1.5. Texting: General Introduction

As mentioned above, the new-literacy activity that will be considered in detail for this study is the information and communications technology (ICT) practice of texting. Texting, or text messaging, refers to the exchange of brief written text (i.e., up to 160 characters) between mobile phones through the use of the Short Message Service (SMS) function. SMS was developed in the late 1980s as a messaging system for emergency situations, utilizing technology that was very similar to that used for the popular paging system of the time (Crystal, 2008). The general public quickly latched on to this quick and efficient system of communication.

The popularity of texting gradually increased in the 1990s and exploded in the 2000s. Presently, texting is the most widely used mobile data service with billions of active users worldwide (Crystal, 2008). The SMS function has since been extended on most mobile phones (and renamed MMS) to include multimedia content such as image, video, and sound. Texting has become so popular with youth nowadays that Thurlow and Brown (2003), in their discourse analyses of young people's text messages, dubbed them Generation Txt. Taken from an even broader societal perspective, texting is now one of the fastest growing modes of communication for all age groups.

New forms of interaction have been made possible by the advent of texting. Conversations can be carried out without the need for immediate replies. Compared to oral interactions, more carefully crafted responses are made possible but at the same time, each response can also be more thoroughly scrutinized. Time does not have to be set aside for these conversations; communication can be maintained at times when a face-to-face or phone conversation would be impractical or even impossible.

Texting also has the potential to lead to increased social and political participation through its convenience and large-scale communication capabilities. Appen (2004) discusses the potential for texting to create decentralized forms of resistance to hierarchical power structures. He cites the overthrow of Philippine president Joseph Estrada in 2001, coordinated by the masses through text messaging, as a prime example. More recently, texting, along with other social media, also played a significant role during the revolutionary Arab Spring uprisings from 2010 through 2012.

Texting, as well as the related online IM and social networking site communication, are widespread in youth (and adult) culture and their prevalence continues to grow exponentially. The average teen in North America (as well as in Europe and much of Asia) sends and receives thousands of text messages every month. In fact, text messages have now surpassed voice calls in popularity in the United States and in many other industrialized countries (Reardon, 2008).

A Nielsen Wire (2010) report on the texting practices of Americans revealed that teenagers text far more than any other segment of the population. The frequency of texting is continuing to grow rapidly as well. In 2008, 13- to 17-year-olds were sending or

receiving, on average, around 1,700 text messages per month; by 2009, that average had jumped to more than 2,500 text messages. By late 2010, the average number of text messages sent or received had climbed again to over 3,300. Lenhart, Ling, Campbell, and Purcell (2010) found that one in three American teens sends more than 100 text messages every day. Importantly for this study, this rapid rise in texting, along with other new-literacy practices, has occurred at the same time as the rates of reading, in the traditional sense, have remained stagnant or even declined (see Chapter Two).

The condensed or abbreviated language forms often used when texting, most commonly referred to as 'textese' or 'textisms', are fast becoming the written 'lingua franca' of youth worldwide. The limited number of characters allowed on SMS, as well as the difficulty in typing on cell phone keypads, has contributed to this development of abbreviations, acronyms, emoticons, and slang terms. To name a few common forms of textese, 'lol' stands for 'laughing out loud', and 'ttyl' is 'talk to you later'. Phonetically similar letters and numbers are often used to replace the original letters in words (e.g., 'see you' becomes 'cu'; 'before' is 'b4'). Several websites provide a dictionary of textese (for example, see <http://www.opentextingonline.com/textspeak.aspx>). As part of the rapid technological change occurring in modern society, cell phone features are being updated on an ongoing basis. For instance, the advent of smartphones with larger screens has made typing out text messages on cell phones much easier; it has also allowed for more varied message formats, as well as greater access to multimedia content while texting.

Besides convenience and practicality, there have been other reasons proposed for the popularity of textese, especially in adolescence. For example, Lewis and Fabos (2005) suggest that textese allows adolescents to vary their tone within a written message, and also helps them navigate social relationships. They also propose that the establishment of social identities through the creative use of language could be an important driving force in the use of textese.

1.6. Problem Statement: The Associations between Literacy and Texting, Reading, and Writing

Considering its vast popularity, there is evidence that, at least to some extent,

texting has changed the way people speak, read and write. There is a debate, however, on whether this change has been beneficial, neutral or deleterious to the development of literacy (or new literacies). Indeed, there appears to be significant disagreement on this issue, especially between the generally more negative reports in the popular media, and the more positive claims from academic fields of research. A detailed presentation of the significant media reports and research findings pertaining to the associations between texting and literacy can be found in Chapter Two.

Most studies that have examined the potential impact of texting on literacy have failed to sufficiently acknowledge other activities, alongside texting, that could be concurrently influencing literacy levels. Rather than viewing texting behaviour as an essentially isolated activity, other habits such as reading and writing, in the traditional sense, need to be considered as well. It seems that taking the broader context into account could provide a more accurate approximation of the associations between literacy and texting specifically.

Therefore, this study will also present the significant research findings concerning the relationships between literacy, and the practices of reading and writing in general. Furthermore, the potential impact of these more traditional activities will be examined in this study, alongside the new-literacy practice of texting, to help indicate their respective contributions to literacy attainment in the adolescent population under investigation. In short, the potential influence on literacy of various formats (and media) of reading and writing, not just one in particular, will be analyzed here.

1.7. Purpose of the Study

The primary purpose of this study was to examine potential relationships between the practices of reading, writing, and texting, and the development of literacy in adolescence. In addition, the possible associations between other common daily habits and literacy levels were also taken into account. An examination of gender as a potential contributing variable was included in this study as well.

Grade ten and eleven students at a Canadian secondary school in the People's Republic of China (PRC) were chosen for this study. The primary reasons for choosing this particular school included accessibility (i.e., the Principal Investigator had close professional contacts employed at the school) and the significant homogeneity in terms of the participants' cultural and socioeconomic backgrounds. The adolescent students at this school were upper-middle class Chinese citizens, first-language Mandarin speakers, and second-language English (ESL) learners.

Based on their performance in English Language Arts (ELA) courses and exams, students were initially divided into three literacy-level groupings: 'high' literacy; 'average' literacy; and 'low' literacy. The participants provided information relevant to this study through a detailed questionnaire, as well as through a course project. The statistical analyses that were done considered variables in isolation, as well as in combination, to determine whether or not there were relationships between particular practice(s) and literacy levels; these findings were used to address, in turn, each of the ten research questions.

The focus of this study was on the English language literacy of these students. Literacy development in the primary language (in this case, Mandarin) has been shown to be an effective means for developing literacy in secondary languages (Cummins, 1981; Krashen, 1996). However, one of the assumptions of this study was that English literacy is *best* developed through activities that involve the use of the English language; as a result, the self-reports regarding texting, reading and writing activities were apportioned according to the language utilized. The statistical analyses of the data were centered on the amount of texting, reading, and writing that was done *in English*.

1.8. Research Questions

The study addressed the following research questions:

1- Are there differences among adolescents with low, average and high literacy levels in terms of the frequency and the time spent text messaging?

2- Are there differences among adolescents with low, average and high literacy levels in terms of the time spent reading books/articles either in hard copy, electronically or online?

3- Are there differences among adolescents with low, average and high literacy levels in terms of the time spent writing in 'non-messaged' formats such as essays and letters?

4- Besides texting/reading/writing practices, are there differences among adolescents with low, average and high literacy levels in terms of the amount of time spent on other common weekly habits?

5- Are there differences among adolescents with low, average and high literacy levels in terms of the amount of time spent texting (course project data)?

6- Are there differences among adolescents with low, average and high literacy levels in terms of the amount of texting time (course project data) plus amount of writing time assigned by teachers?

7- Are there differences among adolescents with low, average and high literacy levels in terms of the time spent reading books/articles either in hard copy, electronically or online (course project data)?

8- Are there gender differences among adolescents with low, average and high literacy levels?

9- Are there differences among adolescents with low, average and high literacy levels in terms of the total time spent on all English activities?

10- What are the optimum literacy levels' predictors among adolescents?

1.9. Significance of Study

The present study is significant to this and other areas of research, as well as society in general, in a number of ways:

1- It addresses an important question that many academic researchers and the general public have posed regarding the possible connections between texting practices and literacy development.

2- It broadens the scope of the research into texting and literacy by explicitly taking into account the potential impact of other activities on literacy, including traditional forms of reading and writing.

3- It expands on the findings and thus enhances the overall level of knowledge and understanding in the areas of research focused on examining associations between literacy and the practices of texting, reading, and writing.

4- It could lead to further studies in these research areas that explore associations between variables in more detail, or through the use of different methodologies. For instance, longitudinal and/or intervention studies could be performed to examine potential directions of causality among variables.

5- It could provide insights for educators in terms of the implications of texting and how to best manage the practice in schools (e.g., deciding whether the practice should be encouraged, condoned, or banned in classrooms).

6- It could provide insights for educators in terms of the implications of traditional forms of reading and writing and how to best manage these practices in schools.

7- It could provide impetus for future studies into the potential effects of various digital (and other) practices on the development of literacy, and new literacies.

8- It could provide insights into ways in which the levels of functional literacy in society could be improved upon.

1.10. Summary

The percentage of the population in our society that has been deemed 'functionally illiterate' is substantial: roughly half of all youth and adults. Research connected with literacy, and particularly explorations into ways in which literacy levels can be improved upon, continues to be crucial. In carrying out such research, one must always keep in mind that literacy is an evolving, complex concept heavily influenced by its historical and sociocultural context. Research into literacy has been further problematized by the recent, rapid technological changes in our society, leading to potentially new forms of literacy. This study will consider the potential impact on literacy development in adolescence of the new-literacy practice of texting, as well as more traditional forms of reading and writing. Previous studies have consistently found a pronounced positive relationship between literacy attainment and traditional forms of reading (and writing to some extent), as opposed to the decidedly mixed, inconclusive results of research into the associations between texting and literacy. By considering the potential influence on literacy of various forms of reading and writing concurrently, this study will, importantly, take into account the broader context of new-literacy practices such as texting.

1.11. Organization of the Thesis

The remaining sections of this thesis are organized as follows. Chapter Two contains a literature review and identifies areas of study that have been explored by researchers examining associations between literacy and the practices of texting, reading, and writing. Chapter Three describes the methodology used for this study and related research, and establishes a theoretical framework for data analysis and interpretation. Chapter Four presents the results of the data analyses and provides a summary of the findings. Chapter Five includes a discussion of the findings within the context of previous related research, as well as an elaboration on educational implications.

Chapter 2. Literature Review

The review of the literature provided in this chapter will include important findings from the various research areas most relevant to this particular study. First of all, the research into texting, with an emphasis on investigations into the associations between texting and literacy, will be presented. This will be followed by an overview of the research into the relationships between reading, in the traditional sense, and literacy. Studies and analyses comparing the specific associations between literacy and texting (and other digital practices) with that of more standard forms of reading will also be summarized. Subsequently, research into the amount and type of reading, in the traditional sense, that is currently occurring in our society will be presented. Research into the associations between writing, in the traditional sense, and the development of literacy will also be included, as will studies into gender variations as pertains to literacy-related practices and literacy attainment. Finally, studies into the connections between literacy and different types of media, as well as different written-text formats, will also be considered.

2.1. Research into Texting

The widespread popularity of texting, as described in the previous chapter, is a recent phenomenon that originated in the mid-1990s. It is not until the 2000s that we start to see a growing range of literature into text messaging and its implications in a variety of disciplines. Thurlow and Poff (2011) provide an extensive review of the literature into all aspects of research connected to text messaging. As they describe, research into texting is not just prominent in the more obviously relevant fields of linguistics, communications and education, but also spans such diverse fields as medicine, business, library studies, environmental science, and political science. In addition, these researchers also point out that even though many of the studies into

texting have been done in English-speaking countries, there has also been a significant amount of research carried out in many non-English-speaking countries in Europe (especially in Scandinavia) as well as in a number of countries in Asia and Africa.

One of the key areas of study identified by these researchers relates to the use of texting, in a broad sense, for the building and maintenance of personal relationships. Within this wide-ranging area of research, one particular aspect that has received significant attention in a number of countries relates to age and gender variations in texting practice. Unsurprisingly, cross-cultural studies that have compared the relative popularity of texting in different age groups have typically found that teenagers and young adults are the most avid texters (Kasesniemi, 2003; Ling, 2005). Gender differences in texting practices have also been commonly investigated; a detailed exploration of the research into gender variations in terms of texting, reading, and writing practices can be found further down in this chapter.

The area of study that Thurlow and Poff (2011) identify as the most extensively discussed, both in lay and scholarly circles, pertains to the stylistic and lexical features of text messages. Cross-cultural comparisons are again common in this particular area of study with such detailed findings as, for example, teenagers in Sweden use significantly more spelling alterations in their text messages than their counterparts in Norway (Ling, 2005). Another example, of many, would be that in the US, emoticons are relatively rare and the omission of sentence-final punctuation and apostrophes occurs approximately 65 percent of the time (Ling & Baron, 2007). Text message length has also been a popular area of research, with discoveries including the following: Swedes typically send longer text messages than Germans (Af Segerstad, 2005), while both Americans and Norwegians send text messages that are, on average, even shorter than those sent by the latter group (Ling & Baron, 2007).

Some studies have looked at the potential effect of texting on different subgroups of students. Durkin, Conti-Ramsden, and Walker (2011) compared the texting behaviours of two categories of 17-year-olds, half of them typically developing, and the other half with specific language impairment (SLI). The SLI group showed reduced patterns of texting behaviour compared to the typically developing group: they wrote less

text messages and the messages they wrote were significantly shorter. Even more recently, a comparative research study (Grace, Kemp, Martin, & Parrila, 2012) investigated the effect of participant country on the textese use of Australian and Canadian undergraduates. The researchers found a significantly higher proportion of textese use in the text messages of Australian students compared to Canadian students. Another recent study (Grace & Kemp, 2014) compared the naturalistic textese use of Australian undergraduates by examining four different cohorts over four years. The researchers found that textese use decreased over the four years and suggested that this may be due to abbreviated language losing some of its practicality, or perhaps a result of improvements in texting technology. To sum up, the findings from the area of research connected with the stylistic and lexical features of text messages highlight the substantial variation in specific aspects of text messaging practice across cultural contexts and over time.

The final area of study underscored in Thurlow and Poff's (2011) extensive literature review into research connected with texting, and most relevant to this study, is what they refer to as the broader metalinguistic context, which mainly includes studies into texting and literacy. This research area addresses both the general effect of texting on standard languages as well as the influence of textese specifically on literacy. According to the researchers, most empirical studies in this research area have shown that texting does not pose a threat, or is even beneficial, to literacy development. Yet, they suggest that "in spite of the growing body of scholarly research on texting, public and policy-level discourse about texting continues to fixate on its deleterious impact on literacy and standard language use – especially that of young people" (p. 7). The literature review done for the present study dealing specifically with research into texting and literacy, found below, examines these claims.

2.2. Texting and Literacy: Media Reports

There have been numerous articles in the mass media regarding the perceived effects of texting on literacy (e.g., Humphrys, 2007; Lee, 2002). Thurlow (2006) found that these reports usually discussed the adverse effects of texting on the quality of

language usage. According to his study, many of these media claims were based on extreme examples and often presented without specified sources.

Indeed, the rapid spread of SMS language has often been blamed on the deterioration of language proficiency and the undermining of the rich heritage of the English language. (It is worth noting that most media reports and studies related to texting have focused on the potential effects on the English language specifically; where other languages are discussed, it is often regarding their 'anglicization' through texting). Some have described texting as the "continuing assault of technology on formal written English" (Lee, 2002, p. 2). Others provide an even more hyperbolic analysis, such as the British journalist John Humphrys (2007), who describes texters as "vandals who are doing to our language what Genghis Khan did to his neighbours eight hundred years ago...pillaging our punctuation; savaging our sentences; raping our vocabulary" (para. 16-17).

There are also claims that the use of textese has become widespread in formal writing in schools and has affected spelling abilities (Barker, 2007; Rogers, 2008). In a survey of American teens, 64 percent of participants admitted that they had incorporated textese into their formal writing (Lenhart, Arafeh, & Smith, 2008). In addition, even though most of these teens were purportedly writing more than ever, this survey showed that most did not consider electronic communication (e.g., text messaging, IM, etc.) to be real writing.

Plester and Wood (2009) found that children are getting mobile phones at gradually younger ages, with most children in industrialized countries getting one by the upper primary years (i.e., by age 12). As this is well known to be a vulnerable age for language development, one can surmise why popular opinion suggests that literacy skills could be disrupted. In the UK, for example, since 2007 the number of children with their own mobile phone has remained generally stable: around 10 percent of 5- to 7-year olds; 50 percent of 8- to 11-year-olds; and 90 percent of 12- to 15-year-olds (Coe & Oakhill, 2011).

On the other side of the popular culture debate, linguist David Crystal's *Txtng: The Gr8 Db8* (2008), a detailed analysis of the practice of texting, has also been

influential. The author claims that the use of textese in homework and on exams is not as widespread as the popular media suggests. According to Crystal, research has shown that text messaging is not harmful to spelling and in fact improves overall literacy. His explanation for the positive relationship is that texting provides more opportunities for engaging with the language in novel, enjoyable ways.

Crystal (2008), among other researchers, has also attempted to determine exactly how widespread textese has become in text messages. He estimates that only about 10 percent of all the words in text messages are abbreviated (i.e., written in textese). Other researchers (Kemp, 2010; Ling & Baron, 2007; Thurlow & Brown, 2003) have come up with different percentages in their text analyses, but generally the range is between two and twenty percent of all the words in the text messages that have been studied. In short, the frequency of textese in text messages appears to be not as elevated as suggested by some mass media reports.

As mentioned above, many articles in the popular media do indeed express negative viewpoints towards the practice of texting. To be fair, however, there are some articles that do focus on the potentially more positive influences of texting on literacy. Newspapers have published articles supporting both positions. The nationally distributed Canadian newspaper, *The Globe and Mail*, for example, has published one article entitled “Texting helps teens’ grammar” (Alphonso, 2006) and another one entitled “Texting, Twitter contributing to students’ poor grammar skills, profs say” (Kelley, 2010).

At this point, it would be prudent to provide some clarification for some of the ICT-related terminology introduced above. Texting practices are often grouped together with other digital applications, such as Twitter. The literature review provided here is focused primarily on research into the associations between literacy development and text messaging, reading, and writing. However, there have also been several relevant studies included here that overlap into related ICT media, such as IM and Twitter. IM, as a type of online chat that allows for real-time text transmissions via the Internet, is functionally similar although not identical to SMS text messaging. IM is the most common form of communication on hugely popular social networking sites such as Facebook. Twitter, another popular online social networking service, allows registered

users to send short messages (i.e., 140-character maximum) called ‘tweets’ to a larger, more generalized audience. It should be noted, however, that studies into the associations between ICTs and literacy development have focused primarily on the potential influence of text messaging specifically.

2.3. Texting and Literacy: Research Findings

So if the media reports have been generally negative in their appraisal of the effects of text messaging on literacy, has the scholarly research shown more positive or neutral results, as some of the researchers mentioned above have suggested? A detailed examination of the evidence-based empirical studies into the associations between texting and literacy shows that the scholarly research has yielded mixed results. While a significant amount of the empirical research points to text messaging as being possibly beneficial to or having no significant effect on literacy (e.g., Drouin & Davis, 2009; Kemp, 2010; Massengill-Shaw, Carlson, & Waxman, 2007; Plester & Wood, 2009; Plester, Wood, & Bell, 2008; Plester, Wood, & Joshi, 2009), other studies, including teachers’ surveys, emphasize its negative effects (e.g., Cingel & Sundar, 2012; De Jonge and Kemp, 2012; Drouin & Driver, 2012; Loftis, 2009; Olliges, 2010; Ross, 2007).

In one of the early academic papers written in this research area, Mphahlele and Mashamaite (2005) assert, from a theoretical perspective, that the use of textese is having a negative effect on literacy development. Utilizing some examples of English textese use found in the writing of university students in South Africa, the researchers suggest that this practice is leading to a greater prevalence of spelling errors as well as the use of informal language in inappropriate contexts, namely in formal writing. Highlighting the contradictory claims frequently encountered in this area of research, Craig (2003) comes to the opposite conclusion in his own theoretical analysis of the use of textese-like language in the IM practices of youth. Similarly to Crystal (2008), he suggests that language play, as an inherent part of using textese, is leading to improved literacy as well as the evolution of language.

Drouin (2011) prudently identifies two distinct lines of inquiry within the empirical research into texting and literacy: a) research into the relationship between literacy and text messaging practices, and b) research into the relationship between literacy and the use of textese. This is a useful separation since the specific line of inquiry is not always clarified in the research. Often, researchers use the general term 'texting' without providing clarification of whether this refers to practices associated with text messaging (such as its frequency), or specifically to the use of abbreviated, textese language. These two categories will be used to help organize the empirical research findings from this area of study.

2.3.1. Literacy and Text Messaging Practices

Most studies that have investigated associations between text messaging practices and literacy have obtained inconclusive results (Coe and Oakhill, 2011; Kemp 2010; Massengill-Shaw et al., 2007; Plester et al., 2008; Rosen et al., 2010). Plester et al., (2008) found that 10- and 11-year-old British children who sent three or more text messages per day had significantly lower literacy scores than children who sent fewer than three text messages per day. In their study of the same age group of British students, Coe and Oakhill (2011) found that poor readers spent significantly more time using their phones than good readers, suggesting that a causal effect of improved literacy from texting practice is highly unlikely.

For higher age groups, the results for studies into the associations between text messaging practices and literacy have been decidedly mixed. Kemp (2010) and Massengill-Shaw et al. (2007) found no significant relationships between text messaging frequency and literacy in their respective samples of American and Australian university students. Drouin (2011), on the other hand, studied American university students and found that self-reported texting frequency was positively correlated with literacy scores. More recently, Grace, Kemp, Martin, and Parrila (2014) obtained contrasting results. The length of phone ownership and the spelling abilities of Canadian undergraduates were negatively correlated, while the length of phone ownership and some reading skills of Australian undergraduates were positively correlated. Meanwhile, a study that looked into the texting practices of Australian secondary school students and undergraduates

(De Jonge & Kemp, 2012) discovered a negative relationship between 'usual text messaging frequency' and overall literacy scores. The researchers concluded that frequent texting could be masking or even contributing to a deficiency in linguistic skills in adolescents.

Extending the text messaging practice research to samples of writing, an online US study by Rosen et al. (2010) found a positive relationship between text messaging frequency and informal writing skills in American adults. However, for adults with some university experience, there was also a negative relationship between text messaging frequency and formal writing skills. Perhaps unsurprisingly, considering the medium, informal forms of writing seemed to improve through texting, but at the expense of formal writing proficiency.

Lee (2011) found that students who were exposed to more print media, such as books, were more accepting (i.e., perceiving words to be grammatically correct) of both real and fictitious words. On the other hand, and somewhat surprisingly, greater exposure to the colloquial language of text messaging made students less accepting of new words. Comparing the relationships between literacy and exposure to varied text formats (e.g., text messages versus books) appears to be a promising avenue of research and is explored further below.

Although research into the potential effects of texting practices on literacy in languages other than English is relatively rare, there have been some noteworthy studies done. Several Dutch studies have explored the relationships between adolescents' texting practices in Dutch and the development of literacy in that language. Spooren (2009, as cited in Verheijen, 2013) observed no significant relationships between the frequency of texting or IM, and literacy skills. In another study, Radstake (2010, as cited in Verheijen, 2013) found no significant associations between the frequency of new media practices (such as texting, IM, emailing, and social networking) and spelling skills.

As the studies in this line of inquiry illustrate, research into the associations between literacy and text messaging practices in general has discovered some interesting patterns. Overall, however, the results have been relatively mixed across all

age groups. The other major line of inquiry connected with texting and literacy involves research into the relationships between literacy and textese use specifically.

2.3.2. Literacy and Textese Use

A number of studies have looked into the associations between textese use and pre-teens' literacy levels (Coe & Oakhill, 2011; Kemp & Bushnell, 2011; Plester et al., 2008, 2009), and the results have been generally positive or neutral. Coe and Oakhill (2011) found that good readers (although using their phones less) used more textese in their text messages, and were faster at reading text messages as well as formal forms of writing. Kemp and Bushnell's (2011) study showed that higher text-message reading speed and accuracy were associated with higher skills in literacy for 10- to 12-year-old students in Australia. Investigations of the same age group of Australian students discovered a positive correlation between the use of textese and general spelling ability (Bushnell, Kemp & Martin, 2011). Studies by Plester et al. (2008, 2009) found that 10- to 12-year-old British children who were better at text translation exercises, and who had a higher textese density in their text messages, scored better in spelling, reading, writing, phonological awareness and vocabulary.

