

**Towards Optimizing Independence and Life Skills (TOILS):  
A Five-Year Study of Text Messaging with Adolescent Deaf Students**

**Final Report**

**26 January 2009**

**C. Tane Akamatsu, Ph.D.**

**Connie Mayer, Ed.D.**

**Shona Farrelly, B.A., B. Ed**

### **Key Findings**

- Text messaging increases independence, social development and employability
- Text messaging improves literacy for functional purposes, such as instant messaging and informal communication, if literate communicators are in the deaf student's "circle of communication".
- Future research areas include
  - How early can deaf students benefit from text messaging?
  - What curriculum could help deaf students using this text messaging achieve their potential
  - How do text messaging and literacy interact

## **Towards Optimizing Independence and Life Skills (TOILS):**

### **A Five-Year Study of Text Messaging with Adolescent Deaf Students**

The TOILS project was born of necessity. Five years ago, one of the writers of this article was the head of the deaf department in a large urban high school. Parent/family workshops revealed parents' concerns regarding the safety of their teen-aged children because of difficulties with distance communication, since the children were unable to call for help, access emergency services, or even report a change in plans. This resulted in social isolation of the children, which in turn left them with restricted opportunities for independent problem solving and socialization. As well, the teenagers' demands and needs for privacy could often not be met because of these safety concerns.

The students' concerns revolved around development of their own independence. Because the literacy skills of most deaf and hard of hearing students at the high school were limited, many were unable to communicate effectively through print. Because they were often accompanied and directly supervised by their parents at later ages than is typical in our society, the students voiced dissatisfaction with their opportunities to make decisions for themselves, be responsible for their actions, and have some freedom.

These sentiments are not unusual. Adolescence is typically described as a period marked by family conflict as the adolescent becomes aware of the need to develop both an individual identity and gain independence from parental control. Within the family, conflicts typically revolve around everyday issues such as homework, chores, personal hygiene, activities, friends, and such, and although they are ongoing, rarely escalate into

altercations serious enough to cause dysfunction (Acock & Bengtson, 1978; Lamb, Hwang, Ketterlinus, & Fracasso, 1999; Youniss & Smollar, 1985).

It has long been noted in the literature that deaf adolescents are delayed in social development relative to their hearing peers (Calderon & Greenberg, 2003; Greenberg & Kusché, 1993). This delay has been attributed to parental restrictions on activities outside the home due to worries about their child's inability to communicate, their whereabouts and their general safety. It is worth noting that, because in this setting the literacy skills of most deaf students are quite limited, they are unable to communicate effectively through print.

Our research, in combination with that of others' (Power & Power, 2004; Power, Power & Horstmanhoff, 2007; Rhone & Cox, 2002), suggests that the use of two-way text text messagers with students in high school settings can increase independence and, to some extent, a functional literacy skill.

The current study was designed as an initial foray into the use of two-way text messaging technology as a way of increasing the independence of deaf adolescents and reducing their parents' anxiety about their safety and responsibility. The advantage text messagers have over electronic mail (instant messaging, in particular) is that while text messagers allow direct one-to-one communication (as did teletype (TTY) machines for the previous generation), they are also compact, easily portable, and do not require a disruptive technology, making them superior to TTYs.

What follows is a brief review on the communication, social and emotional development of deaf children. The point of this selective review, which is in no way comprehensive, is to suggest reasons why the development of independence skills is an

issue in the deaf adolescent population. Research on the social and emotional development of deaf children repeatedly suggests that the crux of deaf and hard of hearing students' developmental challenges is communication, whether face to face, across distances (e.g., telephone), or through writing (see the following reviews: Marschark, 2001; Moores & Meadow-Orlans, 1990; Paul, 1998). This communication challenge also manifests itself in delayed socialization since social skills depend so heavily on the ability to communicate clearly and effectively with a wide variety of people.

While it may appear obvious that deafness would have a negative impact on the development of spoken language, the communication difficulties that deaf children experience go far beyond a lack of spoken language. Teaching profoundly deaf children to read what is fundamentally a spoken language is extremely difficult, and has not met with much success. It is well documented that the average deaf high school leaver typically reads at about the Grade 4 level (Moores, 1996). Such a low level of literacy leads to chronic underemployment (reviewed in Moores, 1996), and overall lifetime incomes substantially lower than for the normally hearing population.