Results from studies looking at older age groups (primarily done in the UK, Australia, and the US) have been generally mixed, with many researchers not finding any significant relationships between the use of textese and standard measures of literacy (Drouin & Davis, 2009; Massengill-Shaw et al., 2007; Varnhagen et al., 2009). In their study of Canadian 12- to 17-year-olds' naturalistic IM practices, Varnhagen et al. (2009) concluded that the use of textese-like language showed no relationship to spelling errors in conventional written language. Meanwhile, in a sample of American college students, Drouin and Davis (2009) found that the reported use of textese was not significantly related to literacy skills. However, it bears noting that the majority of the students in this study believed, nonetheless, that textese was negatively affecting their ability to use standard English. Also looking into the texting practices of American college students, Massengill-Shaw et al. (2007) determined that there was no significant relationship between the use of textese and spelling ability.

Some researchers in this line of inquiry have obtained more positive results in studying older age groups. Kemp (2010) studied Australian university students and found that faster, more accurate reading of both textese and conventional print was either positively or neutrally associated with literacy skills. In Drouin's (2011) study of American university students, the use of textese in text messages was positively correlated with literacy scores. However, those who used more textese in other media (e.g., social networking sites; emails to professors) had lower reading scores. Powell and Dixon (2011) considered the spelling abilities of adult university students. They found that spelling of often erred upon words (e.g., separate) improved when students were exposed to appropriate textese forms (e.g., sepr8), but deteriorated when exposed to phonetic misspellings (e.g., seperate). These research findings indicate a positive relationship between exposure to textese and spelling in young adults. Meanwhile, in the aforementioned study by Durkin et al. (2011) that compared typical secondary school students with those that exhibit specific language impairments (SLI), both groups of students showed positive correlations between textese use and literacy scores.

In other research in this line of inquiry a more negative association between textese use and literacy has been observed. One such study considered the naturalistic texting habits (i.e., actual text messages sent by participants) of American university students (Drouin & Driver, 2012), finding that the frequency of texting and textese density was greater than in earlier studies. In addition, negative correlations between textese density in general and literacy skills such as reading and spelling were found in this study. Different textese categories were also considered: many of these categories (e.g., omitted apostrophes) were negatively related to literacy while only a few (e.g., accent stylization) were positively related.

Grace et al. (2014), already cited in the previous section, found few significant correlations between the use of textese and literacy scores for Canadian and Australian undergraduates. Of the few significant results, there was a negative relationship observed between textese use and spelling skills (in the Canadian sample) and textese use and reading skills (in the Australian sample). The researchers had chosen young adults as the subjects for their study since, in their interpretation of the previous

research, the associations between textese use and children's literacy had been largely positive, whereas adult studies had shown mixed results.

In another study already mentioned above, De Jonge and Kemp (2012) discovered a negative correlation between textese use and literacy scores in Australian adolescents and young adults. They found that texting frequency accounted for a significant portion of this relationship. More recently, an American study has found a significant negative relationship between the use of textese and grammar scores. Cingel and Sundar (2012) found that grade six to eight students who reported using high levels of textese while text messaging performed significantly lower on a grammar assessment than students who used less textese.

Taking into account several age groupings simultaneously, a recent analysis was done of the use of unconventional grammar (i.e., possibly connected to textese use but not necessarily so) in the text messages of British 6- to 8-year-old children, 11- to 15-year-old adolescents, and university students (Kemp, Wood, & Waldron, 2014). This study determined that children and adults who performed more poorly on tests of grammar were also more likely to make grammatical errors in their text messages. No significant relationship was found for the adolescent students. The researchers concluded that these results show that there could be a link between certain aspects of grammatical skill and unconventional grammar use in text messages.

In a related study, Wood, Kemp, Waldron, and Hart (2014a) examined similar age groupings of British children, adolescents, and university students in order to concurrently analyze the potential impact of textese use on their understanding of grammatical forms. The researchers found that the children's and the adolescents' ungrammatical texting behaviour was not connected to their understanding of grammar. However, the undergraduate students' ungrammatical texting behaviour was linked to a limited understanding of grammatical rules and conventions.

Other studies in this line of inquiry have looked into the potential ways in which textese use has impacted formal writing. In a study of South African secondary school students, the formal written work of both first-language English and first-language Afrikaans speakers was analyzed (Winzker, Southwood, & Huddleston, 2009, as cited

in Verheijen, 2013). For both groups, the use of textese in assignments written in English was not frequent but did appear periodically. As a result, the researchers concluded that there was a modest negative effect of textese on the formal writing produced by these students.

Grace, Kemp, Martin, and Parrila (2013) analyzed the attitudes of Australian and Canadian undergraduate students toward the use of textese and its intrusions into formal writing. Contrary to the Winzker et al. (2009, as cited in Verheijen, 2013) study, they found that the vast majority of these students were able to properly distinguish between the appropriateness of using textese in various contexts. A negligible amount of textese was found in the exam papers written by these students, suggesting that these students recognize the varied textese use requirements of different modalities and recipients.

Similarly to research into text messaging practices and literacy, this line of inquiry is dominated by studies that have looked into texting done using the English language. The studies into the relationships between textese use and literacy in languages other than English have primarily focused on how frequently textese is showing up in the formal writing of secondary school and university students. Shafie, Azida, and Osman (2010) only found a few occurrences of textese in the exams written by Malaysian undergraduate students in their native Bahasa Malaysia language. Aziz, Shamin, Aziz, and Avais (2013) obtained a similar result in their study of undergraduate students in Pakistan. There was no evidence of significant use of textese in the students' academic writing.

Nearly all of the research investigating the associations between texting (and textese use specifically) and literacy has involved cross-sectional, correlational types of studies. There have only been several studies performed that have used an experimental or longitudinal approach. Such methodologies allow for inferences to be made regarding causality, or the direction of an observed association (discussed in more detail in Chapter Three).

To move beyond correlations, and explore possible causal relationships, Wood, Jackson, Hart, Plester, and Wilde (2011a) performed an experimental intervention study

using random samples of 9- to 10-year-old British students. Students who did not own a cell phone were provided with one and their literacy skills compared with a 'no-phone' control group for 10 weekends and a holiday week. There was no significant difference (positive or negative) found in literacy skills following the intervention. Within the experimental group, however, the use of textese was associated with improved spelling. The researchers concluded that this was the first piece of evidence that suggested a potential positive and direct influence of textese on literacy development for this age group.

In addition, a nonexperimental, quantitative, longitudinal study (Wood, Meachem, Bowyer, Jackson, Tarczyński-Bowles, & Plester, 2011b) found some evidence of a possible causal contribution of textese use on standard spelling in British 8- to 12-year-olds. However, when the researchers controlled for the measure of rapid phonological retrieval, the significant relationship between textese use and spelling was no longer present. The researchers concluded that, at the very least, they failed to find any evidence for the detrimental effects of texting on literacy often portrayed in popular media accounts. Another similarly designed longitudinal study, also performed in the UK, investigated the relationships between grammatical violations in text messages and measures of literacy in primary, secondary, and undergraduate students (Wood, Kemp, & Waldron, 2014b). There were no significant relationships found for the sample of primary school students. There was a positive association found for the secondary students between the number of grammar violations in their text messages and growth in spelling. The undergraduates also showed a positive relationship between grammar violations in their text messages and written grammar scores. However, the researchers did also observe that the grammar violations were not found to be consistently used over the twelve-month period of the study, and were also not representative of typical text messages.

What is clear from the studies outlined in this section is that much more research of an experimental and/or longitudinal nature is required to substantiate any claims of causation as pertains to texting (or textese use) and literacy. Overall, the results in this line of inquiry, connected specifically with textese use and literacy, are mixed; compared to the other line of inquiry connected with text messaging practices and literacy, the

results are generally more positive for all age groups. However, there are also a significant number of neutral and negative results that need to be acknowledged. Interestingly enough, the greater prevalence of positive results seem to be occurring in younger age groups whereas more neutral or negative results have been observed in the studies of older participants (i.e., secondary school and university students).

2.4. Qualitative Studies

Qualitative studies into texting and literacy are much less common than quantitative ones. In a qualitative, ethnographic study from a sociocultural, new literacies perspective, Lohnes-Watulak (2010) explored why US university students text message during class, and what this tells us about text messaging as a new-literacy practice in classrooms. Lohnes-Watulak concluded that text messaging was a meaningful practice for these students as it allowed them to have ongoing access to their social networks, and also provided them with a means for exercising power within a controlled classroom environment. A similar qualitative case study (Lewis & Fabos, 2005) considered the IM practices of seven youths and searched for ways in which their digital practices interconnected with new literacies as well as their social identities.

Another qualitative, ethnographic study done by Lexander (2011) explored texting practices in languages other than English. This study investigated texting practices in Senegal where both the official language, French, and the majority African language, Wolof, have been utilized. This research highlighted the multilingual nature of the texting done in many international contexts as well as the potential impact texting may have on increasing literacy practices in traditional languages, such as many of the dialects spoken in Africa. As these studies illustrate, qualitative investigations into texting and literacy tend to be more explicitly associated with the new literacies research area, and are therefore less likely to incorporate a more standard definition of literacy.

2.5. Teacher Surveys and Other Related Studies

Geertsema, Hyman, and Deventer (2011) performed a survey-based,

quantitative study on the perspectives of 22 secondary school teachers in South Africa regarding the possible influence of texting on English written-language skills. The vast majority of the teachers surveyed asserted that the practice of texting and the use of textese were having a significantly negative impact on literacy development in their students. The aspects of writing that the teachers felt were most adversely affected were spelling, sentence length, and punctuation.

There are also reports of educators' perspectives related to texting and literacy that are not strictly empirical, but more anecdotal. This type of evidence is generally based on a small sample size and not analyzed systematically. Although evidence of this kind is generally not considered scientifically valid, it may be instructive in this case nonetheless. The majority of published teacher evaluations of texting in classrooms appear to take a more negative perspective on this practice. A variety of reports (Loftis, 2009; Olliges, 2005; Ross, 2007) suggest that many teachers feel that the practice of texting is detrimental to literacy development. Such anecdotal evidence is of course neither conclusive nor necessarily reliable. It does suggest, however, that exposure to the broader context, including the real-life implications of texting practice, may make some of the deleterious effects of texting more evident.

There are also areas of study that have more indirect, yet still relevant, connections with texting and literacy. Numerous studies, especially in the health sciences (e.g., Dworak, Schierl, Bruns, & Struder, 2007; Ray & Jat, 2010) have provided warnings about the detrimental physical and psychological health effects of the excessive use of cell phones and other new digital technologies. Excessive use of these technologies has been associated with increases in obesity levels, sleeping disorders, and attention deficits. Such potentially deleterious effects of too much texting could certainly have an impact, at least in an indirect way, on literacy development. Another pernicious texting-related phenomenon that has received plenty of media and research attention recently is 'texting while driving'. Various studies have highlighted the potentially fatal risks inherent in this (unfortunately) relatively widespread practice (e.g., Madden & Lenhart, 2009).

To sum up, research into texting and literacy, in both a direct and indirect sense, has been extensive. This literature review has included many of the key studies in this area of research but should not be viewed as exhaustive, especially considering the significant number of related studies likely to be completed in the near future. The present study is quite different from much of the research that has been performed into texting and literacy in that the practice of texting is not examined in isolation. In other words, the potential impact on literacy of other likely contributors, such as traditional forms of reading and writing, have been investigated concurrently. Below is an examination of the literature into the associations between literacy and more standard forms of reading and writing, which should provide further insight into why these other practices have been included in this study.

2.6. Exposure to Print and its Relationship to Literacy

Contrary to the mixed findings observed in the aforementioned research into the associations between texting and literacy, the research into the connections between exposure to print (i.e., primarily associated with book reading) and literacy development has been much more consistent. In general, the strong positive relationships between exposure to print and literacy skills have been well documented, especially by prominent reading researcher Keith Stanovich and colleagues. Stanovich and West (1989) found that exposure to print in adults, linked to their orthographic processing skills, showed significant positive correlations with spelling and reading abilities. The associations between exposure to print and literacy measures were shown to be independent of phonological awareness, another consistently observed (e.g., Adams, 1994) and likely contributor to increased levels of literacy.

Cipielewski and Stanovich (1992) made a similar finding in their study of American 10- to 11-year-old children using the Author Recognition Test, an effective measure they developed for evaluating a student's exposure to print. A student's reading ability was strongly predicted by their exposure to print, even when prior reading ability and orthographic decoding ability were statistically controlled for. Stainthorp (1997) developed the Children's Author Recognition Test, designed specifically for British

children, and also found a clear positive relationship between exposure to print and reading ability.

Stainthorp's study also outlined the importance of developing culturally specific equivalents of the author recognition tests. These tests utilize lists of genuine names of children's book authors that are mixed randomly with other genuine names of well-known people from that culture; the participants have to indicate which of the names they recognize as authors. Knowledge of the author, as opposed to a story title, is assumed to make it more likely that the child read the story in print, as opposed to possibly recognizing a title from a film adaptation. Author recognition tests have been adapted for older age groups as well; using such an updated measure, a recent study done on American college students also found that higher levels of print exposure were associated with higher literacy scores (Acheson, Wells, & MacDonald, 2008).

Similar author recognition test results have been obtained using other first languages; significant positive correlations have been found between exposure to print and writing performance in Mandarin (Lee & Krashen, 1996), as well as Korean (Kim & Krashen, 1998a). In addition, Rodrigo, McQuillan, and Krashen (1996), also using a culture-specific author recognition test, discovered that exposure to print showed a positive relationship with vocabulary development in Spanish. More recently, Ecalle and Magnan (2008), using a French version of the test, found that exposure to print in French children of various ages predicted many literacy measures, even after controlling for phonological and orthographic skills. Another study (Kim & Krashen, 1998b) revealed that even for second-language English (ESL) learners, performance on an English author recognition test was positively correlated with vocabulary development.

Exposure to print has been shown to not only have strong positive associations with reading skills, but with other cognitive abilities as well. Ravitch and Finn (1987) discovered that 17-year-olds who read more are also more knowledgeable: their research showed a clear positive relationship between the amount of reported leisure reading and performance on tests of history and literature. Greater exposure to print was also positively correlated with undergraduates' performance on a cultural literacy test created by West and Stanovich (1991), even after factors such as age, education, SAT

scores, exposure to television, and non-verbal abilities were controlled for (Stanovich, West, & Harrison, 1995; West, Stanovich, & Mitchell, 1993). Stanovich and Cunningham (1992) found significant positive correlations between US university students' exposure to print and measures of vocabulary, spelling ability, verbal fluency, as well as cultural knowledge. Print exposure has also been shown to predict individual differences in general cognitive abilities, as well as in knowledge within a variety of domains (Stanovich, 1993; Stanovich and Cunningham, 1993). In studying the leisure reading habits of American undergraduates, Gallik (1999) found a significant positive relationship between time spent reading on holidays and cumulative grade point average. Such research provides empirical evidence for what many people believe to be self-evident: reading, and especially the reading of high quality books, develops the mind by expanding the range and depth of one's knowledge in essentially every field of study.

It is commonly accepted that for one to become proficient at any complex practice, whether it be playing the trombone, playing tennis or trigonometry, one needs to practice these activities extensively. Reading, in the traditional sense, is no exception in this regard, considering the substantial complexity involved in performing this activity, especially at more advanced levels. Although high-quality support and instruction are also undoubtedly important, the amount of reading one does (i.e., exposure to print; reading volume) is a critical variable for determining reading proficiency (e.g., Cunningham & Stanovich, 1997). In addition to its connections with reading expertise specifically, reading volume is also associated with improvements in other, literacy-related skills, such as fluency, comprehension, vocabulary, writing, and higher-order thinking skills (e.g., Anderson, Wilson, & Fielding, 1988; Baker, 1995).

Prior to the many studies performed by Stanovich and colleagues in this research area, there were several other studies completed that had also shown a positive relationship between the amount of time spent reading books and reading achievement. The previously cited Anderson et al. (1988) study found that the amount of time children spent reading for pleasure was a better predictor of reading achievement (e.g., text comprehension) than the amount of time spent doing any other leisure activity. This was a similar result to previous studies (e.g., Greaney, 1980; Walberg and Tsai, 1984) that

also discovered a positive relationship between leisure book-reading time and reading achievement in children.

In terms of in-school reading time, Taylor, Frye, and Maruyama (1990) found that the amount of time elementary students spent reading books during a reading block displayed significant positive associations with improvements in reading achievement. A large-scale International Association for the Evaluation of Educational Achievement (IEA) study into reading and literacy in thirty-two countries (Elley, 1992) confirmed a positive link between the amount of time spent reading, both in-school and out-of-school, and literacy scores. The relationship between the amount of time spent reading and literacy attainment was shown to be significant even after statistically controlling for a variety of school, health and wealth factors.

There have also been large-scale survey studies performed that have confirmed a significant positive relationship between reading enjoyment and frequency, and reading attainment. Since their inception in 2005, the National Literacy Trust surveys have annually investigated the reading habits of tens of thousands of children and youth, aged eight to sixteen, in the United Kingdom. The 2012 survey (Clark, 2013) found that young people who reported enjoying reading 'very much' were, in comparison with young people who reported not enjoying reading 'at all', four times as likely to be reading above the expected level for their age. On the other hand, those who reported not enjoying reading 'at all' were, in comparison with young people who reported enjoying reading 'very much', 15 times as likely to read below the expected level for their age. In terms of the relationship between reading enjoyment and reading attainment, the patterns observed from the 2011 survey (Clark, 2012a) were very similar: those who enjoyed reading 'very much' were five times as likely to be high achievers in reading, whereas those who did not enjoy reading 'at all' were 10 times as likely to be low achievers.

A strong positive relationship was also observed between reading frequency and reading attainment in these surveys. The 2012 survey showed that young people who read outside of the classroom on a daily basis were five times as likely to be reading above the expected level for their age in comparison with those who never read outside

of the classroom. In the 2011 survey, the discrepancy between daily readers and non-readers was even more extreme, with the former being 13 times more likely to be high achievers in reading than the latter. The 2012 survey also found that around 36 percent of those young people who never read outside of the classroom, compared to just four percent of daily readers, read below the expected level for their age.

The causal mechanism that is commonly alluded to in explaining the consistently positive associations between exposure to print and literacy development, as well as academic achievement in general, is the 'Matthew Effect' (term adopted into field of education by Stanovich; see Stanovich, 1986). The term itself is derived from the Biblical passage that describes the related phenomena of the rich-getting-richer and the poor-getting-poorer. Essentially, this 'effect' involves a spiral, reciprocal process whereby greater reading fluency leads to increased reading enjoyment and comprehension (amongst other cognitive skills), which then encourages further exposure. In short, the better one reads, the more motivated one becomes to read more, which then leads to even greater improvements in one's reading ability. Conversely, lower reading fluency decreases enjoyment and comprehension, which commonly reduces future exposure. As a result of this circular relationship between reading practice and reading achievement, the 'Matthew Effect' results in the literacy attainment gap between good readers and poor readers progressively widening over time.

In a comprehensive meta-analysis of 99 different studies focused on the book-reading practices of various age groups from young children up to young adults, Mol and Bus (2011) examined whether the association between print exposure and literacy skills does indeed strengthen across development. Moderate to strong correlations between exposure to print and literacy were found for all the age groups studied, with significant increases in association observed with each additional year of education. Not only does this study highlight the overall consensus that exists on the independent contribution of print exposure to literacy development, it also supports the notion of an upward bi-directional spiral of causality (i.e., the 'Matthew Effect') as the underlying mechanism.

2.7. Texting versus Print Exposure

Almost exclusively, the studies that have looked into the associations between exposure to print and literacy development have focused on the reading of books, and not newer media such as text messages. Some of the researchers who surmise that texting has a predominantly positive effect on literacy, especially for younger ages, have suggested that a likely mechanism involves the greater exposure to print resulting from the practice of texting (Crystal, 2008; Plester & Wood, 2009; Powell & Dixon, 2011; Wood, Jackson, Hart, Plester, & Wilde, 2011a). These researchers cite the aforementioned studies of Stanovich and colleagues to support their argument. Such an association appears premature, however, as it is still far from clear whether exposure to text messages has the same kind of positive connections with literacy development as exposure to print in the traditional sense.

Indeed, there is strong evidence to suggest that print exposure is a far more potent contributor to vocabulary development than oral types of language. (Texting, with its brisk and conversational style, is unique in that it can be essentially characterized as an oral form of language that is written down). Hayes and Ahrens (1988) empirically evaluated the vocabulary found in different types of written and spoken media. They determined the rate of 'rare words' (i.e., words per 1,000 that are ranked lower than 10,000th for usage frequency of the over 86,000 English word forms considered) as well as the median-word rank (i.e., frequency rank of the average word used in each type of media). In short, for both 'rare words' and median-word rank, a higher value leads to a higher rating in terms of the vocabulary level.

Their study found that the median-word rank for scientific articles was 4389, for newspapers 1690, for adult books 1058, and for children's books 627. The frequencies of 'rare words' for these categories of written language were, in the same order, 128.0, 68.3, 52.7, and 30.9. The median-word rank for adults' prime-time television shows was 490, children's prime-time television shows 543, and conversations by college graduates 496. The 'rare words' for these three categories of spoken language were, again in the same order, 22.7, 20.2, and 17.3.

What is especially striking about these data is the significantly lower level of vocabulary found in spoken language as compared to written forms of media. Print contains significantly higher levels of vocabulary than television shows; even children's books scored higher than television, while adult reading material was at least two times more lexically rich. Considering the social and communicative function of most texting, a strong argument could be made that text messages would very likely be more similar in vocabulary content to the spoken media formats described above, as opposed to the written media formats. More studies that analyze the specific content and vocabulary level of text messages compared to traditional print are needed to confirm this supposition. Later in this chapter, there will be data provided pertaining to the amount of time, on average, young people currently spend with different media.

Reading text messages certainly involves 'reading' in a general sense, but it is unclear if it involves the same kind of process (i.e., deeper forms of reading) that is being analyzed in most of the exposure to print research. In "The Shallows", Nicholas Carr (2011) draws on a variety of research in making the argument that digital technologies are significantly impacting our physical brains as well as the way we think. Although the author's focus is on Internet practices, essentially equivalent arguments could be made relating to the practice of text messaging.

Carr (2011) describes how the printed book has performed a crucial intellectual function by helping to focus our attention and thus promote deep thought. Our digital technologies, on the other hand, tend to encourage skimming and scanning of small chunks of information from many different sources. This rapid but distracted form of information retrieval could very likely be changing the way we read and think. Carr argues that as we become more efficient in using our digital media, we lose our capacity for sustained concentration and reflection, critical components of deeper forms of thinking. The following passage provides a succinct summary of his position:

As the time we spend scanning Web pages crowds out the time we spend reading books, as the time we spend exchanging bite-sized text messages crowds out the time we spend composing sentences and paragraphs, as the time we spend hopping across links crowds out the time we devote to quiet reflection and contemplation, the circuits that support those old intellectual functions and pursuits weaken and begin

to break apart...We gain new skills and perspectives but lose old ones.
(p. 120)

In presenting his argument for how digital technologies are significantly altering our ways of reading and thinking, Carr (2011) utilizes recent findings from neuroscience research. As he explains it, until recently, one of the assumptions about the human brain that has remained firm for the past several hundred years has been that the structure of adult brains does not change. Brains were considered to be malleable only during childhood; neurons were believed to connect and form new circuits only during the younger years. As we reached adulthood, it was believed that the circuits would become fixed and immutable. Although the storage of new memories was still believed to occur, the only structural change that the adult brain was assumed to undergo was the slow, gradual decay, and eventual death, of individual neurons.

Now neuroscientists are realizing that the brain's circuitry is actually changing and exhibiting plasticity throughout the entire life span (Pascual-Leone, Amedi, Fregni, & Merabet, 2005). Neuroplasticity is a crucial evolutionary trait that has allowed our brains "to adapt to local environmental demands throughout the lifetime of an individual, and sometimes within a period of days, by forming specialized structures to deal with those demands" (Buller, 2005, as cited in Carr, 2011, p. 31). This mental flexibility, although most prominent in our earlier years, allows us to adapt to new situations and to learn new skills throughout our lifetime.

The physical and mental activities that we take part in on a daily basis strengthen specific circuits in our brain, leading to the formation of our habits. This can lead to either desirable or deleterious effects, depending on the kinds of habits that become ingrained through our neural pathways. Once a new kind of circuitry is wired in the brain through physical or mental practice, it has a strong tendency to stay activated. Conversely, neglecting certain skills can lead to the weakening or dissolving of the associated brain circuits, and subsequent replacement with circuits related to the skills that are actually practiced (Doig, 2007). Indeed, our nervous system is indifferent to the quality of our thoughts. The malleable nature of our brains makes it very possible for us to sacrifice mental aptitudes that are more desirable than the ones that replace them.

There are certainly aptitudes gained through using digital technologies, but, as Carr suggests, there may be a steep price to pay for such ostensible rewards. Traditional literacy skills, including the capacity for deeper forms of reading and thinking, may be forfeited as a result. Considering the rapidly escalating popularity of digital practices, habits (and brain circuits) connected with the 'rushed' reading (and writing) that is promoted on the Internet, and through text messaging, are the ones most likely to predominate in the near future.

There are empirical studies that support Carr's position on the changes in reading behaviour resulting from our immersion in a digital environment. For example, Liu (2005) analyzed the changes that had occurred in reading behaviour in the ten years prior to the commencement of his study. He concluded that distinctive screen-based reading behaviours are emerging as increasingly more reading is done through electronic media. The screen-based reading behaviours, contrary to traditional forms of reading are characterized by "more time spent on browsing and scanning, keyword spotting, one-time reading, non-linear reading, and reading more selectively, while less time is spent on in-depth reading, and concentrated reading" (p. 700). In further support of Carr's argument, this study also showed that the capacity for sustained attention appears to be in significant decline as well.

A recent empirical study (Trapnell & Sinclair, 2012) was performed to specifically investigate Carr's 'cognitive shallowing hypothesis'. The researchers, noting the paucity of research directly testing Carr's important claims, intended to explore whether or not ultra-brief social media technologies, such as texting, were indeed displacing reflective thought and leading to more superficial, shallow thinking. Over two thousand Canadian university students took part in this study by filling out online surveys for three consecutive years. Their findings were overwhelmingly consistent with the hypothesis that texting and other digital technologies are discouraging deeper thought. The study found that students who text more than 100 times per day, compared to those who text 50 times or less per day, were 30 percent less likely to feel strongly that an 'ethical, principled life' was important to them. In addition to placing less importance on moral, aesthetic and spiritual goals, heavier texters were also found to be considerably more interested in wealth and image, and significantly more likely to display ethnic prejudice.

A potent critique of digital practices such as Carr's needs to be taken into account, especially considering the recent neurophysiological research he utilizes to support his argument. Even some of the prominent scholars in the research area pertaining to texting and literacy (see, for example, Plester & Wood, 2009) admit that the challenges presented by arguments such as Carr's have not been satisfactorily addressed in the new literacies literature. Beyond the empirical research, there are a significant number of other voices sounding the alarm bells as well.

A number of contemporary authors and social critics have also been suggesting that reading, in the traditional sense, transforms our understanding of the world in a way unmatched by any other activity. As Maggie Jackson writes in "Distracted: The Erosion of Attention and the Coming Dark Age" (2008), the key question we need to ask ourselves as a society is what kind of reading do we want to be doing. Information and words saturate our daily lives. How we approach that information and how we read those words will determine the kind of literacy that will predominate in our society. The author argues that deep, effective reading lies at the core of our ability to make some sense of such a complex, information-saturated world.

Unfortunately, according to the author, many of us are "increasingly lacking the higher forms of attention that form the bedrock of reading" (Jackson, 2008, p.160). The inevitably labour-intensive capacities for sustained concentration and mental exertion are critical for deeper forms of reading and thinking, and the development of sufficiently advanced levels of literacy. Any definition of literacy, or new literacies for that matter, needs to take these critical cognitive aptitudes into account unless, as Jackson puts it, "we want to slowly redefine [literacy] as a business of skimming" (p. 174) that fails to penetrate the profounder meanings lying below the easily accessible surface.

The focus of these criticisms, as for Carr, is not so much on the new digital practices per se but more so on the implications of these practices, and namely on what we are doing less of, or less well, as a result (i.e., what we are losing). These social critics will argue that one of the key practices that we as a society, and especially our youth, are not partaking in as much as we ought to be is the reading of books and other

more complex materials (see the next section for data regarding current levels of book reading).

As McLuhan (McLuhan & Quentin, 1964) famously put it, the medium truly is the message: the form of the medium itself, melding with the specific content, influences the way in which a message is perceived. The medium of the traditional book, contrary to digital technologies (with the possible exception of electronic books) lends itself to deeper forms of reading and thinking. Comparing books to other media in our electronic age, the famous American author John Updike (2006) argues that the printed book is:

more exacting, more demanding, of its producer and consumer both. It is the site of an encounter, in silence, of two minds, one following in the other's steps but invited to imagine, to argue, to concur on a level of reflection beyond that of personal encounter, with all its merely social conventions, its merciful padding of blather and mutual forgiveness. (p. 3)

In a similar vein, in lamenting the triumph of video over print culture, Jacoby (2009) demarcates a clear distinction between the reading of books and text messaging. The former, she postulates, requires sustained attention and concentration whereas the latter involves, by and large, a sequence of fleeting experiences. As she puts it:

the willed attention demanded by print is the antithesis of the reflexive distraction encouraged by infotainment media, whether one is talking about the tunes on an iPod, a picture flashing briefly on a home page, a text message, a video game, or the latest offering of "reality" TV. (p. 243)

There are certainly some significant differences between these varied digital media practices, but it is their substantial commonalities that Jacoby argues we ignore at our own peril.

Another famous cultural critic, Neil Postman (1992), provides some detailed distinctions between the general character of books (i.e., the printed word) as opposed to television. The traits he ascribes to television could readily be transferred to other digital media:

On the one hand, there is the world of the printed word with its emphasis on logic, sequence, history, exposition, objectivity, detachment, and discipline. On the other there is the world of television with its emphasis on imagery, narrative, presentness, simultaneity, intimacy, immediate gratification, and quick emotional response. (p.16)

If one considers the essential characteristics of text messaging, such as its speed and brevity, one can see that it shares far more similarities with the defining traits attributed here to television than it does with those of traditional literate formats.

It is worth noting that even some of the major proponents of digital technology, such as Google chairman Eric Schmidt, are sounding the alarm bells:

I worry that the level of interrupt, the sort of overwhelming rapidity of information...is in fact affecting cognition. It is affecting deeper thinking. I still believe that sitting down and reading a book is the best way to really learn something. And I worry that we're losing that. (as cited in Greenfield, 2014, p. 7)

However, the research that has looked into the associations between texting and the development of traditional literacy skills, as summarized above, does not seem to differentiate between the types of 'texts' (i.e., a text message versus a complex text) that are being used. The same kind of exposure to print that has been consistently associated with improved literacy (i.e., book reading) is uncritically assumed to be occurring through the process of texting. Reading, in the traditional sense, is not being adequately taken into account in these studies.

It is also worth noting that traditional forms of reading have been shown to be beneficial for a variety of other reasons, beyond just the development of literacy specifically. These other effects, however, can all be seen as connected to literacy in a broader sense. Although a detailed analysis of the other important effects of book reading is beyond the scope of this particular study, it would be prudent to provide at least a brief overview.

The importance of book reading can be considered on a macro, sociocultural level or on a micro, individual level. The arguments in support of the importance of

reading on a macro level stress the significance to a society of transmitting a literary heritage, leading to shared frames of reference and common cultural understandings (e.g., Hirsch, Kett, & Trefil, 1988). The micro level can be separated into the cognitive, emotional, and practical factors affecting each individual. It has been argued that reading improves our thinking by providing us with new concepts and ideas, and by broadening our perspectives. Through developing our vocabulary and other language skills, it has been claimed that reading also enhances our ability to communicate, express ourselves, reason logically, and understand others. Reading is also believed to stimulate the imagination, encourage insight, promote emotional intelligence, and evoke empathy. From a practical perspective, reading is also seen as useful for developing skills important for specific types of employment as well as citizenship in general.

To sum up, although not a comprehensive list, the diverse set of positive effects outlined above give a sense of the various other arguments (i.e., outside of literacy promotion *per se*) that can be made in support of the importance of book reading. This study is focused on the associations between the development of literacy specifically and the practices of texting, reading, and writing. In the introductory chapter, statistics were provided outlining the substantial, and growing, amount of texting that adolescents (among other age groups) are partaking in. In comparison, it is also important to consider the amount and kind of reading, in the traditional sense, which is occurring.

2.8. Quantity of Reading: North America

The American Time Use Survey (ATUS) is a large annual survey carried out by the United States Department of Labor, Bureau of Labor Statistics. In the most recent survey, completed in 2013 (United States Department of Labor, Bureau of Labor Statistics, 2014), over 13,000 US youth and adult participants were asked to chart their use of time on both weekdays and weekends. This survey found that the average amount of time spent on leisure activities was over five hours. The two leisure activities that took up the most time for the population as a whole were watching TV (2.8 hours) and socializing and communicating (43 minutes). Participants read for an average of 20 minutes a day while for 15- to 19-year-olds the average reading time was only nine minutes on weekdays and four minutes on weekend days. On the other hand, leisure

computer use (including computer games) was done for an average of 52 minutes a day by the 15- to 19-year-olds. The results of this annual survey have not changed considerably in any of the categories mentioned since the inaugural ATUS in 2003.

From the data above, it is clear that, on average, Americans (and especially American youth) are reading for only a small percentage of their overall leisure time. Furthermore, it is important to note that these numbers could be somewhat inflated, as reading here was defined very loosely, in that activities such as reading the back of a cereal box during breakfast were even included. Although there are no large-scale survey data available for the Canadian population regarding such daily habits, considering the accumulating social, cultural, and economic overlaps between Canada and the United States, there is little to indicate that the trends observed would be significantly different. Further in this section, in order to include patterns outside of the North American context, there will be large-scale survey data presented on reading habits in several other countries.

Leisure reading, as a voluntary form of reading, and as opposed to school-assigned reading, seems to be a much more telling indicator of the importance of reading for a particular individual. What one wants to do, contrasting with what one has to do, is likely to reveal much more about one's values and dispositions. A Kaiser Family Foundation study entitled "Generation M: Media in the Lives of 8-18-Year-Olds" (Foehr, Rideout, & Roberts, 2005) collected information about the leisure-time media use of American children and teens. The average amount of time spent using media of any kind was over six hours per day, without even taking into account the multitasking that is often occurring (if we take this into account, then these 8- to 18-year-olds averaged 8.5 hours of media content per day). Average television time was over three hours, with computer use and video games each clocking in at around 50 minutes. The total screen time added up to around five hours.

In terms of print media, these children and teens were reading books for an average of 23 minutes per day. This number is still low but somewhat higher than the reading time estimate for late teens in the aforementioned ATUS surveys from 2003 to 2013. This could be due to the lower age groups tending to read a bit more or could

possibly be due to assigned reading from school being included in some of the reading time estimates, in addition to leisure reading. Unsurprisingly, this study concluded that the new generation, Generation M, is undoubtedly the (digital) media generation.

Importantly for our discussion, the 'Generation M' study also considered how closely different kinds of media correlated with students' grades. Of all the leisure time activities considered, reading time was found to be most closely associated with students' grades. The reading time for students with high grades was approximately 36 percent higher than that for students with low grades. Interestingly enough, the difference in TV time between students with high and low grades was negligible, only about one minute per day.

Providing more evidence to support the notion that book reading in our society is on the decline, the National Endowment for the Arts (NEA) performed a large-scale survey of literary reading in the United States in 2002 (NEA, 2004), and found out that around four out of every ten Americans read no books at all (fiction or nonfiction) in an average year and more than half read no fiction. The proportion of the population that reads fiction (including novels, poetry and drama) in their leisure time declined by 10 percent between 1982 and 2002, with the most dramatic decline, a 28 percent drop, in the under 25 age group. Between 1992 and 2002, the decade during which digital technology use increased exponentially, the rate of decline in the reading of fiction almost tripled.

It is worth noting that the NEA counted any kind of fiction as acceptable in their analysis, so an individual who over the entire year read only one 'second-rate' romance novel, or one short story, or one poem, was still considered a reader of fiction. So, presumably, if only works of fiction of a substantially high complexity level were counted (not to mention a more significant volume of these), the percentage of readers would be even lower. The authors of the study suggest that what is especially telling is that the decline in readership over these decades has occurred in a predominantly literate (in the basic sense) society, and is therefore almost certainly not the result of an absence of reading skills, but rather more connected to competition with other forms of entertainment.

The results for the NEA survey performed more recently in 2008 (NEA, 2009) showed a more optimistic trend. Literary reading rates had risen for the first time in decades; over 50 percent of adults were now reading at least one literary item during a calendar year. This was a jump from the almost 47 percent who were reading in 2002, yet still lower than the 54 percent reading in 1992. Although only a modest rise, this was certainly positive news compared to the downward decline observed in previous surveys, and especially so since the most rapid increase was observed in the 18- to 24-year-old age group.

However, this trend does not appear as encouraging when one considers the variety of new literacy initiatives that were undertaken in the US following the exceptionally disappointing 2002 NEA results (Bauerlein & Grantham, 2009). As confirmed by the authors of the NEA reports, the relatively meager measure according to which this survey defines a literary reader fails to impress, as does the fact that the percentage of readers was still lower than it was in previous decades. Indeed, realizing that nearly half the population, the vast majority of whom are literate (at least in the basic sense) are still not reading even one book in a whole year, is hardly cause for celebration. Moreover, and importantly, the results for the most recent 2012 NEA survey (NEA, 2013) failed to uphold the notion that a significant positive trend was afoot in terms of leisure reading rates. The rate of literary reading for adults in 2012 again dropped to 2002 levels, from 50 percent down to 47 percent.

The National Assessment of Educational Progress (NAEP) is a regular large-scale assessment of student learning in different subjects conducted by the US Department of Education. A report released by the NAEP in 2005 (as cited in Bauerlein, 2010) discovered that from 1984 to 2004, the percentage of 17-year-olds who 'never or hardly ever' read in their leisure time more than doubled (from nine percent to nineteen percent). For the year 2004, nearly half of the adolescents surveyed (around 48 percent) read in their leisure time 'once or twice a month or less'. On the other hand, in-class reading time from 1984 to 2004, remained relatively stable. Consistent with the exposure to print research outlined earlier, this report also showed a significant positive association between leisure-time reading frequency and reading comprehension scores.

Anderson, Wilson and Fielding (1988) have shown how even relatively small differences in leisure reading time can have enormous effects on word exposure. In their study, they found that a child who reads for 20 minutes a day will read about two million words in a year, whereas a child who reads for five minutes a day will read seven times less, about three-hundred thousand. Such a dramatic difference in reading volume, especially when coupled with variations in exposure to the relative lexical richness of traditional forms of print, can compound the discrepancies in students' vocabulary acquisition and other aspects of literacy.

In terms of the amount of reading that occurs at the university level, the 2003 National Survey of Student Engagement (as cited in Kuh, 2007) found that 26 percent of freshmen and 21 percent of seniors did not read any books in their leisure time (i.e., for personal enjoyment or academic enrichment) over the course of the previous year. This 2003 survey also found that 81 percent of freshmen and 74 percent of seniors read four books or less in their leisure time over the year. In short, the leisure reading rates of the students starting university were unimpressive and did not seem to improve much over the course of studies. Even at institutions of higher learning, it does not seem that students are taking sufficient advantage of the strong connections research has shown to exist between print exposure and improvements in literacy skills and knowledge levels.

Marc Prensky is an educational writer most famous for his differentiation between 'digital natives' (i.e., young people who have grown up with the digital language of computers, cell phones, and video games) and 'digital immigrants' (i.e., those born prior to the age of digital technology). Using a variety of data sources, Prensky (2001) estimates that prior to completing university the average student will have spent over 10,000 hours playing video games, over 20,000 hours watching television, but, at the very most, 5,000 hours reading books. As the author clarifies, the reading estimate is based on the amount of time a 'voracious' reader would spend reading books. Therefore, one can assume that, in most cases, the reading time would be even significantly lower than the estimate provided, and the discrepancy with digital media that much more pronounced.

The amount of money being spent on specific media can also provide insights into the leisure preferences of youth. The Bureau of Labor Statistics (as cited in Bauerlein, 2008a) carried out a 'Consumer Expenditure Survey' and found out that, in 1990, the average American under the age of 25 spent \$75 on reading materials while they spent \$344 on television, radio, and sound equipment. By the year 2004, spending on reading materials was reduced to \$51 and spending on television, radio, and sound increased to \$500. The latter total would likely have been significantly higher if spending on items such as computers and cell phones was also included.

2.9. Quantity of Reading: Outside North America

An increase in the number of youth that are not partaking in leisure reading at all is not just an American phenomenon. This trend appears to be present in other countries as well. Johnsson-Smaragdi and Jonsson (2006) studied long-term changes in the reading habits of Swedish children and adolescents. They analyzed quantitative data from a Swedish longitudinal research program at eight specific and successive points in time between the years 1976 and 2002. They found that during the latter half of the study period (and especially through the 1990s) the number of Swedish 11- to 12-year-olds and 15- to 16-year-olds that *never* read books in their leisure time increased significantly. For example, the number of habitual non-readers in the adolescent group increased from 13 percent in 1990 to 21 percent in 2002.

This study also showed that young people in Sweden tend to spend far more time with screen media than they do with print media. In 2002, Swedish adolescents watched television for an average of 15.4 hours per week, went online for 11.3 hours per week, played computer games for 5.5 hours per week, but read books for only 2.2 hours per week. Television time stayed relatively constant over the 25-year duration of the study; however, time spent with newer digital technologies (e.g., Internet; computer games), unsurprisingly, saw a sharp increase in the latter decade studied.

Another country where reading has also been shown to be in decline is the United Kingdom. A large-scale 2012 National Literacy Trust survey (Clark, 2013) looked into the reading habits of nearly 35,000 children and young people, aged eight to

sixteen, in the United Kingdom. The survey found that more than 23 percent of young people reported that they rarely or never read outside of class time. The proportion of young people that read daily also dropped significantly from 2005 to 2012, from 38 percent down to 28 percent. Yet another disconcerting trend was the increase in the number of children and young people who reported that they would be embarrassed if their friends saw them reading: from 17 percent in 2010, to 22 percent in 2012.

The National Literacy Trust survey from 2011 (Clark, 2012a) showed that the declines in reading have not just occurred with standard books but with other media as well. From 2005 to 2012, the proportion of children who read magazines dropped from 77 percent to 57 percent; the proportion that read comics dropped from 64 percent to 50 percent; and the proportion that read on websites also dropped from 64 percent to 50 percent. These findings suggest that reading done using other print-based formats or electronic media is not compensating for declines in book reading in general.

Another recent National Literacy Trust survey (Clark & Hawkins, 2010) of young people's literacy-related habits found that a higher percentage of respondents owned a mobile phone than owned even a single book. More than 85 percent of young people in the UK indicated that they own a mobile phone while only 73 percent own at least one book. This statistic is not only an indication of the burgeoning popularity of digital technology, but also provides information about a factor this study revealed to be strongly related to reading enjoyment and frequency: book ownership. In fact, this survey discovered that twice as many young people who own books, compared to those who do not, enjoy reading either 'quite a lot' or 'very much'. Also, twice as many young people who own books, compared to those who do not own any, reported that they read every day. Ensuring that all students have sufficient access to books, not only in school but at home as well, would likely significantly enhance youth reading levels in any cultural context.

2.10. Quality of Reading: Complexity Levels

Not only is the limited amount of reading that is occurring throughout adolescence and across national boundaries a cause for concern, but so is the

decreasing complexity level of the favoured reading materials. A study into the book-reading habits of students at British schools (Topping, 2013) showed that there was a steep, consistent decline in the amount of reading students did from grade seven through grade ten. After that, the reading level plateaued through the later secondary grades. Another troubling trend found by this study was that from grade six onwards, the margin grew steadily between the recommended reading complexity level for the grade and the average complexity level of the books that students were actually reading. In short, students at these higher grade levels that were actually reading were mostly reading books (e.g., *Harry Potter* series; *Twilight* series; *The Very Hungry Caterpillar* picture book) that were less challenging than they should be for their particular grade level. The trend in the secondary years was reversed from the primary grades, when the preferred books were generally significantly above the chronological reading age. This pattern suggests that students in the latter years of schooling are not being sufficiently prepared for the substantially higher levels of literacy that are required in post-secondary studies.

Another recent large-scale survey into what exactly young people are reading collected reading data for nearly ten million American students from grades one to twelve (Renaissance Learning, 2014). The study found that the average number of words students read in books started at 25,000 in grade one and then rose each year until grade six, where it peaked at around 436,000 words. After that, the average number of words gradually decreased to around 300,000 by grade twelve. This was a similar result to other studies cited above (e.g., United States Department of Labor, Bureau of Labor Statistics, 2014) that have found a decline in reading rates in the secondary school years. The Renaissance Learning (2014) study also compared the complexity level of books American students were reading independently with the complexity level of materials used at university and in the workplace. This research utilized a validated (Nelson, Perfetti, Liben, & Liben, 2011) text complexity measure, called the ATOS Readability Formula, that reported by means of a grade-level scale and took into account three key predictors of text difficulty: average word difficulty level, average word length, and average sentence length. The scores produced were estimates of the grade-level of the materials under investigation; for example, a book with a 6.3 score was one

that was expected to be understood by a typically achieving student in the third month of sixth grade.

This comprehensive Renaissance Learning study found that the average complexity level of books being read independently showed a steady increase through the earlier grades and plateaued in late elementary school and through the high school years. From grade one through grade four, students were reading books of a challenge level that roughly matched their grade level. However, students in *all* of the grades from grade five through twelve were reading books with an average difficulty level corresponding to grade four or grade five, peaking at 5.2 in grade twelve. According to this study, this difficulty level was roughly similar to the complexity level of the bestselling books read by adults but significantly lower than the level of many newspaper and magazine articles (most of which the study rated at around a grade ten level). Moreover, the complexity level of the books read by high school students was found to be far below the levels found for sample career documents, which averaged a minimum score of 9.7, and a maximum of 11.7. Even more staggering was the differential between what high school students were reading and sample university textbooks, the latter ranging from a low score of 12.7, to a high of 14.9.

This study also found that the vast majority of the books students were reading, at all the grade levels, were fiction (Renaissance Learning, 2014). Nonfiction, or informational, texts figured far less prominently in the reading lists of most students. Being able to read both literary and informational texts at a considerably advanced level is a prerequisite for success in post-secondary studies as well as in many careers (Ferguson, 2006). Importantly, as concluded by the US-based National Governors Association Center for Best Practices, Council of Chief State School Officers (NGACBP/CCSSO, 2010), “through wide and deep reading of literature and literary nonfiction of steadily increasing sophistication, students gain a reservoir of literary and cultural knowledge, references, and images; the ability to evaluate intricate arguments; and the capacity to surmount the challenges posed by complex texts” (p. 35).

The data from this very recent Renaissance Learning study also revealed that in the elementary grades almost all students read at least one book a year in their grade-

level target range. However, by the time students were in high school, less than 15 percent were reading one or more books at or above their grade-level target range. This information suggests that many students that are graduating from high school have not been sufficiently exposed to the challenging levels of text they will encounter at university and the workplace. Simply put, not only is the quantity of reading that is occurring in adolescence severely lacking, but, importantly, the quality as well.

2.11. Readiness for Post-secondary Studies and Careers

A sufficiently advanced level of literacy appears to be one of the key predictors of success in post-secondary programs of study. Research by Radford, Berkner, Wheelless, and Shepherd (2010), among others, has revealed that a significant percentage of American university students (i.e., approximately 20 percent) need remedial courses prior to enrolling in regular degree programs, and many of these students are unable to graduate within the usual timeframe, if they graduate at all. An inadequate literacy level is often proposed as a critical contributing factor in this substantial rate of failure at post-secondary institutions (e.g., Ferguson, 2006). Indeed, such an explanation appears plausible as a substantial gap in complexity level exists, as outlined above, between the reading materials students are usually exposed to at the secondary school level in comparison to those utilized at the postsecondary level (NGACBP/CCSSO, 2010; Williamson, 2006).

Considering the results of the wide-ranging Renaissance Learning study (2014) outlined above, it is not surprising that data from recent ACT test scores suggest that only about half (i.e., 51 percent in 2005) of American high school students are ready for university-level reading (Ferguson, 2006). The ACT is a university-readiness assessment given to graduating high school students that is accepted by all US post-secondary institutions. Taking either the ACT or the similar, both in terms of content and popularity, SAT, is required for entry to most US universities. University readiness is defined by the ACT as receiving adequate preparation to succeed, without the need for remediation, in entry-level coursework at the post-secondary level. It is also important to keep in mind that the knowledge and skills needed for success at post-secondary

institutions are essentially equivalent to those required in the workplace, and in society in general (e.g., Barth, 2003).

Another key finding from this study of 2005 ACT test scores was that student readiness for university-level reading was at the lowest point in more than a decade. From the years 1994 through to 1999, there was a steady increase in student readiness for university-level reading, peaking at 55 percent in 1999. Since that time there was a steady decline to the 51 percent observed in 2005. This general pattern of decline has been consistent for both genders as well as nearly every racial and ethnic group. It is worth noting that even with the slight increase in university-level reading readiness in the late nineties, the number was still hovering near the 50 percent mark. In other words, what has remained consistent is that nearly half of all US secondary students continue to be inadequately prepared for university-level studies.

An additional important finding from this ACT study (Ferguson, 2006) was that the clearest differentiator in reading between those students who were deemed university-ready and those who were not, was the ability to comprehend complex texts. Comprehension of complex texts differentiated student performance better than reading comprehension level or any other specific textual element. This finding held true for both genders, for all socioeconomic levels, and for every racial and ethnic group studied. Similarly to previously cited studies pertaining to the importance of text complexity levels, this outcome further confirms that secondary school students need to be exposed to, and be able to comprehend, sufficiently complex texts in order to be considered adequately prepared for university studies.

2.12. Writing and Literacy

The present study will not only be considering the associations between literacy and types of reading, but also the associations between literacy and types of writing. Text messaging is a unique practice in the sense that it incorporates distinct styles of both reading and writing. In recent years, there has been significantly less research done connected to the associations between literacy and traditional forms of reading, as opposed to associations between literacy and various digital practices (such as texting).