Substituting sign language for spoken language has its own set of problems. At a very basic level, Siple (1997) suggested that the fact that deaf children who are taught to sign must also deal with the complexities of communicating through the visual modality. The development of any language requires the fundamental ability to establish joint attention, and doing this in the same modality as that in which the language is occurring (e.g., pointing and signing) actually requires more metacognitive skill than simply pointing and saying a word. Deaf parents are more capable at doing this than hearing

parents (Erting, Presizio & O'Grady Hynes, 1990; Siple, Akamatsu, & Loew, 1990; Swisher, 1991, 1993), but less than 10% of deaf children are raised by deaf parents. Because the vast majority of deaf children are raised by hearing parents, they experience not only later language development, but also language learning conditions that are less than ideal. First, their parents may not sign or may not sign well. Second, other than their teachers fluent in sign language, they have very few adult language models. Third, their sphere of socialization is limited; they have each other – also immature language models.

The effects of deafness, and its consequent communication difficulties, also spread to the development of social awareness and social skills. Deaf children raised by deaf parents have been found to have experienced more consistent parenting, effective communication, and less stressed social environments than deaf children of hearing parents (Greenberg & Kusche, 1987). However, the social milieu of all deaf children is necessarily limited to those who can communicate with them effectively. This has a negative impact on the development of knowledge and skills that allow the development of social (and academic) independence (Greenberg & Kusche, 1987). Meadow (1976) intimated that the delay that many deaf children exhibit in the dependence of a variety of developmental skills may be the result of inappropriate attributions on the part of their parents. To wit, the parents may misinterpret the inability to hear and speak as the inability to do many other skills. Moreover, several studies have shown that mothers of deaf children tend to be more controlling and “intrusive” in their interactions with their children, often because of their inability to communicate effectively through verbal means (see, e.g., Gregory, 1976; Lederburg, 1993).

The impact of a lack of depth and breadth of language and socialization opportunities also affects the mental health of deaf children and youth. Deaf children have been shown to be less socially mature and display impulsivity than hearing children, possibly because they have not been taught to delay gratification because their parents typically have not been able to explain the need to do so. They also display more egocentricity and lack in the ability to take another person's perspective (Altshuler, et al., 1976; Harris, 1978; Moores, 1996; Schlesinger & Meadow, 1972). More recent research aimed at "unpacking" deafness, language/communication ability, and personality factors suggests that deaf children do have the ability to take another's perspective, but do not necessarily carry over this skill in their interpersonal interactions (Cates & Shontz, 1990; Kusche & Greenberg, 1983). This tendency toward social immaturity and impulsiveness may have implications for safety in childhood and adolescence.

This very brief review suggests that deafness and its consequent communication difficulties impacts the social and academic development of deaf children and adolescents in a number of ways, and it is not surprising that the parents of the deaf adolescents in Toronto District School Board (TDSB) high schools are expressing concerns that have long been discussed in the research literature. This project aims to address concerns, which center around the deaf adolescents' development of some independence and personal autonomy, while balancing their parents' concerns for their safety and responsible decision-making. Amongst normally hearing teenagers, the telephone becomes a lifeline through which they maintain social contact with both peers and parents. Because using traditional telephone service is not available to deaf students, TTYs are often not available or cumbersome at best, and cell phones do not work with

TTYs. Text messaging is a viable alternative for distance communication between deaf teens and their parents.

Text messaging allows deaf people to text message both among themselves and with hearing people. The advantage that text messaging has over electronic mail (instant messaging, in particular) is that the equipment needed is compact, easily portable, and already in use by the hearing population. Furthermore, text messaging appears to have given rise to a new genre of writing in English, “with minimal or no syntax or tense and other morphological markers and a limited lexicon of phrases and messages familiar to senders and receivers” (Power & Power, 2004, p. 335), thus bypassing many of the difficulties that deaf students typically exhibit with English writing.

#### The partnership

The Rotary Club of Toronto Eglinton, continuing its long practice of supplying the Toronto District School Board (TDSB) with technological devices for deaf and hard of hearing students, provided initial funding for translation of letters to parents who did not have English as a first language. Rotary also provided contacts with Motorola, CI Investments, General Electric, and Bell Canada.

Initially, Motorola donated 250 two-way PageWriter 2000X Motorola text messengers, and Bell Canada donated 5 years of monthly services and maintenance and repairs. (Three years into the project Bell dismantled their pager service which we were using for text messaging, so a switch was made to Blackberry devices, which were donated by CI Investments and General Electric.) Including not only the three school sites in the TDSB but also York University, Toronto, which provided research time and expertise, this represents the largest educational partnership in the district.