Even less prevalent has been the research into the connections between literacy and more traditional forms of writing.

As these processes are both based on the printed word, there are inevitably significant overlaps between the practices of reading and writing. It makes logical sense that in order to be able to write coherently, one needs to be exposed to significant amounts of articulate writing (i.e., one needs to read substantially in the traditional sense). Empirical research also supports the notion that individuals who read more perform better on assessments of writing (e.g., Applebee, Langer, Mullis, Jenkins, & Foertsch, 1990; Lee & Krashen, 1996). As renowned psycholinguist Frank Smith (1988) contends, one does not learn to write simply by rote memorization or by assimilating specific procedures, but primarily through reading. Reading books exposes one not only to the requisite form and structure of competent writing but also, importantly, to novel terms and concepts. Therefore, many of the literacy gains associated with reading, in the traditional sense, can be conceptually extrapolated to most likely benefit writing, in the traditional sense, as well.

There are a number of recent studies that have explored the links between reading and writing. The previously cited data obtained from the UK National Literacy Trust surveys not only showed a strong relationship between reading frequency and enjoyment, and reading attainment, but also strong linkages between the distinct practices of reading and writing. The 2012 survey (Clark, 2013) found that 42 percent of young people (i.e., aged eight to sixteen) who read above the expected level for their age also wrote above the expected level, and only 11 percent of these young people wrote below the expected level. Conversely, 60 percent of young people who read below the expected level for their age also wrote below the expected level, with only four percent of these young people writing above the expected level. Similar trends were observed in the 2011 survey results (Clark, 2012), with the most significant difference being the finding that even a higher proportion of students who were reading above the expected level, 49 percent as opposed to 42 percent, were also writing above the expected level.

Beyond the strong links outlined above between reading attainment and writing attainment, the National Literacy Trust surveys have also shown significant positive relationships between the enjoyment of reading and writing, as well as between the frequency of these activities. The 2012 survey showed that 65 percent of young people who said they enjoy reading 'very much' or 'quite a lot' also said they enjoy writing either 'very much' or 'quite a lot'. In terms of the frequency of these activities, this survey found that frequent readers are also frequent writers. For example, around 38 percent of respondents who reported reading on a daily basis were also writing daily. These findings suggest there are significant connections between the practices of reading and writing, especially as pertains to achievement, enjoyment, and frequency.

Some of the other survey studies that have explored the popularity of reading among youth have also included writing time as a research variable. In general, writing has been found to be a less prevalent activity than reading for all age groups. For example, Nippold, Duthie, and Larsen (2005), in investigating the leisure activity habits of 11- to 15-year-old American youth, found that one of the least popular free time activities was writing (i.e., with only 34 percent of respondents choosing this activity as something they enjoy doing in their free time). The researchers found that the most popular activities for youth were listening to music, and watching television and movies (i.e., both types of activities scoring around 80 percent) while reading was only moderately popular (i.e., scoring 51 percent). This particular study, similarly to many other studies that have looked into students' writing habits, did not consider the associations between writing frequency and the development of literacy.

The 2011 National Literacy Trust survey (Clark, 2012b) into young people's literacy practices in the United Kingdom, mentioned above, in addition to reading practices, also considered in detail factors that relate specifically to the practice of writing, such as its enjoyment and frequency. This survey showed that 47 percent of the respondents were enjoying writing either 'very much' or 'quite a lot' while 14 percent were not enjoying writing 'at all'. Around 27 percent of young people practiced writing outside of the classroom every day, while 25 percent rarely or never wrote outside of the classroom. As described in this study, and adding to the reliability of the findings, the overall results were very similar to those found in the survey from the previous year.

It is important to note that this particular survey did not distinguish between more traditional forms of writing and the generally less complex technology-based formats, such as texting and IM. In fact, by far the most common form of writing reported by the respondents was texting, with 69 percent writing text messages at least once a month. Some key distinguishing features between text messaging and more traditional forms of writing (and reading), not taken into account in this survey, will be elaborated on in Chapter Five.

Importantly, and similarly to the results obtained from the reading data for the National Literacy Trust surveys previously cited, writing enjoyment and writing frequency were both shown to have strong relationships with writing attainment. The 2011 survey (Clark, 2012b) found that young people who reported enjoying writing 'very much' were significantly more likely to write above the expected level for their age: 49 percent of them writing above the expected level, and only five percent writing below the expected level. In contrast, and providing essentially a mirror image of this trend, of those young people who reported not enjoying writing 'at all', only six percent were writing above the expected level, while 51 percent were writing below the expected level.

In terms of writing frequency, young people who wrote outside the classroom every day, compared with those who never wrote, were over five times as likely to be writing above the level expected for their age. More than 27 percent of those who wrote every day were writing above the expected level, compared to five percent of those who never wrote, and eight percent of those who rarely wrote. In addition, 47 percent of young people who never wrote outside of the classroom were writing below the expected level, compared to only 12 percent of those who wrote every day. In short, these results provide evidence of a strong positive association between how much students are writing outside of school and their literacy attainment.

The results from the most recent National Literacy Trust survey (Clark, 2014) into children's and young people's writing habits, completed in 2013, were for the most part strikingly similar to the results observed in earlier surveys. The multiple repetition of survey trials has added reliability to the findings of these investigations. Indeed, the patterns for writing enjoyment and writing frequency have stayed relatively constant. For

example, 17 percent of respondents reported enjoying writing ‘very much’ in 2013 in comparison to 18 percent in 2011; in addition, the surveys for these years both found that 14 percent of respondents did not enjoy writing ‘at all’. In terms of writing frequency, the 2013 survey showed that more than 26 percent of young people wrote every day, compared to nearly 27 percent in 2011; for both surveys, seven percent of young people reported that they never wrote, and 18 percent that they rarely wrote. Moreover, similarly to previous surveys, the 2013 survey results also showed very similar, clear relationships between writing attainment and writing enjoyment, as well as between writing attainment and writing frequency.

Although there appears to be a clear indication from these as well as earlier studies (e.g., Applebee et al., 1990) that good writers tend to write more than poor writers, it is unclear whether increasing the amount of writing, on its own, will necessarily lead to improved writing proficiency. Indeed, a number of studies have shown that merely increasing writing quantity does not appear to affect writing quality (Lee, 2001; Varble, 1990). More recently, Mason (2003, as cited in Krashen, 2004) compared the effect of first and second language writing activities on the English writing proficiency of Japanese university students. There were no gains observed in English language development from any of the supplementary writing activities that were utilized over the three-semester study period.

More studies related to writing practices are required to further investigate these relationships. Indeed, there appears to be a significant gap in the literature, especially more recently, connected to the associations between literacy and writing, in the traditional sense. Moreover, as for the research areas examining the associations between literacy and texting, as well as literacy and reading, more studies of an experimental and/or longitudinal nature are needed to investigate the direction of associations, which could lead to more insights regarding causality. These methodological issues, among others, are discussed in more detail in Chapter Three.

2.13. Gender Differences: Texting, Reading, Writing, and Literacy Attainment

Another key factor in terms of literacy development that this study has taken into account is the influence of gender. As pertains to text messaging frequency and content, empirical studies have found evidence of significant gender-based discrepancies. In a sociolinguistic analysis of texting use by Norwegian adolescents and young adults, Ling (2005) found that females tended to send more text messages than males, and that messages sent by females were longer and exhibited more syntactic complexity. This finding is consistent with other research that has looked into the effect of gender on texting in the United States (Rosen et al., 2010), as well as in a number of countries in Europe (e.g., Kasesniemi, 2003). The messages sent by females were more likely to include greetings and words of parting. Females tended to include both practical and emotional content in their messages, whereas males focused primarily on the practical. Ling and Baron (2007) observed similar gender-specific discrepancies in their study of text messaging practices among US university students. Grace and Kemp (2014) also discovered that females used more textese, and their textese was more emotionally expressive than that of males. Other studies into gender differences in texting practices (Ling, 2005; Rosen et al., 2010) have also showed that adolescent females were more likely to use textese than adolescent males, especially at younger ages.

Gender variation has also been shown to be present when it comes to more traditional types of literacy-related practices. Research has consistently shown (e.g., Clark, 2013, Renaissance Learning, 2014) that girls of all ages read more books than boys; this difference remains in the adult population as well, with women reading more books than men in all age groups. This result appears to be constant across a variety of different cultural contexts. In their study of the reading habits of Swedish children and adolescents between 1976 and 2002, Johnsson-Smaragdi and Jonsson (2006) found that, irrespective of age, girls were shown to read more books than boys in all the years analyzed.

The large-scale Renaissance Learning study (2014) into the reading habits of American children and adolescents, discussed in detail above, found that girls, on

average, read around 760,000 more words than boys during their school years. Taking into account the average cumulative words read by each gender through grade 12, this means that girls were reading around 25 percent more words than boys. This significant gender difference in reading volume is likely one of the key reasons for the discrepancy in literacy attainment between genders (see below).

In the UK, the aforementioned large-scale survey performed by the National Literacy Trust (Clark, 2013) found that girls enjoy reading significantly more than boys. Around 27 percent of girls, compared to 19 percent of boys, reported enjoying reading 'very much'; conversely, nearly twice as many boys as girls reported not enjoying reading 'at all', sixteen percent versus nine percent, respectively. Not surprisingly, reading enjoyment results were shown to be largely consistent with those for reading frequency: 33 percent of girls read outside of class daily, compared with 24 percent of boys. Moreover, 11 percent of boys stated that they never read outside of class as opposed to five percent of girls. Simply put, this study provided further evidence that, on average, not only do girls enjoy reading more than boys, but they are doing a lot more of it as well.

When it comes to writing, in the traditional sense, females have been shown to do significantly more of this activity as well (e.g., Nippold et al., 2005). The National Literacy Trust surveys, cited above, also considered gender differences in leisure-time writing practices. The most recent of these surveys that looked at young people's writing, carried out in the years 2010 and 2011, respectively, both showed very similar results. Therefore, only the data from the latest survey have been elaborated on here. The 2011 survey (Clark, 2012b) found that nearly twice as many girls as boys reported that they enjoyed writing 'very much': 23 percent versus 13 percent, respectively. Conversely, boys were shown to be almost three times as likely to claim that they did not enjoy writing 'at all': 22 percent of boys versus eight percent of girls. Not surprisingly, this survey also showed that girls not only enjoyed writing more than boys, but they also did it more frequently outside of class. More than 33 percent of girls reported writing outside of class on a daily basis as opposed to 21 percent of boys. In addition, boys were more than twice as likely as girls to say that they never wrote outside of class, ten percent versus four percent, respectively. The findings for gender-based variations in writing

practices essentially mirror those for reading practices. The data suggest that girls tend to enjoy writing more than boys and also tend to perform this activity significantly more often.

This survey (Clark, 2012b) did not distinguish between the generally more basic, conversation-like writing that occurs through ICT formats such as text messages, and the more complex, formal character of standard forms of writing. Nonetheless, the survey results showed that girls tend to write more than boys in all the formats of writing considered. Girls wrote more than boys using digital formats, such as text messages, instant messages, and emails. In addition, approximately twice as many girls as boys wrote lyrics or poems outside the classroom, and three times as many kept a diary. Not surprisingly, considering the discrepancies in the enjoyment and frequency of writing between girls and boys, boys were also found to be significantly more likely to report being embarrassed if their friends observed them writing outside the classroom.

The question of why exactly girls tend to read and write more than boys remains unanswered. A variety of plausible explanations for this gender discrepancy have been suggested including: gender differences in attitudes toward books; gender differences in the value placed on book-reading and writing; society's expectations of appropriate gender behaviour (e.g., books and literary knowledge viewed as feminine or 'unmanly'); reading and writing requiring traits more often ascribed to girls than boys such as the capacity for sustained concentration; and the higher literacy levels generally exhibited by girls (as outlined below). This is yet another research area related to this study that would benefit from further investigation.

In terms of gender differences in literacy achievement, these have been reported in a variety of studies as well. Female students, as a general rule, have outperformed male students in terms of literacy attainment (e.g., Arnot, David, & Weiner, 1999; Martin, Mullis, Gonzales, & Kennedy, 2003; Younger & Warrington, 2007). This significant gender gap has remained relatively consistent for the past 40 years (Hedges & Nowell, 1995). A PISA (Programme for International Student Assessment) study performed in the year 2000 revealed that females performed better on literacy measures in all 32 countries that participated, including all the Canadian provinces (OECD, 2001, 2002). A

large-scale 2001 IEA study showed that the advantage girls have over boys in terms of literacy begins at an early age (Martin, Mullis, Gonzales, & Kennedy, 2003), and continues thereafter. In this study, fourth-grade females were shown to perform significantly better than their male classmates in various literacy measures in all 35 participating countries. In short, not only are girls (across a variety of cultural contexts) reading and writing more than boys, they are exhibiting significantly higher levels of literacy as well.

On balance, when we make comparisons in terms of gender, clear evidence emerges of a positive relationship between reading and writing frequency, and literacy attainment. Gender-based variations in terms of practices associated with literacy development could provide some useful insights into ways in which literacy attainment can be improved for *all* students. Indeed, the positive associations between time spent reading and writing, in the traditional sense, and literacy development, appear to be consistent at both the gender and individual level.

2.14. Influence of Medium/Format

Another key aspect of the UK National Literacy Trust surveys into young people's writing habits, cited above, was a section that investigated different types of writing formats, and their associations with writing attainment. Although the focus in these surveys was on writing specifically, considering the fundamental links between writing and reading, discussed above, much of this data could be extrapolated to apply to the practice of reading as well.

These results are worth noting as they are directly connected to some of the core research questions in the present study. The types of written materials considered in these surveys included both technology-based and traditional formats: text messages, social networking messages, instant messages, tweets, emails, notes, letters, lyrics, fiction, diary entries, poems, blogs, essays, and reviews. Young people were asked which of these kinds of materials they wrote outside of the classroom at least once a month. Similarly to studies done in the previous years, the 2013 National Literacy Trust survey (Clark, 2014) showed that technology-based formats predominated, with text

messages being written by the most respondents (76 percent), followed by social networking site messages (53 percent) and emails (48 percent). In terms of more traditional formats, notes (38 percent) and letters (29 percent) were most common.

The relative proportions of the types of writing that young people were doing remained consistent from 2010 through to the most recent survey in 2013. The only significant change occurred in the proportion of respondents who were text messaging outside of class at least once a month, rising from 66 percent in 2010 to 76 percent in 2013. This increase is not at all surprising considering the previously described burgeoning popularity of cell phones and texting.

Importantly for the purposes of this study, these surveys also included analyses of how the production of certain types of written material were associated with higher levels of writing attainment than others. The results from previous surveys were again largely consistent with the most recent data from the 2013 survey (Clark, 2014) presented here. The most conspicuous finding from this analysis was that young people who wrote above the expected level for their age were significantly more likely, than those who wrote below the expected level, to report that they wrote in more traditional formats. They were nearly twice as likely to say that they wrote notes, letters, lyrics, essays, reviews, and kept a diary; they were three times as likely to report writing poems and fiction. For example, over 40 percent of young people who wrote above the expected level for their age wrote fiction, as opposed to 13 percent of young people who wrote below the expected level.

The trend outlined above for more traditional formats was quite different from the pattern observed for most digital media formats. Young people who wrote below the expected level for their age were just as likely to write using digital technology based formats, such as text messages, social network messages, and tweets, as those who wrote above the expected level. For example, 71 percent of young people who wrote below the expected level, and 73 percent of young people who wrote above the expected level, wrote text messages outside of class at least once a month. The only exceptions to this general pattern were emails and blogs, which both showed a modest difference. For example, in terms of emails, 53 percent of young people who wrote

above the expected level wrote these as opposed to 42 percent of those who wrote below the expected level. This is not surprising as emails and blogs generally share many of the characteristics of more traditional writing formats, such as increased length and complexity level.

The results above suggest that certain writing formats are more clearly associated with literacy attainment than others. Simply put, more traditional, complex formats of writing seem to be more positively correlated with literacy achievement than the generally shorter and less complex digital media writing formats. More studies are needed to further confirm this pattern, especially those with a longitudinal research design that could provide useful information regarding the specific direction of these associations.

To sum up, it is worth noting that many of the studies into print exposure, discussed above, have also found clear positive associations between more traditional forms of reading and literacy attainment. Research into texting, as summarized above as well, has thus far revealed far less consistent associations between this particular digital practice and literacy. Although the findings have been primarily positive, recent empirical research pertaining to the relationships between time spent reading, in a traditional sense, and literacy development is relatively limited, especially when compared to the attention currently received by research into new literacies. This may be partly due to the common, and plausible, assumption that the more one reads, the better reader one becomes. However, as the research into texting and literacy has highlighted, such a relationship is not a foregone conclusion, especially when we take into account distinct media and formats.

2.15. Summary

There has been an extensive amount of research done, especially in recent years, into the associations between texting and literacy development. Overall, the results of these studies have been mixed and it would be premature to make conclusive remarks about the relationship between texting and literacy. Research findings pertaining to the connections between literacy and more traditional forms of reading (and

writing) have been far more consistent: there is a strong positive association between the frequency and enjoyment of such reading (and writing), and literacy attainment. Alas, recent large-scale survey data indicate that while the amount of time spent by young people worldwide on new-literacy practices such as texting is rapidly rising, the amount of time spent reading (and writing), in the traditional sense, has generally stagnated in recent decades. Moreover, the complexity level of the reading that is occurring in adolescence is usually far below the standard required for post-secondary studies or many careers (i.e., below a functional level of literacy). Such findings have prompted many researchers and writers, from fields usually not connected with new literacies, to sound the alarm bells and present arguments championing more traditional, complex formats of reading and writing. In researching the associations between particular practices and literacy, it seems only reasonable, although many studies into new-literacy practices have failed to do so, to differentiate between the specific formats of reading and writing being employed. This study will attempt to do that by distinguishing between the influence of different types of reading and writing (i.e., texting versus more complex, traditional forms) on literacy.

Chapter 3. Methodology

3.1. Introduction

Researchers have studied the educational and social impacts of literacy and new literacies in a number of different ways. They have utilized quantitative and qualitative approaches, as well as mixed methods, in the diverse studies that have been carried out. The previous chapter outlined the studies that have been done relating to the associations between literacy and specific practices, such as texting, reading, and writing.

Educational research involves systematic investigation into issues that impact teaching, learning, and schools in general. Most educational research is empirical and thus involves gaining knowledge either directly or indirectly through observations and experience. Some educational research is theoretical, however, and not based on specific observations or practices. Research can take on many forms; settings, time spans, research questions, and funding are some of the crucial factors that determine the form of the study undertaken.

Education is a very complex field to research since there are many interacting factors operating concurrently (e.g., teaching style, location of school, individual characteristics of students, etc.) Therefore, what happens in classrooms is extremely context-specific and it is difficult to make generalizations regarding most empirical research findings. As Berliner (2002) suggests, educational researchers need to deal with perhaps “the hardest-to-do science of them all” (p. 18).

Educational research is diverse; new literacies research takes this diversity to an entirely new level. Research into these dynamic new forms of literacy takes place in a wide variety of disciplines, using a diverse set of theoretical frameworks, each based on

varied epistemological approaches. These multiple perspectives provide a distinct richness to the field and help us understand the many issues associated with the development of new literacies (and the changing nature of the concept of literacy).

Some of the disciplines through which new literacies are studied include: cognitive science, linguistics, information science, education and cultural anthropology. Theoretical perspectives include: sociolinguistics theory, discourse theory, critical theory, sociocultural theory, informatics, various network theories, feminist theory, communication theories, hermeneutics, and a variety of other theories of culture and media.

An interdisciplinary approach is already an integral component of the new literacies research area. One orientation towards 'new literacies' can be characterized as psycholinguistic in nature, drawing on theoretical domains such as cognitive psychology, linguistics, and metacognition (e.g., Coiro et al., 2008). Another orientation draws more from sociocultural theory and has sometimes been labeled a more inclusive and uppercase New Literacies Theory (Lankshear & Knobel, 2003). Other research connected with new literacies does not fit neatly into either of these orientations, appearing in such diverse disciplines as cultural anthropology (Markham, 1998; Street, 2003), and information science (Hirsh, 1999).

However, some of the key researchers in this field are attempting to bring some unity to this diverse area of research. Leu, O'Byrne, Zawilinski, McVerry, and Everett-Cacopardo (2009) explicitly distinguish between New Literacies Theory (as the broader patterns) and 'new literacies theories' (as the specific changes occurring in each area of study). This provides a dual-level approach that is helpful for dealing with the previously described (see Chapter One) deictic and multifaceted nature of new literacies. These authors argue that through the inclusion of a wide range of lowercase theories, scholars can pursue their particular interests while generating findings and insights that are useful for others working in different contexts, investigating varied technologies, and incorporating diverse perspectives.

According to these researchers, a New Literacies Theory is necessary for the recognition and integration of common, consistent patterns that are generated through

the multiple lenses of the lowercase theories. The ongoing work done on lowercase theories is supposed to add new dimensions and depth to our understanding of the uppercase theory. Such a flexible model for studying new literacies has been built in an attempt to accommodate a constantly evolving definition of literacy.

All of this diverse research into new literacies also varies in terms of the overall purpose of each study. The purposes range across the spectrum and include: promotion of the economy, social justice, Internet safety, respect for property rights, improving online-based instruction, developing strategies for accessing information online, and so on. In short, research in this field is produced through multiple lenses and in multiple contexts.

Diversity notwithstanding, research into literacy, and new literacies, utilizes similar methodologies as educational research in general. The major difference in working with new literacies is the necessity to explore novel digital technologies and media. Relatedly, a lot of the research on new literacies is now carried out online.

An example of a unique research approach into new literacies is virtual ethnography. Similarly to traditional ethnography, this area of study involves an in-depth exploration of a culture, but in this case a particular cyber-culture. Contrary to traditional ethnography, the level of participant observation is usually not as high, although this level varies in different studies. Indeed, the emergence of the Internet and digital technologies has problematized such notions as 'participation' and 'field' in the application of the ethnographic approach (Duke & Mallette, 2011).

Many other features of ethnography remain the same, however, such as the frequent use of mixed methods. For example, Steinkuehler (2007) applied virtual ethnographic techniques to study young people's literacy practices within, what is referred to as, a massively multiplayer online game (MMOG). She combined the use of qualitative methods, such as interviews and observations, with quantitative methods, such as statistical analyses of social network habits. The purpose of her study was to argue against the general contempt displayed toward the notion of video games as literacy activities.

3.2. Research Methodologies: Associations between Literacy and Texting, Reading, and Writing

Investigations into the potential impact of text messaging on literacy have been more conventional than a lot of other new literacies research in that most studies in this area have been carried out offline. This could change in the near future, however, and there have already been studies (e.g., Rosen et al., 2010) that have utilized an online format. In addition, and notably, the studies into the associations between literacy and practices such as texting, and more traditional forms of reading and writing, have generally applied a more standard definition of literacy.

The literature review of the research into the links between literacy and texting, reading, and writing practices, presented in the previous chapter, included multiple examples of studies that utilized the quantitative approach. There were several studies that incorporated an experimental design, but the vast majority used non-experimental designs. The qualitative approaches appearing in the literature review were the case study method, ethnography, and written discourse analysis. Some examples of the mixed methods approach were also evident in the studies that were presented.

This literature review revealed that qualitative approaches are not as prevalent in this area of research as quantitative ones. Quantitative, and especially non-experimental, correlational approaches have been favoured at least partly due to the specific nature of this sphere of study (i.e., focused on the associations between a particular practice and a standard form of literacy). In research that looks at a broader range of practices, or applies a more expansive 'new literacies' definition, qualitative approaches are far better represented. This is unsurprising considering quantitative research generally requires more concretely defined terms than made possible by the fluid nature of many 'new literacies' characterizations.

The popularity of the quantitative approach also suggests that the paradigm favoured by most of the researchers in this research area is post-positivist (i.e., assuming an objective and knowable reality, with conclusions presented through the use of probabilities). In the wider field of study investigating new literacies, other paradigms such as the constructivist and transformative, more often associated with qualitative

approaches, are more prevalent. In addition to the empirical studies, there were also media reports and interdisciplinary analyses included in the literature review, as well as pertinent anecdotal evidence.

As seen in Chapter Two, the vast majority of the studies exploring associations between literacy and texting, reading, and writing practices are cross-sectional, correlational types of non-experimental quantitative research. Since they are investigating correlation and not causation, it is difficult to draw any causal conclusions from them. Indeed, the direction of the established relationships, where they exist, is uncertain. For example, looking at the texting results, if we consider the positive cases, textese may very well not be causing improvements in literacy; possibly students who are good at writing will experiment and use textese more. The same can be said for the negative results. Texting may not necessarily be causing the stunting of literacy development; possibly students who are poor readers simply enjoy using this mode of communication more than good readers do.

One of many specific examples of a non-experimental, cross-sectional research design in this research area is the study performed by Trapnell and Sinclair (2012), described in Chapter Two, which specifically investigated Carr's 'cognitive shallowing hypothesis'. In general, the study found that heavy texters scored lower on measures of deeper thought and reflection. However, another plausible explanation could be that those students more disposed to reflection may not be as interested in frequent texting. Also, as could be claimed for essentially all empirical educational research, these results may simply be reflections of sampling anomalies related to the specific years or local population being examined. As the researchers themselves suggest, the results are definitely intriguing, but more studies are required, especially those utilizing a more rigorous experimental, longitudinal research design, before we can make any firm conclusions regarding this shallowing hypothesis. One can come up with similarly ambiguous interpretations of the correlational data from the studies connected specifically with associations between literacy and reading or writing practices.

In addition, many of the studies in the texting and literacy research area do not take into account other plausible explanations for the results, thus significantly lowering

their internal validity. One of myriad examples of this is the Plester and Wood (2009) study that looked into the associations between texting and the literacy skills of 10- to 11-year-old British children. This particular study failed to take into account the effects of potential confounding factors such as book-reading levels, socio-economic status, or cultural values on the final outcome. Taking into consideration some of the more likely confounding factors in terms of the ostensible links between texting and literacy, such as levels of more traditional forms of reading, was an important aspect of the present study.

As also elucidated in the literature review, there have been only a few studies done connected with texting and literacy that have utilized an experimental and/or longitudinal research design (Wood et al., 2011a, 2011b, 2014b). Such studies are crucial for obtaining results that move beyond correlations and allow for informed deliberation on the direction of an association, as well as the causal contribution of specific variables. The experimental intervention study performed by Wood et al. (2011a) found some evidence, albeit quite limited, of a possible causal contribution of textese on some literacy measures. However, much more research would be required to substantiate claims of such a causal relationship between texting (or textese use specifically) and literacy attainment for any particular age group.

In terms of the longitudinal research designs utilized in this research area (Wood et al., 2011b, 2014b), it is important to keep in mind that such longitudinal, panel (i.e., same sample measured two or more times) studies can establish the temporal order of variables, and can thus indicate if a causal relationship is *possible*. These kinds of longitudinal studies have more power than cross-sectional studies in indicating the possibility of a cause-and-effect relationship. However, it should be noted that any purported causal relationships in such longitudinal studies carry much less weight than with an experimental design since they cannot *necessarily establish* cause and effect (Jurs & Wiersma, 2009).

Drawing even stronger conclusions about causality would require studies involving experimental interventions. These can be problematic due to ethical and practical concerns. In terms of ethics, for example, encouraging the use of cell phones, or discouraging book-reading, in a particular group of students can be a contentious

issue. From a practical perspective, it may be difficult to find a significant number of students that do not use cell phones at all. Therefore, in terms of determining the causal direction(s) of any observed associations in this area of research, longitudinal studies appear to be much more feasible than experimental ones.

As pertains specifically to the research into the associations between literacy and reading, in the traditional sense, it has been frequently suggested, or at least implicitly assumed, that there is a positive relationship between reading enjoyment, reading behaviour, and reading attainment. In other words, many people consider self-evident the proposition that the more one reads, and the more one enjoys reading, the higher the reading (and literacy) attainment will be in the long run. As seen in the literature review, empirical studies have also consistently shown a positive relationship between reading frequency (and enjoyment) and reading attainment; however, it must be reiterated that these studies have been predominantly cross-sectional (i.e., temporal snapshots) and therefore do not provide evidence of causation. (Similar statements could be made relating to the perceived positive influence of the practice of writing, with the key distinctions being that the relationship between writing and literacy has not been as extensively studied, nor have the results been as consistent).

As mentioned above, a cross-sectional research design can indicate correlation but does not allow for inferences to be made about causality. Indeed, higher attainment in reading (or writing) could be leading to increased reading (or writing) frequency, enhanced enjoyment of it, and more positive attitudes toward it; conversely, these latter three factors (acting either independently or in some combination) could be leading to higher attainment. Or perhaps the relationship is cyclical, or reciprocal, with causation operating in more than one direction (i.e., as proposed by the 'Matthew Effect' hypothesis described in Chapter Two). Indeed, the Mol and Bus (2011) study provides strong evidence for such a bidirectional spiral of causality, with the association between reading amount and reading achievement shown to strengthen over development.

Although correlational analyses cannot lead to conclusions about causal contributions, they can provide useful information regarding consistently correlated variables that are deserving of further investigation. Such additional explorations could

involve quantitative or qualitative approaches, as well as more theoretical forms of research. For the purposes of more conclusively confirming the direction(s) of associations involved between the practices of texting, reading, and writing, and literacy development, more research of a specifically experimental and/or longitudinal nature is required.

Empirical evidence is valuable and a key component of this present study. However, especially in a highly complex field such as education, with its inherent focus on oftentimes unpredictable human behaviour, an excessive dependence on empirical studies can sometimes be counterproductive. Although empirical studies have much to offer, the context-specific nature of much of education limits their overall effectiveness and generalizability. It seems that the hegemony of the empirical needs to be somewhat counterbalanced with a greater reliance on more comprehensive, interdisciplinary analyses that take into account the broader context. It was with this end in mind that more generic voices from outside this specific field of study were also included in the literature review. Indeed, more benefit would likely be derived from any particular research findings if they were not exclusively deliberated on within isolated islands in academia, but rather also incorporated into interdisciplinary analyses, as well as larger intellectual and cultural debates.

Recognition of the complexity of the world we live in does not necessitate the use of highly specialized, dense, and impenetrable language to describe it. Striving toward a certain degree of (admittedly tentative) conceptual clarity, even in such a diverse field as education, appears prudent. The lack of common definitions and regular appearance of frequently confused terms in this, and other, areas of educational research prompted at least a partial elucidation of key terminology, namely literacy and 'new literacies', for this study.

3.3. Types of Reading and Writing

Contrary to most of the other research into the associations between texting and literacy, this study did not work under the assumption that the 'reading' of text messages involves essentially the same process (i.e., exposure to the written word in the broad

sense) as more traditional forms of reading. It would be useful, in future studies, to utilize a text complexity measure to empirically validate this position through a systematic comparison of the content in text messages with that found in other reading materials. Due to constraints of time and resources, a text complexity measure was not utilized in this study.

There are various measures of text complexity that can provide useful information regarding the difficulty level of the written work being employed or generated by students. The Renaissance Learning study (2014), previously described in Chapter Two, used the text complexity measure named ATOS Readability Formula. Similarly to other such metrics, ATOS takes into account a range of key predictors of text complexity, including the average length of sentences, the average length of words, and the average difficulty level of words. What makes this particular text difficulty measure especially practical is the way it reports results using a grade-level scale that is immediately applicable to classroom teachers.

Nelson et al. (2011) conducted a study that assessed the validity of six commonly used text complexity metrics: REAP (Carnegie Mellon University); Lexile (MetaMetrics); ATOS (Renaissance Learning); SourceRater (Educational Testing Service); Degrees of Reading Power: DRP Analyzer (Questar Assessment, Inc.); and the Pearson Reading Maturity Metric (Pearson Knowledge Technologies). The study concluded that “all of the metrics were reliably, and often highly, correlated with grade level and student performance-based measures of text difficulty across a variety of text sets, and across a variety of reference measures” (p. 46). Simply put, the evidence suggests that any of these text complexity measures can be used to accurately and reliably predict the difficulty level of various written work.

In terms of the implications for education, such text complexity metrics can be useful guides for curriculum standards and grade-specific classroom practice. Such metrics can also be beneficial for determining differentials in complexity level between reading materials used at particular levels of education, such as the current sizeable gap between typical high school and university texts (Ferguson, 2006; Renaissance Learning, 2014). Text complexity measures could certainly help efforts to close this gap

by providing data that would be useful for the recalibration of text difficulty across specific grade levels.

Moreover, such text complexity metrics can also be valuable for educational research, especially where quantitative measures of text complexity are most appropriate. As the research into these standards of measurement recognizes (Nelson et al., 2011), there are certain literary genres (e.g., poetry, drama) whose complexity is not as readily assessed using such quantitative approaches. Especially in such cases, these metrics would be best used in combination with qualitative forms of analysis, as well as expert educational judgment.

3.4. The Present Study: Overview of Methods

The primary purpose of this study was to explore potential relationships between text messaging practices, as well as more traditional forms of reading and writing, and literacy levels in adolescents. In addition, potential associations between literacy level and other common leisure habits were investigated. Gender variations in the results were also considered.

A non-experimental, quantitative approach was utilized in this study for several reasons. First of all, as outlined above, most of the research in this specific research area has followed such an approach, which made such a methodology desirable in terms of allowing for a more systematic comparison with previous results. Secondly, the data collected and analyzed were primarily of a numerical nature and thus conducive to such an approach. Thirdly, from a practical perspective, these data were readily available to be used in the study.

The present study attempted to incorporate aspects of all three major types of non-experimental, quantitative research: cross-sectional, comparative, and longitudinal. First of all, the study was similar to most other studies in this research area in that it included a cross-sectional component (i.e., some of the information it collected about the participants was from a single point in time). Secondly, the study was comparative in the sense that the participants were separated into three different groups according to their

level of literacy; these groups, in turn, were compared on a variety of variables. In addition, males and females were compared on the variable of literacy attainment.

Separating the participants into groups based on literacy levels allowed for a straightforward and orderly comparison on a number of variables. The idea for such a comparative research design came from the previously mentioned Coe and Oakhill (2011) study into the relationships between British children's reading ability and their text messaging behaviour. The participants in this study were divided into two groups: 'better readers' and 'poorer readers' (p. 7). The purpose of the study was to compare these two groups on several specific behaviours connected to text messaging.

Thirdly, the present study also attempted to integrate a longitudinal component by incorporating a semester-long course project based on several of the most crucial research questions. Due to timetabling conflicts at the school between the course project and provincial exam preparations, the project was pared down to six weeks in length (from the proposed twelve weeks). Even the initial twelve weeks would have probably been insufficient for providing the extended period of time (i.e., often estimated as one academic year) required for an effective longitudinal study, with six weeks definitely falling short. However, the repeated observations of a number of key variables that the course project made possible undoubtedly enhanced the internal reliability of this study.

As previously mentioned, there have been only a few longitudinal studies (Wood et al., 2011b, 2014b) undertaken in the area of research connected with texting and literacy. There is also a scarcity of studies that have explored the potential impact of traditional forms of reading and writing on literacy over time. The inspiration for including a longitudinal component in this study, albeit in a restricted fashion, came from the dearth of such potentially informative studies in this general area of research. More longitudinal studies that are sufficient in length for observing changes in literacy development would most certainly benefit this sphere of inquiry.

3.4.1. Study Details

This section, providing detailed information about study specifics, will describe the following: the sample population chosen for this research, the procedure used to

organize the study, the methods and instruments utilized to collect and collate data, and the statistical procedure applied to analyze data.

Participants

The sample population selected for this study included 93 students between the ages of 15 and 17. This sample size was similar to those in many of the studies in this research area, and was sufficient to allow for appropriate statistical tests to be conducted. As with the vast majority of the empirical research into the associations between texting and literacy, both genders were almost evenly represented, with 47 females and 46 males taking part. The students were from two grades (grade ten and eleven) in the same secondary school in Qingdao, Shandong Province, People's Republic of China (PRC). The students were Chinese by nationality and second language English learners. All of the students owned a cell phone and all were familiar with text messaging.

The school was a British Columbia (BC) offshore secondary school that delivered a grade ten through twelve BC program to Chinese students who planned to enter North American universities. The school had an enrolment of approximately 300 students. BC-certified teachers taught all the courses at the BC school in English. The BC school was physically located in and partnered with a much larger Chinese secondary school. In addition to the regular BC school program, students also took courses, taught in Mandarin, which followed the local Shandong Province curriculum. Both the BC Ministry of Education and the Shandong Bureau of Education certified this dual Chinese-Canadian secondary school program. The tuition fees at this private BC school were considered high in the PRC; as a result, students that attended this school were generally from upper-middle class families.

There were several reasons for choosing these participants and this particular context to carry out the research. First of all, the Principal Investigator had worked previously at similar BC offshore schools in the PRC. This particular school was also the location where a close contact of the Principal Investigator was employed as the principal. This individual agreed to act as a Research Associate for this study and to provide support as required. Secondly, the participants were very much alike in terms of

age, cultural background and socio-economic status; as a result, these variables were not selected for further examination in the study. These similarities among participants reduced the potential for confounding factors in terms of these important characteristics. Finally, in general, there was a significant range of abilities evident in terms of literacy development in students at BC offshore schools. The links between literacy development and texting, reading and writing practices can be more readily identified in a cohort with diverse aptitude levels.

Procedure

Prior to carrying out this research, both the BC school and its partner Chinese school provided official letters of permission for the research study. Official approval to carry out this study was also granted by the Office of Research Ethics (ORE) at Simon Fraser University in Burnaby, BC, Canada. The Chinese school also provided confirmation that this research study met Chinese research ethics standards.

Participants for the study were recruited through emails sent by the Research Associate at this school. Students as well as their parents received emails that outlined the details of the study in attached assent and consent forms (see Appendix A). An official translator at the school translated these assent and consent forms from English into Mandarin. Students and parents were asked to sign the assent/consent forms at a parent-student meeting if they agreed to the conditions outlined therein.

The assent/consent forms highlighted that there were no risks associated with this study for participants, third parties, or researchers. These forms provided confirmation that the identity of students was to remain confidential at all times and the information that was collected was to be stored on a password-protected computer, and in a locked filing cabinet, in the office of the Principal Investigator. Participants were also informed that the information obtained would be properly destroyed within two years of the study. In addition, the forms clarified that participants and third parties were able to request the results of the study from the Principal Investigator.

Only those students that voluntarily agreed to take part in the study (and received signed parental consent) were included as participants. Students were given the option

to not take part in the study, without penalty, and to discontinue their participation in the study at any time. As it turned out, all the students in the classes that were chosen for the study received parental consent and agreed to participate in the study. From the outset, the Research Associate assigned each student a participant identification (ID) number; this made it possible for the identity of the students to remain confidential throughout the study.

This BC offshore school also granted official permission for the Principal Investigator to access school records as pertaining to the literacy levels of the participants. The participants' English Language Arts (ELA) grades and ELA 10 BC provincial exam marks (if available) were analyzed. Achievement in ELA courses was chosen as a primary literacy measure since this was the school subject most directly focused on developing and assessing the English reading and writing skills of students.

As only the grade eleven students in the sample population (i.e., approximately half of the total sample) had already written the ELA 10 BC provincial exam, exam marks were only used for these students. In the case of the grade eleven students, an average mark was calculated using the following three equally weighted measures: ELA 10 final mark, ELA 10 provincial exam mark, and ELA 11 first semester mark. For the grade ten students, the ELA 10 first semester mark was utilized to determine their literacy level.

It is worth noting that the working definition of literacy being utilized for this study, as outlined in Chapter One, is aligned with the overriding BC Ministry of Education (i.e., the jurisdiction under which the participating school in this study falls) curricular aim for ELA courses from grades eight to twelve:

The aim of English Language Arts is to provide students with opportunities for personal and intellectual growth through speaking, listening, reading, viewing, writing, and representing to make meaning of the world and to prepare them to participate effectively in all aspects of society (BC Ministry of Education, 2007, p. 2)

There is an inclusion of a variety of media (e.g., not only reading and writing but also viewing and representing) in this curricular aim and an explicit acknowledgement of the continued importance of more traditional forms of literacy as well. As the OECD (2013)

definition of literacy (see Chapter One) highlights, although various digital media warrant inclusion, the focus in terms of literacy development *per se* should be on written texts, which also make up a large majority of the recommended resources in the ELA curriculum.

ELA grades were also chosen as a primary literacy measure since they represent an average of a student's literacy-related work over a semester (or several semesters), as opposed to performance on a particular test at a specific point in time. In addition, as behaviour issues and truancy are negligible at this school, the ELA mark these students received was almost exclusively based on their academic achievement in the course. Based on their achievement in ELA (and unbeknownst to them), students were divided into three groups: 'high' literacy level; 'average' literacy level; and 'low' literacy level. It is worth noting that these literacy level allocations were relative to the specific context of this BC offshore school in the PRC; although, in principle, offshore schools are expected to follow the same curriculum and standards as other BC schools, considering the ESL context, there is an overall tendency toward more lenient grading.

The average ELA marks of the participants ranged from 50 percent to 89 percent: students at or above 75 percent were placed in the 'high' group; those below 60 percent in the 'low' group; and those at or above 60 and below 75 percent in the 'average' group. The percentage amounts of 60 and 75 were chosen as the cut-off points between the groupings since this allowed the top two groups to have approximately the same range of percentages (i.e., about 15 percent) represented. In addition, these separations allowed all the students with a mark below the "C" level (i.e., C representing a letter-grade level of 'satisfactory' in BC provincial schools) to be included in the low group. The literacy-level allocations were further examined and validated by the participants' ELA teacher, as well as the principal at the school.

The study did not collect information about age, ethnicity, or socioeconomic status, as these variables were generally consistent across the sample population, and were not being evaluated. Information about students' gender was collected, as this was one of the variables to be considered. At the outset of the study, the Research Associate

sent the Principal Investigator participant identification (ID) numbers along with information regarding the gender of each student.

Data Collection

Part One: Questionnaire

In order to ascertain details related to these adolescents' texting, reading, and writing practices, a twenty-item 'Literacy-Related Practices Questionnaire' (see Appendix B) was administered to the participants during one of their ELA classes. In the two-page questionnaire, participants were asked about weekly habits in terms of texting, Internet use, book reading, and writing in both English and Mandarin. They also distinguished between voluntary and involuntary (i.e., school-assigned) forms of reading and writing, and estimated the degree to which reading was encouraged in their homes as they were growing up. The final section of the questionnaire included questions connected to some other common daily habits such as watching TV, listening to music, gaming, and exercising.

Students were given as much time as needed to complete the questionnaire, with all students who were present from each of the classes completing within an hour. The ELA teacher and Research Associate monitored the students during this time, ensured that they used the proper ID numbers, and helped clarify any questions that arose related to the questionnaire items. No questionnaire data were collected for students who were absent during the period when the questionnaires were completed. Once completed, the questionnaires were handed in to the Research Associate, who gathered all the forms from each of the classes and subsequently sent them en masse to the Principal Investigator.

Part Two: Class Project

After collecting the baseline data above, a twelve-week long, graded course project was set up in the students' ELA class through collaboration with their teacher (as mentioned previously, due to logistical constraints the duration of the study was later reduced to six weeks). Students formed 'teams' consisting of two students, or in a few cases (when the total number of students was not even), three students. As a result of

the small group sizes, in which the pair or 'buddy' system was applied, every student was responsible for tracking their specific partner's texting, reading, and writing practices.

Having larger groups did not seem to be necessary or desirable in this case, since even in a larger group every student would (most likely) still be responsible for just their partner. It also seemed more likely that if one student was working diligently tracking another student's behaviours, then that other student would feel compelled to act in kind. Indeed, having larger groups would probably have led to greater confusion in terms of individual responsibilities and accountability.

Students were asked to fill in a 'Literacy-Related Practices Project Form' (see Appendix C) at the end of each of the six consecutive weeks for which the project lasted. The information that students were asked to focus on was determined from the findings of the literature review for this study. Previous empirical studies had shown that reading, in the traditional sense, was the practice that had shown the strongest and most consistent (positive) associations with literacy development; the empirical evidence was much more mixed relating to the associations between texting and literacy. Alas, comparisons between more traditional forms of reading and digital ones are rarely found within the areas of research connected with texting and literacy, or 'new literacies' in general. Therefore, for the project, the students were asked to focus their attention on two particular habits, time spent text messaging and time spent reading books and articles. For both the texting and reading activities, as was done in the questionnaire, information regarding the language that was being utilized was also collected. It was hoped that having students focus on a few specific activities performed by a partner would improve the accuracy of the reporting.

Each student also submitted a random sample of two English-language text messages that their partner sent during the week as well as provided the name of a book which their partner spent time reading. (Of course, these sections would not be applicable to those whose partners, in that particular week, did not send any such text messages or who did not take part in any book reading). In future studies, text complexity measures could be applied to more systematically analyze and compare the

specific content in such text messages and books. At the end of the project, each team received a mark based on their thoroughness and timeliness in performing the tasks outlined above. Probably at least partly due to the fact that the project work was being evaluated, most students followed the instructions provided and the project forms that were filled in were generally complete.

Data Analyses

As mentioned above, the questionnaire data were collected by the Research Associate and sent to the Principal Investigator. The information obtained from the questionnaires was examined, collated, and transferred to a spreadsheet. If students provided a range of values as their response to a question, then the mean value was entered (e.g., 15-20 would be entered as 17.5). A separate table was created on the spreadsheet for each of the different literacy level groupings.

The data for each of the literacy levels were organized into the following columns:

1. Student ID number;
2. Gender (1=male; 2=female);
3. Literacy Level (1=low; 2=average; 3=high);
4. Text messages sent per week;
5. Text messages received per week;
6. Texting time;
7. Percent of texting in English;
8. Internet time;
9. Online instant messaging time;
10. Online reading time;
11. Percent of online reading in English;
12. Percent of online writing in English;
13. Book-reading time;
14. Percent of book reading in English;
15. Percent of book reading assigned by teachers;
16. Book reading encouraged at home (scale of 1-10);
17. Writing time;
18. Percent of writing in English;
19. Percent of writing assigned by teachers;
20. TV/video/movie time;
21. Music time;
22. Gaming time; and
23. Sports/exercise time.

Once the course project was completed, the Research Associate sent all the forms from the six weeks of the project to the Principal Investigator. The data pertaining to each student's texting time and book-reading time from the course project forms were examined, collated, and transferred onto the original spreadsheet file. The quantitative data found in this now completed spreadsheet were statistically analyzed using SPSS 22

(Statistical Package for the Social Sciences) software and the results can be found in Chapter Four.

For the statistical analyses of the research questions, both a *Kruskal-Wallis H test* and a one-way ANOVA test were performed. Prior to that, exploratory data analysis had shown that the variables in this study were not normally distributed. Contrary to the one-way ANOVA test, the *Kruskal-Wallis H test* is a non-parametric method and therefore does not assume a normal distribution of the variables. In general, although the one-way ANOVA test assumes (at least approximately) normally distributed variables, it can nevertheless be a relatively robust procedure when it comes to the assumption of normality. Both tests were performed but the results for the *Kruskal-Wallis H test*, with no normality assumption required, were the ones emphasized throughout the statistical analyses. It bears mentioning that the overall results (for all the research questions) obtained from these two tests were nearly identical.

Triangulation was used to help validate the research data through cross verification of the information obtained from the two different research instruments: the questionnaire and the course project. Having multiples sources was useful in identifying some key regularities in the research data.

3.5. Assumptions and Limitations of Study

This study was based on a distinct set of assumptions and was limited due to various factors. It would be useful at this point to clarify some of the key assumptions and limitations of this study:

3.5.1. Assumptions

1- Students were able to provide honest and reasonably accurate estimations of their weekly habits in their self-reports.

2- English Language Arts (ELA) marks, in combination with ELA standardized test scores (if available), were accurate reflections of a student's overall literacy level.

3- Students' literacy levels stayed the same over the course of the study.

4- Students did not have any physical impairment (e.g., visual, auditory, or motor) that would influence the extent of their text messaging or other behaviours.

5- English literacy is best developed through activities that involve the use of the English language.

3.5.2. Limitations

1- The sample for the study was selected from grade ten and eleven high school students from one specific institution.

2- The sample for the study consisted of students from predominantly upper-middle class families.

3- The results obtained in this study could be simply reflections of sampling anomalies related to the specific year or local population examined.

4- The study utilized data obtained from self-reports of weekly activities.

5- The course project was carried out over a limited period of time (i.e., six weeks).

6- Only the grade eleven students (i.e., approximately half of the sample) had written and received a mark for the ELA 10 B.C. provincial exam at the time of the study.

7- Besides level of literacy, other factors (e.g., attendance, participation, or rapport with teacher) may have influenced the marks received by students in their ELA classes.

8- The questionnaire data were cross-sectional and thus could only be used to assess associations (and not causal inferences) between variables.

9- A text complexity measure was not utilized in this study due to constraints of time and resources.

10- The literature review failed to locate any studies that specifically considered texting and literacy trends in China.

11- The assessment tools used to evaluate the standard of literacy applied in the study inevitably place greater value on particular types of literacy-related practices over others.

3.6. Research Questions

Prior to considering the results of the statistical analyses, it is worth reiterating the research questions that were addressed in this study, and analyzed in detail in the next chapter:

1- Are there differences among adolescents with low, average and high literacy levels in terms of the frequency and the time spent text messaging?

2- Are there differences among adolescents with low, average and high literacy levels in terms of the time spent reading books/articles either in hard copy, electronically or online?

3- Are there differences among adolescents with low, average and high literacy levels in terms of the time spent writing in 'non-messaged' formats such as essays and letters?

4- Besides texting/reading/writing practices, are there differences among adolescents with low, average and high literacy levels in terms of the amount of time spent on other common weekly habits?

5- Are there differences among adolescents with low, average and high literacy levels in terms of the amount of time spent texting (course project data)?

6- Are there differences among adolescents with low, average and high literacy levels in terms of the amount of texting time (course project data) plus amount of writing time assigned by teachers?

7- Are there differences among adolescents with low, average and high literacy levels in terms of the time spent reading books/articles either in hard copy, electronically or online (course project data)?

8- Are there gender differences among adolescents with low, average and high literacy levels?

9- Are there differences among adolescents with low, average and high literacy levels in terms of the total time spent on all English activities?

10- What are the optimum literacy levels' predictors among adolescents?

The null hypothesis for research questions 1 to 9 was, by definition, the following: there is no significant relationship between the variables under consideration. Question 10 is open-ended and the null hypothesis in this case was that there are no predictors of adolescent literacy. The null hypotheses were assumed to be true unless statistical tests showed otherwise. The results presented in Chapter Four will indicate whether or not a significant relationship was found (i.e., whether or not the null hypothesis was rejected) between the variables being analyzed in each research question.

3.7. Summary

The primary purpose of this study was to investigate associations between adolescents' literacy levels and the practices of texting, reading, and writing. Other potential contributing factors in terms of literacy development, such as gender and common daily habits, were also taken into account. Similarly to much of the research previously performed in this and related areas of study, a non-experimental, quantitative approach was utilized. Also analogously to previous related research, this study incorporated a predominantly cross-sectional, correlational type of research design.

Therefore, the present study yielded useful information about particular associations (or lack thereof) between literacy levels and specific practices, but did not generate conclusive evidence regarding causality, or the direction of any observed association(s). Primarily due to reasons of accessibility and sociocultural homogeneity, the participants chosen for this study were adolescent students at a Canadian secondary school in the PRC. The participants, prearranged into three English literacy level groupings, provided information relevant to this study through a detailed questionnaire, as well as through a six-week-long course project carried out in their English Language Arts class. The pertinent numerical data collected was collated onto a spreadsheet and statistically analyzed using SPSS software. The statistical analyses compared the results on a variety of variables for the three literacy level groups; these findings were used to address, in turn, each of the ten research questions. An elucidation of some of the key assumptions and limitations of this study was also included in this chapter.

Chapter 4. Findings

The sample for this study consisted of adolescent students who were Chinese by nationality, first language Mandarin speakers, and second language English learners. The focus of this study was on the English language literacy of these students. One of the assumptions of this study was that English literacy is best developed through activities that involve the use of the English language; as a result, texting, reading and writing activities were apportioned according to the language utilized. The statistical analyses done on the data were centered on the amount of texting, reading, and writing that was done *in English*. In addition, prior to presenting the results, it would be prudent to mention that the data below connected directly to the research questions relate to *weekly* habits, and all the time measures are in *hours per week*.

4.1. Descriptive Statistics

As Table 1 shows, the frequency of males and females in this study was approximately equal:

Table 1. Distribution of males and females

Variable		Frequency	Percent
Gender	Male	46	49.5
	Female	47	50.5
Total		93	100.0

As shown in Table 2, the participants were grouped according to literacy level, with most of them (i.e., nearly 60 percent) fitted in average literacy:

Table 2. Distribution of literacy levels

Variable		Frequency	Percent
Literacy Level	Low	15	16.1
	Average	55	59.1
	High	23	24.7
Total		93	100.0

Although the total number of participants in this study was 93, the number of questionnaire responses that were utilized for each of the variables fluctuated from 85 to 93 (see Table 3). Responses in the questionnaires that were left blank or were illegible were not included in the data analyses; therefore, we see a variance in the number of responses for each particular variable. Table 3 also shows that Standard Deviations (SDs) for the first two variables (i.e., text messages sent/received per week) are much larger than means. A large SD (relative to the mean) indicates that the data points are distant from the mean (i.e., the mean is not an accurate representation of the data).

Table 3. Mean, standard deviation, minimum and maximum of variables

Variables	N	Minimum	Maximum	Mean	SD
Text messages sent per week	85	.00	1100.00	143.61	261.20
Text message received per week	85	.00	1100.00	163.31	283.41
Texting time	87	.00	50.00	4.00	6.78
% of texting in English	93	.00	100.00	18.37	21.35
Internet time	86	1.50	120.00	17.09	20.64
Online messaging time	89	.25	60.00	9.56	12.73
Online reading time	91	.00	40.00	5.65	7.53
% of online reading in English	92	.00	90.00	23.24	20.05
% of online writing in English	91	.00	100.00	23.37	24.15
Book-reading time	89	.50	50.00	6.93	7.29
% of book reading in English	91	.00	100.00	48.82	30.37
% of book reading assigned by teachers	89	.00	100.00	40.38	28.90
Book reading encouraged at home	91	3.00	10.00	7.71	1.83
Writing time	85	.16	50.00	5.32	6.33
% of writing in English	91	.00	100.00	64.59	30.51
% of writing assigned by teachers	92	.00	100.00	65.91	29.16
TV/Video/Movie time	93	.50	36.00	7.12	6.46
Music time	92	.00	60.00	9.46	10.01
Gaming time	93	.00	20.00	2.59	3.62
Sports/Exercise time	93	.00	21.00	8.02	5.59
Texting time (project data)	92	.00	15.70	4.31	3.45
Book-reading time (project data)	92	.80	27.50	6.18	4.51

As shown in Table 3 above, participants included information regarding how many text messages they sent and how many text messages they received per week. Upon examining the overall data distribution for these two variables, two outliers (with an estimate of 2700 for text messages sent and received, respectively, and more than double the next largest estimates) were identified and removed from further analysis. Even after removing these most extreme outliers, there were still some values that were much higher than the majority. These were not removed since there were at least

several estimates in each of the groupings that were in the same general high range (i.e., at or near a value of 1000). These remaining yet not so extreme outliers, coupled with the sufficient but not very large sample size, contributed to the large SDs found for these initial two variables.

4.2. Normality Assessment

Exploratory data analysis was conducted on the variables and revealed that these variables were **not normally distributed** (see Table 4). In order to assess normality, the *Kolmogorov-Smirnov* and *Shapiro-Wilk* were used.

Table 4. Tests of normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Text messages sent per week	.300	85	.000	.624	85	.000
Text message received per week	.319	85	.000	.639	85	.000
Texting time	.274	87	.000	.782	87	.000
% of texting in English	.200	93	.000	.825	93	.000
Internet time	.232	86	.000	.708	86	.000
Online messaging time	.282	89	.000	.547	89	.000
Online reading time	.240	91	.000	.662	91	.000
% of online reading in English	.170	92	.000	.896	92	.000
% of online writing in English	.211	91	.000	.829	91	.000
Book-reading time	.263	89	.000	.738	89	.000
% of book reading in English	.151	91	.001	.935	91	.002
% of book reading assigned by teachers	.153	89	.001	.928	89	.001
Book reading encouraged at home	.176	91	.000	.906	91	.000
Writing time	.245	85	.000	.529	85	.000
% of writing in English	.155	91	.001	.930	91	.002
% of writing assigned by teachers	.154	92	.001	.918	92	.000
TV/Video/Movie time	.222	93	.000	.764	93	.000
Music time	.265	92	.000	.617	92	.000
Gaming time	.297	93	.000	.701	93	.000
Sports/Exercise time	.155	93	.001	.869	93	.000
Texting time (project data)	.161	92	.000	.892	92	.000
Book-reading time (project data)	.150	92	.001	.740	92	.000

a. Lilliefors Significance Correction

4.3. Research Questions: Statistical Data

4.3.1. Research Question One

Are there differences among adolescents with low, average and high literacy levels in terms of the frequency and the time spent text messaging/instant messaging?

Participants estimated the number of text messages they sent and received per week. These two variables were combined into one measure: *total text messages* per week. As shown in Table 5, a *Kruskal-Wallis H test* indicates that there was **not a statistically significant difference ($p=0.05$)** in *total text messages* per week between the three levels of literacy, $H(2) = 2.249$, $p = 0.325$, with a mean rank of 34.17 for low literacy, 43.67 for average literacy and 45.88 for high literacy.

Table 5. Comparison mean rank of total text messages in three levels of literacy

	Literacy	N	Mean Rank	Test
Total text messages	Low	15	34.17	$H(2) = 2.249$ $p=0.325$
	Average	49	43.67	
	High	20	45.88	
	Total	84		

Participants were also asked to estimate how much time per week (in hours/minutes) they spent performing the following activities: texting, instant messaging, reading books/articles in hard copy, electronically or online, and writing. All times were converted to number of hours for the data analyses (e.g., 3 hours 20 minutes was recorded as 3.33 hours). For each of these activities, participants were also asked to estimate the percentage of time they spent performing the activity in the English language. A *Kruskal-Wallis H test* (see Table 6) showed that there was **not a statistically significant difference ($p=0.05$)** in *total texting/instant messaging time* per

week between the three levels of literacy, $H(2) = 1.140$, $p = 0.566$, with a mean rank 38.23 for low literacy, 46.04 for average literacy and 42.25 for high literacy.

Table 6. Comparison mean rank of total texting/instant messaging time in three levels of literacy

	Literacy	N	Mean Rank	Test
Total texting/instant messaging time	Low	13	38.23	$H(2) = 1.140$ $p=0.566$
	Average	54	46.04	
	High	20	42.25	
	Total	87		

4.3.2. Research Question Two

Are there differences among adolescents with low, average and high literacy levels in terms of the time spent reading books/articles either in hard copy, electronically or online?

In Table 7, the *Kruskal-Wallis H test* showed that there was a **statistically significant difference ($p=0.05$)** in *total time reading books/articles in hard copy, electronically or online* per week between the three levels of literacy, $H(2) = 14.955$, $p = 0.001$, with a mean rank 39.19 for low literacy, 36.80 for average literacy and 61.60 for high literacy.

Table 7. Comparison mean rank of total time reading books/articles in hard copy, electronically or online in three levels of literacy

	Literacy	N	Mean Rank	Test
Total time reading books/articles in hard copy, electronically or online	Low	13	39.19	$H(2) = 14.955$ $p=0.001$
	Average	52	36.80	
	High	20	61.60	
	Total	85		

As table 8 shows, follow-up *Mann–Whitney tests* were conducted to evaluate pairwise differences among the three groups. A *Bonferroni* correction was applied and so all effects are reported at a 0.0167 level of significance. It appeared that *total time reading books/articles in hard copy, electronically or online* per week, was **statistically different (p=0.05)** between average literacy level ($U = 219$, η^2 (effect size) = 0.45) or low literacy level ($U = 59$, $\eta^2 = 0.45$) compared to high literacy level. However, *total time reading books/articles in hard copy, electronically or online* per week was **not statistically different (p=0.05)** between average literacy level compared to low literacy level ($U = 316.15$, $\eta^2 = 0.04$). We can conclude that adolescents with high literacy level spent more time for *total time reading books/articles in hard copy, electronically or online* per week compared to adolescents with low literacy and average literacy level.

Table 8. Pairwise differences of total time reading books/articles in hard copy, electronically or online among the three groups

	Literacy	N	Mean Rank	Test
Total time reading books/articles in hard copy, electronically or online	Low	13	34.65	$U = 316.15, \eta^2=0.04, p=0.827$
	Average	52	32.59	
	Low	13	11.54	$U = 59.0, \eta^2=0.45, p=0.009$
	High	20	20.55	
	Average	52	30.71	$U = 219.0, \eta^2=0.45, p=0.000$
	High	20	51.55	

4.3.3. Research Question Three

Are there differences among adolescents with low, average and high literacy levels in terms of the time spent writing in 'non-messaged' formats such as essays and letters?

a. Writing in general

As is shown in Table 9, a *Kruskal-Wallis H test* showed that there was **not a statistically significant difference ($p=0.05$)** in *writing time (excluding texting)* per week among the three levels of literacy, $H(2) = 0.530, p = 0.767$, with a mean rank 40.38 for low literacy, 41.68 for average literacy and 45.76 for high literacy.

Table 9. Comparison mean rank of writing time (excluding texting) in three levels of literacy

	Literacy	N	Mean Rank	Test
Writing time (excluding texting)	Low	13	40.38	$H(2) = 0.530$ $p=0.767$
	Average	50	41.68	
	High	21	45.76	
	Total	84		

b. 'Assigned' forms of writing and reading

As its shown in Table 10, a *Kruskal-Wallis H test* showed that there was **not a statistically significant difference ($p=0.05$)** in *writing time (excluding texting) and book-reading time assigned by teachers per week* among the three levels of literacy, $H(2) = 0.455$, $p = 0.797$, with a mean rank 36.32 for low literacy, 39.96 for average literacy and 42.13 for high literacy.

Table 10. Comparison mean rank of writing time (excluding texting) and book-reading time assigned by teachers in three levels of literacy

	Literacy	N	Mean Rank	Test
Writing time (excluding texting) and book-reading time assigned by teachers	Low	11	36.32	$H(2) = 0.455$ $p=0.797$
	Average	48	39.96	
	High	20	42.13	
	Total	79		

4.3.4. Research Question Four

Besides texting/reading/writing practices, are there differences among adolescents with low, average and high literacy levels in terms of the amount of time spent on other common weekly habits?

In the final section of the questionnaire, participants were asked to report the number of hours per week they took part in some common leisure activities. These activities included: watching television/movies; listening to music; playing video/computer games; and exercising/playing sports. A *Kruskal-Wallis H test* (Table 11) showed that there was **not a statistically significant difference (p=0.05)** in *common weekly habits* per week among the three levels of literacy, $H(2) = 0.771$, $p = 0.680$, with a mean rank 41.50 for low literacy, 48.22 for average literacy and 45.72 for high literacy.

Table 11. Comparison mean rank of common weekly habits in three levels of literacy

	Literacy	N	Mean Rank	Test
Common weekly habits	Low	15	41.50	$H(2) = 0.771$ $p=0.680$
	Average	54	48.22	
	High	23	45.72	
	Total	92		

4.3.5. Research Question Five

Are there differences among adolescents with low, average and high literacy levels in terms of the amount of time spent texting (project data)?

The project variables that were most relevant to this study were time spent texting and time spent reading books/articles. A *Kruskal-Wallis H test* (Table 12) showed that there was **not a statistically significant difference (p=0.05)** in *time spent texting (project data)* between the three levels of literacy, $H(2) = 1.803$, $p = 0.406$, with a mean rank 38.13 for low literacy, 48.54 for average literacy and 47.17 for high literacy.

Table 12. Comparison mean rank of time spent texting (project data) in three levels of literacy

	Literacy	N	Mean Rank	Test
Time spent texting (project data)	Low	15	38.13	$H(2) = 1.803$ $p=0.406$
	Average	54	48.54	
	High	23	47.17	
	Total	92		

4.3.6. Research Question Six

Are there differences among adolescents with low, average and high literacy levels in terms of the amount of texting time (project data) plus amount of writing time assigned by teachers?

A *Kruskal-Wallis H* test in Table 13 showed that there was **not a statistically significant difference ($p=0.05$)** in *texting time (project data) plus writing time assigned by teachers* between the three levels of literacy, $H(2) = 3.010$, $p = 0.222$, with a mean rank 31.77 for low literacy, 44.11 for average literacy and 45.25 for high literacy.

Table 13. Comparison mean rank of texting time (project data) plus writing time assigned by teachers in three levels of literacy

	Literacy	N	Mean Rank	Test
Texting time (project data) plus writing time assigned by teachers	Low	13	31.77	$H(2) = 3.010$ $p=0.222$
	Average	49	44.11	
	High	22	45.25	
	Total	84		

4.3.7. Research Question Seven

Are there differences among adolescents with low, average and high literacy levels in terms of the time spent reading books/articles either in hard copy, electronically or online (course project data)?

The one-way ANOVA showed the difference in *book-reading time (project data)* between the three levels of literacy was **significant ($p=0.05$)**, $F(2, 89) = 8.40$, $p = <.001$, η^2 (effect size)= 0.32. Post hoc analyses using the *Games-Howell post hoc* criterion for significance indicated that the average of *book-reading time (project data)* was **significantly higher ($p=0.05$)** in the high literacy level ($M = 9.86$, $SD = 6.43$) than in the average literacy level ($M = 5.29$, $SD = 2.76$) and low literacy level ($M = 3.74$, $SD = 2.52$). In Table 14, a *Kruskal-Wallis H test* showed that there was a **statistically significant difference ($p=0.05$)** in *book-reading time (project data)* between the three levels of literacy, $H(2) = 23.47$, $p = 0.000$, with a mean rank 27.47 for low literacy, 42.69 for average literacy and 67.87 for high literacy.

Table 14. Comparison mean rank of book-reading time (project data) in three levels of literacy

	Literacy	N	Mean Rank	Test
Book-reading time (project data)	Low	15	27.47	$H(2) = 23.47$ $p=0.000$
	Average	54	42.69	
	High	23	67.87	
	Total	92		

According to Table 15, Follow-up *Mann–Whitney tests* were conducted to evaluate pairwise differences among the three groups. A ‘*Bonferroni correction*’ was applied. All effects are reported at a 0.0167 level of significance. It appeared that *book-reading time (project data)* per week were **statistically different ($p=0.05$)** between low literacy level compared to average literacy level ($U = 248.000$, $\eta^2 = 0.27$) and between low literacy level compared to high literacy level ($U = 44.000$, $\eta^2 = 0.62$). And also, *book-reading time (project data)* per week was **statistically different ($p=0.05$)** between average literacy compared to high literacy level ($U = 258.000$, $\eta^2 = 0.46$). Therefore, adolescents with different literacy levels displayed varied durations for *book-reading time (project data)*.

Table 15. Pairwise differences of book-reading time (project data) among the three groups

	Literacy	N	Mean Rank	Test
Book-reading time (project data)	Low	15	24.53	$U = 248.0$, $\eta^2=0.27$, $p=0.022$
	Average	54	37.91	
	Low	15	10.93	$U = 44.0$, $\eta^2=0.62$, $p=0.000$
	High	23	25.09	
	Average	54	32.28	$U = 258.0$, $\eta^2=0.46$, $p=0.000$
	High	23	54.78	

4.3.8. Research Question Eight

Are there gender differences among adolescents with low, average and high literacy levels?

As shown in Table 16, a *chi-square test* was performed to examine the relation between gender and literacy levels. The relation between these variables was **statistically significant ($p=0.05$)**, $\chi^2(2, N = 93) = 18.004$, $p = 0.000$. Clearly, females in this study tended to achieve higher literacy levels in English more often than males; males in this study tended to achieve low and average literacy levels more often than females.

Table 16. Cross-tabulation of gender and literacy levels

Variables	Literacy			Test
	Low	Average	High	
Male	13 (28.3)	29 (63.0)	4 (8.7)	$\chi^2 = 18.00$ df=2, N=93 $p=0.000$
Female	2 (4.3)	26 (55.3)	19 (40.4)	
Total	15 (16.1)	55 (59.1)	23 (24.7)	

Note. Percentages appear in parentheses below group frequencies

4.3.9. Research Question Nine

Are there differences among adolescents with low, average and high literacy levels in terms of the total time spent on all English activities?

A *Kruskal-Wallis H test* (see Table 17) showed that there was a **statistically significant difference ($p=0.05$)** in *all English activities* between the three levels of

literacy, $H(2) = 6.731$, $p = 0.035$, with a mean rank 32.30 for low literacy, 33.09 for average literacy and 48.00 for high literacy.

Table 17. Comparison mean rank of all English activities in three levels of literacy

	Literacy	N	Mean Rank	Test
All English activities	Low	10	32.30	$H(2) = 6.731$ $p=0.035$
	Average	45	33.09	
	High	17	48.00	
	Total	72		

Follow-up *Mann–Whitney tests* (see Table 18) were conducted to evaluate pairwise differences among the three groups. A *Bonferroni correction* was applied and all effects are reported at a 0.0167 level of significance. It appeared that *all English activities* were **statistically different ($p=0.05$)** between average literacy level ($U = 219.000$, $\eta^2 = 0.32$) compared to high literacy level. However, *all English activities* were **not statistically different ($p=0.05$)** between high literacy level ($U = 52.000$, $\eta^2 = 0.31$) or average literacy level ($U = 215.000$, $\eta^2 = 0.03$) compared to low literacy level. Therefore, adolescents with high literacy level spent more time on all English activities per week compared to adolescents with average literacy. There is **not a statistically significant difference ($p=0.05$)** among adolescents with low literacy level and other levels in terms of *all English activities*.

Table 18. Pairwise differences of all English activities among the three groups

	Literacy	N	Mean Rank	Test
All English activities	Low	10	27.00	$U = 215.0, \eta^2=0.03, p=0.827$
	Average	45	28.22	
	Low	10	10.80	$U = 52.0, \eta^2=0.31, p=0.115$
	High	17	15.88	
	Average	45	27.87	$U = 219.0, \eta^2=0.35, p=0.01$
	High	17	41.12	

To make the procedure understandable, a one-way ANOVA table is provided here (Table 19) to indicate how all the study's variables are different among the three levels of literacy. As shown in Table 19, only **two variables** ('Online-reading time plus book-reading time' and 'Book-reading time - project data') were **statistically significant ($p=0.05$)** among the three literacy levels.

Table 19. Mean of all variables by literacy level

Literacy				
Variables	Low	Average	High	Test
Total text messages per week	112.10 (251.35)	297.65 (490.51)	475.58 (743.58)	$p=0.201$
Texting time	0.47 (1.18)	0.76 (1.38)	0.62 (1.10)	$p=0.746$
Online-reading time plus book-reading time	318.26a (280.78)	346.29a (418.75)	867.67b (749.13)	$p=0.025^*$ $\eta^2=0.16$
% book reading assigned plus % writing assigned by teachers	109.69 (48.14)	102.49 (45.20)	112.27 (48.45)	$p=0.676$
(Internet+TV/Video/movie+Music+Gaming+Sports/exercise) time	33.33 (24.71)	43.99 (32.11)	47.18 (39.83)	$p=0.459$
Texting time (project data)	3.17 (2.20)	4.48 (3.45)	4.47 (4.03)	$p=0.374$
Book-reading time (project data)	3.74a (5.52)	5.29a (2.77)	9.18b (6.43)	$p=0.001^{**}$ $\eta^2=0.32$

Note. Means not sharing a row subscript a, b are statistically different according to the Games-Howell procedure. Standard deviations appear in parentheses below means.

η^2 = Welch's F .

* $p=0.05$.

** $p=0.001$.

4.3.10. Research Question Ten

What are the optimum literacy levels' predictors among adolescents?

Since 'literacy level' is an ordinal variable, we used *ordinal logistic regression models* to estimate the effects of explanatory variables on literacy levels (see Table 20). The most frequently used *ordinal logistic regression model* in practice is the *constrained cumulative logit model* called the *proportional odds model*. What we want to establish in the *ordinal regression* is whether there is any systematic relationship between the *explanatory variables* and the probability of being entered into literacy levels.

One assumption of *ordinal logistic regression* is no *multicollinearity* between *explanatory* variables. So, all predictor variables were checked for *multicollinearity*. The average *variation inflation factor* (VIF) for all predictors was very close to '1' and this confirms that *collinearity* was not a problem here.

Table 20. Ordinal logistic regression models

Model 1: The first ordinal regression model was completed to determine whether the odds of literacy level differ significantly for different 'genders'.

The odds for girls [0.37] on literacy level were greatly higher than for boys [7.72] with ($p < 0.50$).

Model 2: For the second model, some variables related to 'writing' were added to the first model.

The odds for girls [0.18] on literacy level were greatly higher (approximately 32 times) than for boys [5.72] with ($p < 0.01$).

Model 3: For the third model, some variables related to 'reading' were added to the two previous models.

The odds for girls [0.18] on literacy level were approximately twice that for boys [0.37] with ($p < 0.001$). The effect of gender is decreased by the 'book-reading time (project data)' variable. So, gender is not statistically significant in the third model.

Looking at the models' fit, it is shown the Nagelkerke R^2 has increased considerably (from 22.5 percent to 35.2 percent). So, the final model (Model 3) is able to better predict the outcome variable (literacy level in general). It should be noted that the test, at this point, is not talking about higher, average or lower literacy level. So, as it was recommended to examine the data using a set of separate *binary logistic regression* equations to explicitly see how the *odds ratios* (ORs) for the *explanatory variables* vary

at the different thresholds (i.e., literacy levels), the following *binary logistic regression tests* are performed (See Tables 21 and 22).

Note: The 'odds' of an event occurring are defined as the probability of an event occurring divided by the probability of that event not occurring. So, for example, the odds of rolling a six with a fair die are the probability of rolling a six divided by the probability of not rolling a six. The probability of rolling a six is $1/6$ and the probability of not rolling a six is $5/6$. Therefore, the odds for rolling a six are $1/6$ divided by $5/6$, which equals $1/5$, or 1 to 5.

The proportionate change in odds is the odds ratio (OR), and we can interpret it in terms of the change in odds: if the value is greater than 1 then it indicates that as the predictor increases, the odds of the outcome occurring increase. Conversely, a value less than 1 indicates that as the predictor increases, the odds of the outcome occurring decrease.

Therefore, in the third model, the odds of a high literacy level in adolescents who spent more time on *book reading (project data)* are **1.28 times higher** than others.

Table 21. Summary of simultaneous ordinal logistic regression models

	Variable	Model 1	Model 2	Model 3
	Literacy average	0.05	0.0496	0.338
	Literacy high	1.45	1.44	13.50
	Reference: Low literacy			
Gender	Gender girl (reference female)	0.13 (<i>p</i> =0.000)	0.178 (<i>p</i> =0.002)	0.373
Writing and texting	Total text messages per week		1.001	1.001
	Texting time in English		0.898	0.965
	Online writing time in English		0.999	0.999
	Writing time in English		1	1
	Texting time (project data)		1.006	0.988
Reading	Online reading time in English			1.002
	Book-reading time in English			1.001
	Book-reading time (project data)			1.28 (<i>p</i> =0.038)
	Nagelkerke <i>R</i> ²	0.225 (<i>p</i> =0.000)	0.237 (<i>p</i> =0.014)	0.352 (<i>p</i> =0.004)

Note: Values are odds ratios.

Table 22 is the result of *binary logistic regression*. ‘Model 1’ shows that *gender* is a good predictor of the literacy levels (high literacy level against other levels). ‘Model 1’ shows that girls are more likely to achieve high literacy than boys. The ‘OR’ tells us that girls are **7.125 times more likely** to achieve a high literacy level.

In ‘Model 2’, *book-reading time (project data)* is added to ‘Model 1’. ‘Model 2’ shows that girls are more likely to achieve high literacy than boys. Also, this model shows that one unit increase in *book-reading time (project data)* is associated with 1.296 unit increase in achieving a high literacy level. Adolescents who spent more time on *book reading (project data)* were **1.296 times (or 29.6 percent) more likely** to achieve a high literacy level than low and average literacy levels.

Nagelkerke *R*² values indicate that *gender* and *book-reading (project data) time* explains **38.2 percent of variation** of high literacy level against the other levels.

Table 22. Reporting the results of binary logistic regression

Variable	Model 1			Model 2		
	B	SE	OR	B	SE	OR
Constant	-2.351	0.523	0.095	-3.829	0.789	0.022
Gender Female (Base=male)	1.964	0.602	7.125 ($p=0.004$)	1.597	0.662	4.938 ($p=0.016$)
Book-reading time (project data)				0.259	0.089	1.296 ($p=0.004$)
2LL				76.00		
				$\chi^2 = 11.347, df=8, p=0.183$		
Nagelkerke R^2	0.200			0.382		
Classification accuracy	75.3			81.5		

4.4. Summary

As demonstrated in the results presented above, there was no significant relationship found among the variables for most of the research questions. In other words, the results for most of the research questions failed to reject the null hypothesis. As regards one of the primary foci of this study, there was no relationship found among the three literacy levels for texting time or texting frequency. The statistical analyses of the data from both the questionnaire and course project corroborated this result.

The results for several of the research questions did, however, show a statistically significant relationship that rejected the null hypothesis. The results for research question two, based on questionnaire data, showed that a statistically significant relationship exists among the three literacy groups in terms of weekly English book-reading time in hard copy, electronically or online. Further analysis indicated that the statistically significant difference only exists among the high literacy group and each of the other groups, respectively. There was no significant relationship shown between the low and average literacy groups.

Research question seven explored the same question as research question two, but utilized course project data rather than questionnaire data. The results of the statistical analysis for question seven largely corroborated the results for question two. The only difference was that the course project data showed a statistically significant difference in weekly English book-reading time in hard copy, electronically or online among *all* the groups. In addition, research question ten demonstrated that a one-unit increase in book-reading time (project data) is associated with an approximately 1.30 unit (30 percent) increase in achieving a high literacy level.

For research question nine, which compared the time spent doing all English activities for the three literacy groups, the relationship was shown to be statistically significant only between the high literacy group and the average literacy group. This was similar to the result for research question two, except in this case there was no significant relationship found among the low literacy group and either of the other literacy groups. The findings for question nine also further corroborated the statistically significant difference in book-reading time (for both project and questionnaire data) among the high literacy group and each of the other two groups.

As outlined in the results for research question eight, the relationship between gender and literacy level was statistically significant. There was a far larger proportion of females than males present in the high literacy level grouping, and the converse was true for the low literacy level. The results for research question ten show us that females were around seven times more likely to achieve a high literacy level than males. The results for research question ten also show that gender and book reading (project data) were by far the top two indicators of literacy level. These two variables explain over thirty-eight percent of the variation of high literacy level against the other two levels.

Similarly to the results connected with the practice of texting, there was no statistically significant difference found among the three literacy levels for time spent performing the following activities: going online; instant messaging; writing; watching television/movies/videos; playing video/computer games; listening to music; or playing sports/exercising. In an attempt to find other potential relationships among the three literacy levels, some of the related variables were combined and then analyzed

collectively. There was no statistically significant relationship found after combining the following connected variables: reading and writing time assigned by teachers; texting time and writing time assigned by teachers; and common leisure activities.

Chapter 5. Discussion

This study was focused on the associations between texting, reading, and writing practices, and literacy development in adolescence. One major strand of this research was related to the associations between literacy and the popular, relatively new digital practice of text messaging. Another major strand included an attempt to address what appears to be a significant gap in the literature within this area of research: namely, the potential effect on literacy of the complexity level of the written materials being employed or generated (e.g., text messages versus more traditional forms of reading and writing). This chapter will include a discussion of the key findings from the present study, as well as an elaboration on the connections between different types of reading and literacy. In addition, the broader context of research into new literacies, and its educational repercussions, will also be revisited. The educational implications of this investigation will also be deliberated on, with some key insights included in the latter portion of this chapter. Finally, recommendations for future research connected with this area of study will be presented.

5.1. Discussion: Research Questions

5.1.1. Texting and Literacy

As shown in the results for research questions one and five (see Chapter Four), and utilizing the data from both the questionnaire and course project, there were no significant relationships discovered between text messaging frequency and literacy level. This is a similar result to that obtained by Kemp (2010) and Massengill-Shaw et al. (2007) who found no significant relationship between text messaging frequency and literacy in their respective samples of undergraduate students. In a cross-cultural context, this result is also consistent with several Dutch studies (Spooren, 2009;

Radstake, 2010, both cited in Verheijen, 2013) that found no significant relationships between adolescents' texting frequency, or other digital practices, and literacy levels.

As mentioned in the literature review, studies that have looked into the associations between literacy and the texting frequency of secondary school and/or undergraduate students have generally received inconsistent results. For example, Grace et al. (2014) observed a positive relationship for one of the undergraduate sub-groups in their study, and a negative relationship for the other. Drouin (2011) observed a positive correlation between the text messaging frequency of university students and literacy scores whereas De Jonge and Kemp (2012) found a negative correlation in their study of secondary school and university students. Rosen et al. (2010) found a positive relationship between adults' texting frequency and informal writing skills but a negative relationship as relates to formal writing skills. For younger, pre-teen age groups, several studies (Coe & Oakhill, 2011; Plester et al., 2008) have discovered a negative relationship between text messaging frequency and literacy scores.

Considering the mixed results of previous research into this particular area of study, the lack of a significant finding for research questions one and five is certainly not surprising. One plausible explanation for such inconclusive results could be that texting frequency is not as crucial a factor in literacy attainment as other mediating variables. One would expect far more unity in the results if texting frequency were having as large an impact, either detrimental or beneficial, on literacy as some of the opponents (and proponents) of digital technology are suggesting. In addition, it should also be kept in mind that the different samples and variable methodologies of these studies could be contributing to such contradictory results as well. Indeed, as outlined in the description of study limitations in Chapter Three, there are various aspects of the methodology used in this particular study that may have also weakened the reliability and validity of the results.

Even though the results from this area of study are far from consistent, some of the researchers in this field seem to be suggesting that there exists a general consensus as relates to texting and literacy; they propose that texting is beneficial or at the very least not detrimental to the development of literacy (see, for example, Wood, Kemp, &

Plester, 2013). Indeed, a lot of the empirical research does in fact show a positive or neutral correlation between texting, and especially textese use, and literacy skills. However, it must also be acknowledged that there is a significant amount of empirical research that has obtained a negative result. A more accurate synopsis of the research results up to this point would be to describe them as mixed and inconclusive.

Underlying much of the research in this area of study, in an ostensible binary opposition to media reports, there tends to be the assumption that texting is contributing to literacy development in a positive way. Students who are texting are assumed to be more engaged with written language than they were before, using it in new, playful, and imaginative ways. Wood et al. (2009) illustrate the common perspective for researchers in this area of study, by overtly presupposing that the widespread problems with low literacy levels are *in spite of* the contribution of texting and not *because of* it.

In the previously mentioned intervention study involving British children, Wood et al. (2011a) observed no significant difference between the control and experimental groups in terms of literacy attainment during the ten-week intervention period. In their discussion of results they explicitly revealed the result that they were expecting: “The lack of significant positive benefits is striking given the previous literature on the subject, which has shown significant concurrent associations between textism use and literacy development” (p. 33-34). Such a statement, typical for this area of research, reveals some of the key assumptions held by many of the researchers.

First of all, this statement makes the incorrect suggestion that an overall consensus exists in this area of research in terms of a clear association between the use of textese and higher literacy. Our literature review has shown that the research results have been far from conclusive, especially if we consider all age groups. Secondly, considering the dearth of intervention or longitudinal studies in this research area, and the far from consistent results of those that have been performed, it seems presumptuous to expect to observe ‘significant positive benefits’ on literacy from the use of textese. There is no convincing evidence presented that suggests that, if there is indeed a positive association between these variables, the causal contribution is less likely to be in the other direction. In other words, it appears just as plausible, if not more

so, that increased use of textese (and especially greater proficiency with textese) is the result of higher literacy, and not the cause of it.

Another key point that needs to be reiterated also pertains to the methodologies that have largely been applied in this area of research. An essential concept that is sometimes conveniently swept aside when researchers attempt to generalize their findings is that correlation does not imply causation. This important maxim needs to be kept in mind when analyzing the results from the predominantly correlational types of studies in this area of research. Therefore, even if some of the studies do show a positive correlation, this does not imply that texting itself is necessarily beneficial to literacy.

In another previously cited study, Thurlow and Poff (2011), ironically, just as they accuse the media of doing but with a contrasting conclusion, also provide a simplistic and misleading generalization of the connections between texting and literacy. In their one-sentence summary of the research into this area of study, they write: “Some of the most explicit (and conclusive) research on the issue of standard literacies comes from Plester and her colleagues, which reveals a *positive* [emphasis in original] relation between texting and literacy” (p. 7). There is no mention here of what exactly makes these studies the ‘most explicit and conclusive’ nor any indication of other studies that have drawn different conclusions. Furthermore, there is no differentiation between the practice of text messaging and textese use, nor any discussion of varied results for different age groups. The correlational nature of the limited number of studies used to support this claim is also not made explicit, nor is the fact that even the researchers mentioned have obtained relatively mixed results.

We need to be wary of simplistic, binary-based views on new digital technologies. Just as the media tends to focus on the perceived detrimental effects of texting on literacy, many researchers in the field tend to assume the opposite. As the research into this issue makes clear, this is a complex issue that needs to be approached critically and with the broader societal context in mind. Biased, unsubstantiated claims in both the media and research literature do little more than confuse matters.

It should also be recognized that the amount of research that has been completed in this area of study is still quite limited. More research needs to be performed before any firm, informed conclusions can be drawn regarding the links, if any, between text messaging and literacy skills. Indeed, a number of researchers in this field of study have submitted that the potential effects of texting practices and textese on literacy are not very well understood yet and more research is definitely required (e.g., Wood et al., 2009). Moreover, this area of study could also benefit from a more diverse range of researchers approaching these issues from a more varied set of perspectives.

5.1.2. Reading and Literacy

The variable in this study that consistently, for both the questionnaire and course project data sets, showed a positive relationship with literacy attainment was book-reading time. This variable was specifically defined as time spent reading books and/or articles in English in hard copy, electronically or online. In short, it was a comprehensive measure of how much time students spent reading materials in English of a presumably more complex nature (i.e., excluding text messages and instant messages). The various similarities and differences between reading material in hard copy, electronically (e.g., e-books) or online were beyond the scope of this study but provide yet another potentially fruitful avenue of research connected with new literacies.

The significant positive relationship between book-reading time and literacy attainment discovered in research question two, using questionnaire data, was further confirmed in research question seven, where course project data was utilized. In addition to gender, book-reading time was shown to be the only other key indicator of literacy level. This was especially evident at the uppermost levels of literacy attainment, as a significant correlation was most consistently shown to exist between book-reading time and literacy at the 'high' literacy level (relative to one or both of the other literacy levels). Moreover, such a result also indicates that reading books, articles, and other more complex materials is probably especially important for the development of more advanced forms of literacy.

This finding could also help explain the differential outcomes, as pertains to texting and literacy, observed in the various age groups that have been studied. The generally more positive result for younger age groups could be a consequence of literacy development, at lower levels, being more readily influenced by any kinds of reading materials, including text messages. As literacy levels rise, however, the impact of text messages may be diminishing due to the lower complexity level (relative to books) of their content. Although seemingly plausible, more studies that include samples consisting of a wider range of age groups are required to further test this possible explanation for the age discrepancies.

The positive associations found in this study between traditional forms of reading and literacy attainment are consistent with the existing literature (e.g., Mol & Bus, 2011; Stanovich, 1993), as previously discussed, that suggests a favourable effect of print exposure on literacy. It is important to emphasize that the debate on the associations between texting and literacy is different from the general consensus that exists on the positive relationships between exposure to print and literacy. It seems that an important question has been overlooked in the research area connected with texting and literacy. Is exposure to any kind of written language sufficient, or does an improvement in literacy require being exposed to gradually more sophisticated forms of language? Our study results, among others in the exposure to print research area, suggest that the complexity level of the language utilized is indeed important; the practice of reading text messages, for example, does not appear to be exhibiting the same consistency in terms of positive associations with literacy development as the practice of reading books.

5.1.3. Gender and Literacy

The findings in this study for research question nine highlight the disparity between females and males in terms of literacy attainment for this sample of secondary students. The result is consistent with previous research (e.g., OECD, 2001, 2002) that has shown that for all age groups, females tend to achieve higher literacy scores than males. Since females made up the large majority of participants in the highest literacy grouping, and this group displayed substantially higher levels of book-reading than the groups with average and low levels of literacy, one can infer that there was also a

significant gender gap in terms of time spent reading books. Once again, such a result is consistent with previous research (e.g., Clark, 2013, Renaissance Learning, 2014) that has regularly shown that girls tend to read more books than boys.

What appears to be clear from the present study, once again consistent with previous studies, is that the gender-specific level of print exposure is a key factor in the gender variation in literacy attainment. Exploring other potential reasons for this gender gap is beyond the scope of this discussion, but this phenomenon is definitely worthy of further study and deliberation. Indeed, a more thorough exploration of the roots of such gender differences would likely help elucidate the primary reasons for the disparities in literacy attainment among young people, as well as the whole population, in general.

5.1.4. Other Habits and Literacy

Two daily practices potentially impacting literacy development that have received substantial emphasis in the literature, as outlined in Chapter Two, are text messaging and book reading. This study also focused in particular on these hypothetically influential habits. Besides the practice of texting and more traditional forms of reading, this study also considered the potential effect on literacy of various other, less commonly investigated, habits.

From the questionnaire data, there were no significant relationships discovered for research question three between the amount of (non-messaged) writing that students regularly do and their literacy scores. This was bit surprising considering that research (e.g., Clark, 2014) into the associations between writing and literacy has generally shown that good writers tend to write more than poor writers. However, as indicated in the literature review, the amount of research into the links between writing and literacy is limited. Furthermore, there have also been studies that have shown no significant improvements in literacy from merely increasing writing quantity (Lee, 2001; Varble, 1990). Although no relationships were found in this study, further explorations of possible associations between amount of writing performed and literacy levels are required.

In addition, there were also no significant associations found between the amount of writing (and reading) assigned by teachers, and literacy. As the participants were students at the same school and had the same teachers for all their academic subjects, consistency in the amount of assigned work was expected. This particular result, acting essentially as a control for this study, provided support for the validity of the questionnaire results. In addition, this finding also lends support to the notion that leisure reading amount is a more critical factor in literacy development than assigned reading amount.

Texting has been considered by some researchers (e.g., Crystal, 2008) in this field of study as a similar activity to more traditional forms of writing. To analyze whether texting time (i.e., as it involves a form of writing) coupled with more traditional forms of writing may be having an impact on literacy levels, these two variables were combined in research question six. There was no significant association found between these combined variables and literacy attainment, suggesting that the amount of writing being performed is not having a critical impact on the development of literacy, even if writing is defined in such an expansive manner.

The findings for research question four, based on questionnaire data, yielded no significant relationships between a variety of common daily habits (e.g., watching television; listening to music) and students' literacy level. This result supports the notion that these activities are likely not the most crucial determinants of literacy development. Although outside the scope of this study, further exploration of the present-day impact on literacy of other pervasive digital practices, such as television watching and computer gaming, coupled possibly with comparisons of the effects of more traditional print-based media, would be useful.

Other important factors that need to be noted in terms of potential influences on the overall results of this study are the ethnicity and cultural background of the students. As mentioned previously, all the students were of Chinese ethnicity, living in the PRC, and second language English learners. This study has provided useful data for this particular context, of which there is a very limited amount, at least in terms of research that has been published in the English language.

Future comparative studies in this research area, using similar sample populations (i.e., in terms of age and socioeconomic status) from different countries, could help clarify the specific contributions of ethnicity and cultural background. For the time being, considering the largely overlapping patterns observed in international studies into youth texting and reading practices, as well as the rampant globalization of (youth) cultures, it appears that the growing similarities across cultures tend to trump the inevitable differences. Further study is needed to confirm this supposition, as well as to compare the effects of literacy-related practices on first and second language learning (in English, and other languages).

5.2. Discussion: Types of Reading and Literacy

In the research connected with texting and literacy, there is often mention of the ostensibly negative treatment that texting is receiving in the media. It appears that one of the key aims of many researchers in this field of study is to dispel the notion that texting does harm in terms of the development of literacy. Much of the literature on this topic concludes, somewhat complacently, that even if no clear positive associations exist, at the very least there do not appear to be any obvious negative associations either (e.g., Wood et al., 2014). As our own research has shown, whether or not texting is having a negative effect on literacy is far from clear. Either way, a further clarification on whether or not there is a negative impact would still leave us with limited useful information as to what practices could actually benefit the development of literacy, and by association, education in general.

Indeed, in many of the studies into the associations between texting and the development of literacy (and/or new literacies), the emphasis is almost always more on the technological practice itself, as opposed to literacy *per se*. By changing the focus from literacy itself to the technology being utilized, the central research question often becomes the following: are these digital practices deleterious to literacy development? The far more challenging and important question, relating to whether or not these common digital practices significantly improve literacy, is placed in a subordinate position. In so doing, much of the research into texting and literacy implicitly devalues a critical question: how can we best improve literacy?

Contrary to the texting and literacy area of study, research into exposure to print, as outlined in the literature review, has revealed clear positive associations between reading, in the traditional sense, and literacy development. As described in Chapter Three, more studies of an experimental and/or longitudinal nature would be required to conclusively confirm the specific direction(s) of these observed associations. The positive relationship between reading books or other more formal written works, and literacy attainment, was further supported by the results of this study. However, research into texting and literacy, including the investigation here, has thus far not provided any convincing evidence to suggest that texting is likely beneficial to literacy, and certainly no evidence to suggest that it is nearly as effective as traditional forms of reading.

Yet studies into the associations between exposure to print and literacy are currently far less prevalent than investigations into the relationships between literacy and texting (or various other digital practices). For example, there has been a limited amount of follow-up research done on the work of Stanovich and colleagues (see Chapter Two), even though their research has provided some critical findings as pertains to literacy development. In fact, the texting and literacy studies often include references to this research; however, these references do not always appear relevant to that particular context.

When suggesting possible mechanisms for a potentially positive causal relationship between texting and literacy, researchers in this field often mention that this may be due to the increased exposure to print that texting affords (e.g., Powell & Dixon, 2011; Wood et al., 2011a). Considering the significant differences between texting and more formal forms of reading and writing, such a claim is based on what appear to be essentially unfounded assumptions. After all, the research into the associations between print exposure and literacy has only considered the potential impact of more traditional forms of reading.

As described in the introductory chapter, there has been much discussion in a variety of research areas connected with the definition of literacy. Many researchers suggest that we need to reconsider the definition in light of the ongoing, rapid technological transformations going on in our society. The concept of 'new literacies' has

been one of the results of these semantic debates. From the investigations undertaken in this study, it seems that there are concepts that are perhaps even more in need of a reformulation than literacy itself, namely 'reading' and 'writing'.

As touched on earlier, text messaging is a novel form of communication that involves the practices of reading and writing, in a broad sense. However, the reading and writing involved in texting is certainly different from how these practices have traditionally been conceived (see, for example, Carr, 2011). Texting is much more conversational-like than these traditional forms; as a general rule, the messages are brief, usually spontaneous, and often do not follow standard grammatical conventions. Traditional forms of reading usually involve passages that are much longer, more carefully developed, and thus often contain more sophisticated levels of language. The generally rapid, superficial reading/scanning that occurs while texting varies considerably from the slower and deeper traditional forms of reading. Therefore, it seems specious to equate the reading that occurs through texting with that which occurs through the reading of books or other more complex works.

Studies utilizing text complexity measures would be useful to irrefutably confirm what many would consider self-evident: there are some key distinctions between the content students are normally exposed to in text messages to that which they encounter in more formal pieces of writing. All the written work one is exposed to inevitably falls on a continuum in terms of its depth and complexity level. Indeed, considering the diverse array of contemporary writing genres, it appears probable that text messages could be assembled into larger works such as novels. However, it is highly unlikely that collections of text messages, characterized by brief and spontaneous outbursts, will ever reach the complexity level found in many other written works.

And yet, many of the researchers in the area of study connected with texting and literacy continue to assume that the more students are reading and writing (regardless of the actual content), the better it is for literacy. In contrast, the results from this study support the notion that literacy development can be optimized only if the intricacy level of the reading and writing is taken into account. Utilizing increasingly more complex written materials, coupled with expert mediation, is almost certainly necessary for moving

students to gradually higher levels of language development (Vygotsky, 1978). It seems manifest that reading Dickens or Dostoyevsky, or even a magazine or newspaper article, will do much more for the mind, and thus for literacy, than reading a succession of brief descriptions of, say, what your friend plans to do on a particular day.

In turn, it is this higher level of literacy, connected with a greater understanding of key cultural concepts, that helps mediate students' abilities to use new technologies in meaningful ways (Warschauer, 2007). Therefore, by stressing new literacies at the expense of the traditional form(s), many researchers and educators are essentially putting the cart ahead of the horse. It is doubtful that greater understandings will develop without a fundamental grounding in the key language-based terms and concepts of our culture(s). As practices such as text messaging increase, and book reading declines, so does the opportunity to engage with the rich language and profound ideas found in high quality literature (Birkerts, 2006, 2010; Solway, 1997). The appeal of the 'bells and whistles' of our digital technologies appears to be compromising our invaluable capacity for engaging in silent, sustained contemplation (Carr, 2011; Jacoby, 2008).

Reading, in the deeper traditional sense, is associated with reflection and contemplative thought. Such thinking is not usually geared toward some specified end; it is essentially an intransitive and non-instrumental form of thinking (i.e., thinking for its own sake). It is exactly this kind of thinking that appears to be most threatened when the time spent skimming material online or texting friends exceeds, by far, the time we spend reading books, and reflecting. Indeed, the more time we spend performing the former activities, the less adept we become at maintaining the kind of attentive focus required to enter a deeper realm of contemplation (Carr, 2011).

As Birkerts (2010) puts it: "The reader who reads without directed concentration, who skims, or even just steps hurriedly across the surface, is missing much of the real point of the work; he is gobbling his foie gras" (p. 42). Considering the amount of time we currently spend using digital technology, it appears likely that there will be a significant transfer of the predominant habits of mind created therein onto other realms of our daily lives. Once such habits of mind start to prevail, such as skimming through whatever it is

we are reading, even the limited amount of time we do spend reading more complex works could lose many of its potential benefits.

Yet many researchers and educators, seemingly caught up in the ever-expanding momentum of technological change, fail to make this critical distinction between types of reading. For example, as described in the review of the literature for the texting and literacy field, many researchers elevate even one of the most truncated forms of screen reading (i.e., text messaging) to equal status with slow reading. Bauerlein (2008b) describes such a comparison as a “strange flattening of the act of reading” that:

equates handheld screens with *Madame Bovary*, as if they made the same cognitive demands and inculcated the same habits of attention. It casts peeking at a text message and plowing through *Middlemarch* as subsets of one general activity. And it treats those quick bursts of words and icons as fully sufficient to sustain the reading culture. (p. 4)

One of the key premises of this study was that varied reading formats and media likely have differential effects on literacy development. Reading complex novels, untangling metaphors in poems, or pondering philosophical arguments appear to be quite distinct practices from the kind of reading that usually occurs on screens (with the possible exclusion of e-books), especially when one considers ultra-brief formats such as text messages. Beyond conceptual arguments, there also appears to be significant empirical support for differentiating between the types of reading (i.e., skimming/scanning) involved in digital practices such as texting, and slower, deeper forms of reading. This study, among others, has shown that exposure to print appears to have significantly more positive associations with the development of standard literacy than exposure to digital practices, such as texting.

5.3. The Broader Context: New Literacies

In addition to the links between specific types of reading and literacy, another important strand of this study was a consideration of how concepts such as literacy, and the more recent ‘new literacies’, are currently being defined and examined. Indeed, a

consideration of the strengths and limitations of research into new literacies in general will help contextualize the findings from this study. As mentioned previously, this is a burgeoning area of research that encompasses studies into digital practices such as texting. Included herein will be an elaboration on the practical educational consequences of the new literacies approach. This will be followed by a discussion of some of the educational implications of this particular study.

As described previously, the definition of new literacies promoted by theorists in this field of study, importantly, takes into account the multifaceted and deictic nature of this concept and the modern world in general. From an educational standpoint, what seems especially useful about such a definition of new literacies is the implied emphasis on students being prepared to continuously learn new concepts, as opposed to simply concentrating on the present-day requirements. In addition, the dual-level theoretical framework utilized by new literacies research provides a promising model for dealing with the complexity of the concept as well as the multiplicity of findings in this research area.

Whereas the development of literacy, in the traditional sense, implies years of structured, sequential study, induction into the new technology-assisted representational systems is accessible to children as well as adults. Digital media utilize mimetic representation (e.g., screens, moving images, quick cuts, etc.) and mythic narrative (e.g., binary oppositions, story forms) to make messages accessible and engaging to a wide variety of audiences, including the very young. In fact, many students are much more skilled with these new technologies than their teachers. In general, young people enjoy working with digital technology and are coming into the classroom with plenty of prior knowledge connected with new literacies. Research into new literacies has been able to take full advantage of the passion that youth, and many researchers for that matter, share for digital media.

Several of the key scholars in the field of new literacies have outlined what they feel are some of the critical factors that hamper their work. Leu et al. (2007) suggest that a limited body of research and an insufficient number of researchers studying these issues are some of the major drawbacks. Indeed, research into new literacies would

benefit greatly from having a more diverse set of scholars enter the field, and not primarily due to a fascination with the technology involved. Research needs to be driven more by a careful consideration of the greater social context, than by enthrallment with a particular gadget. In addition to these limitations, there appear to be several other shortcomings in the studies connected with new literacies that also require some attention.

First of all, research in the new literacies field tends to ignore or even marginalize previously valued concept(s) of literacy. An effective curriculum involves an initiation into various traditional as well as newer forms of knowledge. Students are not born with an understanding of the practices and meanings within particular cultures. A good education needs to expose students to what Oakeshott has famously described as the great cultural 'conversations' of past and present and Arnold, no less famously, has portrayed as 'the best which has been thought and said in the world' (as cited in Gutek, 1995).

As Hirsch (1988), among others, has argued, literacy in the standard sense needs to be recognized as far more than just a formal, technical skill as it requires knowledge of substantial amounts of wide-ranging, specific, quickly accessible information. In other words, the background knowledge that one possesses plays a crucial role in determining one's level of literacy. Even if one disagrees with Hirsch's much-maligned recommendations for acquiring such critical knowledge (i.e., memorizing somewhat arbitrary lists of decontextualized facts), the main argument pertaining to the importance of possessing significant amounts of cultural knowledge needs to be acknowledged.

Such cultural literacy and the amount of serious reading it requires appear to be deficient in a large proportion of youth, as the statistics outlined in Chapter One and Two, respectively, have conveyed. As described by Solway (1997), low levels of literacy are common even in university students, who are often:

lacking in substantive information, deficient in the 'schematic associations' shared by the culture in general, innocent of the protocols of reasoned thought and lucid speech, having read very little and reflected even less, not having enjoyed what Theodore Roszak

calls the 'Homeric interlude' or Umberto Eco describes as 'inferential walks in the cultural encyclopedia.' (p. 6)

The development of new literacies would benefit significantly from a greater emphasis on concepts and ideas currently best accessed through exposure to print. Schools need to foster not just the ability to develop new literacies, but also traditional print-based literacies and understandings so that students are able to scrutinize the vast stores of information online, or in books, in a thoughtful and critical way. Students need to develop capacities for critically accessing, processing, understanding, analyzing, and interpreting not only multimedia materials but also print-based materials. Furthermore, they need to develop capacities for focused, sustained concentration and silent contemplation, skills that are much more readily developed through traditional forms of reading (Carr, 2011).

Moreover, the skills and attitudes promoted by print literacy are still being developed wholeheartedly in the homes and private schools of the privileged. Students that do not develop the sophisticated thought patterns that come with advanced forms of traditional literacy are placed at a distinct disadvantage to those that do learn them. Knowledge does provide power to its possessor and our knowledge base, or 'universal cultural baggage' (see Gramsci, 1971), determines to a large extent our personal and professional prospects.

The new literacies research needs to be more cognizant of the continued importance of print-based literacies. It would be prudent to more explicitly integrate the cognitive skills and understandings inherent in the 'older' literacies into an even broader conception of new literacies. Using such a dialectic approach would help transcend previous conceptions of literacy and increase the chances that individuals from all socio-economic levels receive the best possible education.

Some researchers in the field of new literacies have implied that the easy access to an ocean of information is making the learning of content knowledge obsolete (e.g., Coiro et al., 2008). Alas, a strong case can be made that information stored outside the brain is simply data, not knowledge. Knowledge, as Wendell Berry (2003) notes, "is instantaneous; it is present when and where it is needed" (p. 150). Information that

needs to be accessed is not knowledge as such, and students lacking an adequate knowledge base are incapable of reading, writing, or thinking at higher levels.

In fact, an argument could be made that these 'new literacies' may not actually exist. There are certainly new skills that need to be learned to deal with the new digital technologies, but the literacy required may not be 'new' in any significant way. Literacy in the traditional sense has always been connected with language. It involves the transformation of written text to some kind of meaning or understanding within the mind. As we internalize new concepts and understandings, our mind is transformed and our thought processes change. This process can certainly occur through digital media as well (e.g., *Anna Karenina* will likely have similar cognitive effects, regardless of whether a print book or e-book is utilized), but the form of literacy involved remains essentially the same.

From this perspective, the content and complexity level of the written work is crucial since the meanings that are developed (i.e., *what* is decoded) are what determine the quality of thought. Therefore, content needs to be emphasized at least as much, and probably more so, than the skills (i.e., *how* the content is decoded). New literacies approaches in general assume an epistemology that is focused on skills; they tend to devalue the importance of content. This field would benefit from more explicitly acknowledging and confronting opposing perspectives, such as expressed by those theorists who argue for a single literacy (e.g., Postman, 1995), and the central role that the liberal arts should play in education (e.g., Solway, 1997).

Technology alone will not reconstruct society or education; it is the way in which it is applied (or not applied) that matters. As individuals, and as a society, we need to reflect much more deeply upon the nature and effects of new digital practices and not just accept them as a matter of course. In examining the research into new literacies, one gets the sense that some of the deeper societal issues connected with these digital technologies are, as of yet, not receiving the attention they deserve. In short, theories on new literacies would benefit from a more critical and reflective approach that displays a greater awareness of the diverse set of assumptions involved in the ongoing restructuring of education and society.

Simply because a new digital practice is widespread in society does not mean that it should necessarily be incorporated into formal educational settings as well. The other, possibly deleterious, effects of many digital practices (e.g., technology addiction; physical inactivity) need to be taken into account in addition to their potential benefits to literacy (and/or new literacies). An informed decision can only be made if one weighs out all the possible benefits and detriments of incorporating a particular technology into education and society at large. After all, these new digital technologies are potent tools that have the power to change the way we think and act (McLuhan & Fiore, 1967). It is their negative effects, often ignored due to the appeal of novelty and convenience, which could turn out to be the most significant (Postman, 1992).

To sum up, the issues surrounding the incorporation of digital media into social and educational spheres are contentious ones. The new literacies research needs to be more explicit about the controversies involved and should play a more active role in this debate. This field requires greater input from a wider range of researchers within more diverse disciplines than are currently represented. In particular, interdisciplinary approaches utilizing insights from various fields of inquiry need to gain further traction. After all, digital technology touches all aspects of our lives. Issues surrounding digital practices, and new literacies in particular, need to be approached as crucial societal debates that require comprehensive, thoughtful, and critical analysis.

5.4. Educational Implications

As shown by the studies in the area of research connected with texting and literacy, including the present study, texting is likely not as detrimental to standard literacy as suggested in many popular media accounts (and could, possibly, even have some positive effects). But compared to traditional forms of reading, the potentially positive associations between texting and literacy are far less apparent at this point in time. Assuming the continuing importance of standard literacy, this result leads one to the general conclusion that our educational system needs to encourage traditional forms of reading more, and at the same time be wary of unconfirmed technological fixes. An effective curriculum should ensure that students are initiated into more sophisticated

forms of language: a symbolic, linguistic context that enables them to communicate proficiently, read extensively, and ponder important ideas.

As the vast majority of parents and educators can attest to, when students are on their cellphone and/or online, they are far more likely to chat to their friends or jump between websites than they are to engage in deep, concentrated reading. A preference for 'surfing' as opposed to 'researching' could possibly lead to certain gains in terms of rapid mental processing, but at the expense of the deeper knowledge and understanding gained through traditional 'slow and deep' reading. As pertains to the penchants of youth, the favoured is most certainly not always the most favourable for literacy development.

As long as we, as individuals and as a society, continue to value the rewards that literacy in the standard sense provides, then we need to view the trend away from traditional forms of reading (i.e., both in terms of quantity and quality) with substantial trepidation. We need to be careful not to prematurely celebrate the unmistakable conveniences and potential cognitive gains arising from new digital practices, without first taking into account the concomitant losses.

As suggested by Ferguson (2006), an important step in ensuring that more students are ready for university and careers would be to incorporate increasingly complex reading materials, coupled with ongoing teacher support, into all secondary school courses. As described in detail in the literature review (e.g., Renaissance Learning, 2014), secondary school students nowadays receive limited exposure to books, especially challenging ones, outside the classroom. Thus, schools must take on the primary role in guaranteeing that students are exposed to a significant amount of books that are at appropriate, and gradually increasing, levels of challenge, and that will serve as adequate preparation for university studies and career responsibilities.

Teachers, especially in cases where parents are not doing so, need to push adolescents to not only read more, but also to read more materials that are both engaging and challenging to them. Such prodding needs to be done progressively and cautiously, however, as students should not be forced to read more difficult materials at the expense of comprehension. The benefits of increasing the amount and challenge

level of independent reading could be augmented through instructional support, including the use of common, effective strategies such as scaffolding and interactive discussions. In addition, students of all ages need to be provided with and encouraged to read any books that are of interest to them, regardless of the specific challenge level, in order to help initiate them into the rewarding pleasures of reading.

The written works that have been used in secondary ELA classes in the past few decades, at least in Canadian schools, have remained relatively constant (Mackey, Vermeer, Storie, & DeBlois, 2012). In order to get more students interested in reading, this canon needs to be expanded and diversified. Moreover, as the present study, among others, has shown, it appears to be the leisure-time reading levels of adolescents that are most clearly associated with literacy attainment. Being exposed to personally engaging forms of literature in class increases the likelihood that an individual student will be motivated to continue reading outside of the school context.

Considering that higher levels of literacy are most clearly related to reading in traditional formats, as opposed to digital-based ones, the low levels of book reading in adolescence are especially disconcerting. The ability to read and comprehend at a relatively advanced level is becoming a prerequisite for almost everything we do in the social and cultural realms. It seems very likely that our definition of functional literacy will need to evolve to include what are now seen as more advanced forms of literacy:

Adolescents entering the adult world in the 21st century will read and write more than at any other time in human history. They will need advanced levels of literacy to perform their jobs, run their households, act as citizens, and conduct their personal lives. They will need literacy to cope with the flood of information they will find everywhere they turn. They will need literacy to feed their imaginations so they can create the world of the future. In a complex and sometimes even dangerous world, their ability to read can be crucial. (Moore, Bean, Birdyshaw, & Rycik, 1999, as cited in Clark & Rumbold, 2006, p. 5)

In other words, significantly advanced levels of literacy are not only important for those going on to university, but also for the general population. The social landscape is being bombarded with information, much of it in written form, more than ever before. A higher level of literacy is a critical tool for making sense of the complex array of written (and other) materials encountered in the various spheres of our lives.

The existing low levels of functional literacy in modern society, especially considering the relatively modest standard currently applied (see OECD, 2013), definitely provide a cause for some trepidation. The development of sufficiently high levels of literacy in youth needs to be an ongoing priority in schools, as well as in homes. Placing too much emphasis on unconfirmed technological solutions appears to be diverting our attention from a verified, 'tried and true' practice: reading books.

As this study (amongst many others) has reconfirmed, the value of reading for pleasure, in the traditional sense, cannot be overstated. Krashen's (1993) commentary summarizes many of the key associations between reading books and literacy that the research into print exposure has revealed:

When children read for pleasure, when they get 'hooked on books', they acquire, involuntarily and without conscious effort, nearly all the so-called 'language skills' many people are so concerned about: they will become adequate readers, acquire a large vocabulary, develop the ability to understand and use complex grammatical constructions, develop a good writing style, and become good (but not necessarily perfect) spellers. Although free voluntary reading alone will not ensure attainment of the highest levels of literacy, it will at least ensure an acceptable level. Without it, I suspect that children simply do not have a chance. (p. 85)

Considering the importance of continually evolving digital technologies in our society, new literacies need to be acknowledged and proportionately addressed in schools. However, in order to ensure that the sophistication level of new literacies moves beyond such practices as superficial PowerPoint presentations or plagiaristic cutting and pasting from the Internet, standard literacy needs to be developed concomitantly. Greater understandings in terms of new literacies, as for essentially any sphere of learning, requires a fundamental grounding in key language-based, cultural concepts. Continuing to value literacy in the standard sense will not only likely lead to gains in reading and writing proficiency, but also in the related level of cultural knowledge, all of which "strongly mediate students' ability to make use of the Internet to find and use information or create meaningful multimodal content, whether in school or in out-of-school settings" (Warschauer, 2007).

5.5. Recommendations for Future Research

It is hoped that this study will help inform further deliberation and research on these important issues. Here are some specific recommendations for helping enhance the validity of findings in *similar future research*:

1- Have students provide data from cell phone service providers in terms of number of text messages sent and received, as opposed to self-reports.

2- Use a culture-specific Author Recognition Test (e.g., Cipielewski & Stanovich, 1992) to determine levels of book reading, as opposed to self-reports.

3- Utilize a more diverse set of reliable measures for determining the literacy level of each student.

4- Separate types of 'reading' and 'writing' into a wider range of specific formats (e.g., Clark, 2013, 2014), as opposed to using more general categories such as 'traditional' and 'screen-based'.

5- Incorporate an experimental and/or longitudinal study design (over the course of at least one academic year) in order to explore possible causal relationships.

6- Include a larger sample size of students from different schools and locations within a particular geographical region.

7- Systematically analyze (i.e., using a validated text complexity measure) the specific content and complexity level of the text messages produced, and compare the results to those for traditional print media being utilized.

Before any definitive conclusions can be reached regarding the effects of practices such as reading, writing, and texting on literacy, more investigations are required in a variety of research areas. Here are some recommendations for more *general directions of research*:

1- More studies into texting and literacy that further analyze age and gender differences, such as more research that incorporates a broad range of age levels, and further explorations into reasons why girls tend to read and write more than boys.

2- More studies that consider texting within its broader context, as opposed to in isolation from other literacy-related practices.

3- More current research into the potential effects of traditional reading and writing on literacy, complemented by an exploration of the specific impact of text complexity.

4- More studies into new-literacy related practices but not at the expense of exploring other potentially significant influences on literacy development. For example, it would be prudent to carry out studies that compare the literacy impacts of exposure to print with those of other digital practices (e.g., television watching; computer gaming).

5- More comparative studies that systematically consider the issues surrounding texting and literacy from a cross-cultural perspective. These studies would not only extend the knowledge base in this research area, especially in terms of cultural influences, but would also help consolidate some of the previous findings.

6- More investigations into the differences between reading on screens and reading on paper. After all, factors such as actually touching paper, being able to flick pages back and forth, and scribbling notes in the margins could all possibly affect the level of comprehension of a piece of writing. For instance, in a recent Norwegian study, Mangen, Walgermo, and Bronnack (2013) found that reading on a computer screen involves unique strategies that generally lead to lower levels of reading comprehension than reading on paper. More explorations into the differences between reading materials on screens versus reading on paper would be especially useful considering the recent boom in the popularity of e-books.

7- More studies comparing the impact of literacy-related practices on first and second language learners.

5.6. Conclusion

The findings from the present study are consistent with some general trends found in the research literature connected to practices potentially influencing the development of literacy in youth. This study showed that text-messaging practices do not appear to be significantly associated with literacy in this adolescent population sample; reading in the traditional sense, on the other hand, exhibited more positive links with literacy attainment than all the other practices considered. These findings, similarly to previous research, suggest that the type of reading that is occurring while texting is substantially different, in terms of its associations with literacy, from more traditional forms of reading. Further support for this notion can be found in various interdisciplinary analyses that have explored the differential impact of various digital and print-based media on literacy, and cognition in general.

The level of functional illiteracy in the North American context, among others, appears to be reaching epidemic levels. The necessary linguistic and intellectual tools required to adequately function in our complex, highly-literate societies are not being sufficiently developed in many of our homes or schools. Reversing this troubling trend will involve not only an acknowledgement that overall literacy levels need to be improved upon, but also a recognition that standard forms of literacy, involving key language-based concepts, continue to play a crucial role in society. Research into new literacies has provided useful information regarding the societal impacts of particular digital practices, but has thus far yielded few insights into how standard literacy can be further enhanced.

There is significant empirical, and theoretical, support for the notion that reading, in the traditional sense, is likely a beneficial practice to the development of literacy in adolescence, as well as in other life stages. The disturbingly low amount of book reading that is currently occurring across societies (and particularly in adolescence), coupled with the reduced complexity level of the materials that are being read, has resulted in a virtual disarming of this potent weapon against functional illiteracy. On the other hand, digital practices are on the rise worldwide (and especially in youth) but as epitomized by

this investigation into texting, the various deleterious implications are far more evident at this point than potential positive impacts on literacy.

To sum up, considering the hyper-complex, information-saturated modern milieu, inadequate levels of functional literacy, coupled with a reduced emphasis on practices strongly linked with literacy gains, are definitely a cause for concern. As Chris Hedges (2009) warns in *Empire of Illusion: The End of Literacy and the Triumph of Spectacle*: “The more we sever ourselves from a literate, print-based world, a world of complexity and nuance, a world of ideas, for one informed by comforting, reassuring images, fantasies, slogans, celebrities...the more we are destined to implode” (p. 189-190).

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Appendix A.

Application number: [...]

Participant ID# _____

Faculty of Education, Simon Fraser University

8888 University Drive, Burnaby BC, Canada V5A 1S6

Assent Form

The University and those conducting this research study subscribe to the ethical conduct of research and to the protection at all times of the interests, comfort, and safety of participants. This research has received ethics approval and is being conducted under permission of Canada Qingdao Secondary School, Qingdao No. 9 High School, and the Simon Fraser University Research Ethics Board. Canada Qingdao Secondary School has provided written approval for this study to recruit students from the school and to have access to school records where consent has been granted by both the student and his/her parent. The Board's chief concern is for the health, safety and psychological well being of research participants.

Title: *A study of texting, reading and writing practices and the development of literacy in adolescent learners at a Canadian high school in the PRC.* Principal Investigator: Dmitri Zebroff, PhD Candidate, Faculty of Education, Simon Fraser University; Supervisor: Dr. David Kaufman, Professor, Faculty of Education, Simon Fraser University

Goal. The goal of this study is to explore the associations between text messaging, and other reading/writing practices, and the development of literacy in adolescent learners. Results from this study will be included in the forthcoming thesis of the Principal Investigator.

Benefits of the study. This study will inform current practice (and future work) on the associations between various practices, such as reading and text messaging, and literacy development.

Procedure. You will complete a literacy-related practices questionnaire, which will take approximately 30 minutes. Your student records such as subject grades and provincial exam results will also be analyzed for this study. Later, you will take part in a project in your English Language Arts class where you will monitor and record the texting/reading/writing practices of one of your classmates. By signing this form, you will be consenting to the use of all school records pertaining to your grades, exam marks, and evaluation, in addition to the questionnaire and project responses.

Provision of confidentiality. Your identity will remain confidential at all times and no students will be identified in the final report. The information that is collected will be stored on a web server and computer (both password protected), as well as in a locked filing cabinet, for a period of two years in the office of Mr. Dmitri Zebroff (address - [...]). The data collected will then be destroyed.

Risks. There are no risks associated with participation in this study. If you refuse to participate or withdraw after agreeing to participate, there will be no adverse effects on your grades, or evaluation in the school or classroom, or enrollment.

Comments can be addressed to, and requests for results can be obtained from: Mr. Dmitri Zebroff, address - [...], email - [...], phone - [...]; and/or Dr. David Kaufman, address - [...], email - [...], phone - [...].

All concerns or complaints with respect to participation in this research project can be sent to Dr. Dina Shafey, Associate Director of Research Ethics, address - [...], email - [...], phone - [...].

By signing this form below, you confirm that you:

1. Understand what is required based on the above information
2. Understand that your participation is voluntary and you are free to withdraw at any time
3. Understand the provisions for confidentiality

Print Name _____

Signature _____ Date (dd/mm/yyyy) _____

Application number: [...]

Student's Name _____

Faculty of Education, Simon Fraser University

8888 University Drive, Burnaby BC, Canada V5A 1S6

Consent Form

The University and those conducting this research study subscribe to the ethical conduct of research and to the protection at all times of the interests, comfort, and safety of participants. This research has received ethics approval and is being conducted under permission of Canada Qingdao Secondary School, Qingdao No. 9 High School, and the Simon Fraser University Research Ethics Board. Canada Qingdao Secondary School has provided written approval for this study to recruit students from the school and to have access to school records where consent has been granted by both the student and his/her parent. The Board's chief concern is for the health, safety and psychological well being of research participants.

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Risks. There are no risks associated with participation in this study. If you refuse to allow your child to participate or withdraw your child's participation after agreeing to

participate, there will be no adverse effects on your child's grades, or evaluation in the school or classroom, or enrollment.

Comments can be addressed to, and requests for results can be obtained from: Mr. Dmitri Zebroff, address - [...], email - [...], phone - [...]; and/or Dr. David Kaufman, address - [...], email - [...], phone - [...].

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By signing this form below, I confirm that I:

1. Understand what is required based on the above information
2. Understand that my child's participation is voluntary and I am free to withdraw my child at any time
3. Understand the provisions for confidentiality

Print Name _____

Signature _____ Date (dd/mm/yyyy) _____

Appendix B.

Literacy-Related Practices Questionnaire

Participant ID# _____

Texting Habits:

On average, how many text messages do you send per week?

On average, how many text messages do you receive per week?

On average, how much time per week do you spend texting? (include HOURS/MINUTES for all 'time' questions)

What percentage (0-100%) of your texting is in English?

Internet Use:

On average, how much time per week do you spend on the Internet?

On average, how much time per week do you spend instant messaging online (include msn, facebook, twitter, etc.)?

On average, how much time per week do you spend reading online materials that are not instant messages (e.g., articles, blogs, wikipedia, etc.)?

What percentage (0-100%) of your online reading is in English?

What percentage (0-100%) of your online writing is in English?

Book-Reading Habits:

On average, how much time per week do you spend reading books (in regular or electronic formats)?

What percentage (0-100%) of your book-reading is in English?

What percentage (0-100%) of your book-reading is assigned by your teachers (not voluntary)?

On a scale of 1-10, how much was reading encouraged in your home when you were a child?

1: Not encouraged at all; 10: Constantly encouraged

Writing Habits:

On average, how much time per week do you spend writing material that is not instant messaging (e.g., essays, journal entries, blogs, etc.)?

What percentage (0-100%) of this writing is in English?

What percentage (0-100%) of this writing is assigned by your teachers (not voluntary)?

Other Habits:

On average, how much time per week do you spend watching TV/movies/videos (include online viewing)?

On average, how much time per week do you spend listening to music?

On average, how much time per week do you spend playing video/computer games?

On average, how much time per week do you spend playing sports or exercising (include walking)?

Appendix C.

Literacy-Related Practices Project Form (Week)

My Partner's Student Number:

You are asked to write about your partner. All information should be in complete sentences.

A) How much time did your partner spend text messaging? B) What percentage of this time was in English?

e.g., Nabiros spent X hours texting. X% of this time was in English.

C) Write two text messages (if any) that your partner wrote in English.

e.g., 1. "I'll message from Beijing that all okay." 2. "Where r u?"

A) How much time did your partner spend reading books or articles? B) What is the name of the book (if any) your partner is reading? C) What percentage of time was spent reading in English?

e.g., Nabiros spent X hours reading books and articles. He's reading *Sophie's World*. He spent X% of his time reading in English.