Because the school board could not monitor student usage of the pagers, the board was not responsible for any risk that may result from changes in students' behaviours as a consequence of pager use. If any of the project staff became aware of student behaviour that indicated a risk of harm to self or others, normal school board procedures regarding the protection of students were followed.

### Project objectives, Research questions and hypotheses

The purpose of this project is to investigate the use of text messaging with deaf and hard of hearing students in a secondary school setting, and to consider the possible impact of their use with respect to developing literacy and independent living skills. Our initial goal was to find out whether students will make use of the pagers to communicate with their family, with their teachers, and with each other.

1. Would the students use text messaging, and to what extent? Before we could make any claims about independence and literacy skills, we needed to establish whether the students will use text messaging. We expected that students would use this technology, but the extent to which they use it would depend on their and their parents' literacy skills in English.
2. Did the amount of independence the students experience increase with pager use? We expected that the students will be allowed to go out independently (i.e., without their parents) more often and more frequently if they used text messaging to their parents' satisfaction.
3. How satisfied were the students and parents with this technology? We hoped that parents and students would be satisfied, but the extent of satisfaction

would be dependent on their English literacy skills. We also expected that the parents' concerns about safety would be alleviated somewhat with text messaging.

### Data collection

The Rotary Club of Toronto Eglinton, continuing its long practice of supplying the Toronto District School Board (TDSB) with technological devices for deaf and hard of hearing students, provided initial funding for translation of letters to parents who did not have English as a first language. Rotary also provided contacts with Motorola, CI Investments, General Electric, and Bell Canada.

Initially, Motorola donated 250 two-way PageWriter 2000X Motorola pagers, and Bell Canada donated 5 years of monthly services and maintenance and repairs, and provided us with the number of text message per device per month. Including not only the three school sites in the TDSB but also York University, Toronto, which provided research time and expertise, this represents the largest educational partnership in the district. In addition, questionnaires and interviews with the participants provided the rest of the data.

The project took place at two large inner-city public high schools and in grade 8 of their feeder school. Participants in the study included

- All 90 students in the deaf and hard of hearing programs at the two high schools and grade 8 of the feeder school.

- Seventeen staff members of the deaf departments at the two high schools. The staff at both schools included deaf, hard of hearing and normally hearing individuals.
- Ninety-five parents or guardians of the students. All of the students' parents were hearing.

The students represented multiple cultures, and many came from homes where English was either not spoken or not spoken much. Some of the students communicated orally, and others through sign (or some combination of speech and sign). Many of the parents of these students did not know enough sign language to communicate easily with their child. Moreover, the target student was typically the only deaf or hard of hearing person in his or her family. The literacy levels of the student participants were not commensurate with those of their hearing age-peers.

As participants in this project, each student and his/her parents received a two-way texting device. They also received training in how to use the equipment. The teachers at the schools also received pagers and training. All participants completed several short surveys -- one at the start of the project, one during the project, and the last one when the pilot project was completed -- and participated in annual discussion groups as new cohorts were added to the project.

Prior to actually having any experience with the text messengers, each participant filled out a survey designed to find out how he or she thought the two-way text messengers might be used. After four months of two-way text-messaging use, all participants attended a feedback meeting. They reported on how they used their text messengers and noted any changes in either their concerns or their expectations after they

had actually used the equipment. A second feedback meeting took place five months later.

Several types of data were collected. First, we tracked the number of times that each pager was used, but did not have access to the content of the messages nor to the identities of the persons to whom messages are sent. This proved to be unsatisfactory, as we were unable to verify exactly who was sending messages. That is, anyone could be using the equipment, and in some cases, we discovered that the people to whom the equipment had been issued were not necessarily the people who were actually using the equipment, particularly within families. That said, frequency of two-way text messaging use is highly variable, ranging from a handful of messages to several hundred per person per month. Given the small number of participants and the high variability in frequency of two-way text messaging use, it does not make sense to talk about “average” frequency. We do not know the reasons for this variability, but speculate that to some extent, individual students’ literacy levels might influence how likely they are to use the two-way text messagers in the first place. However, we need to analyze further the relationship between literacy levels and two-way text messaging use. We will discuss this more in the results section, below.

The timeline for the study is presented in Figure 1, below.

Figure 1. Timeline

Winter, spring 2003	Initial discussions re: partnership formation, \$500,000 and 5 year equipment and service commitment from Bell and Motorola
Fall 2003	Initial distribution of text messaging devices to first site (School

	D; training in use of text messaging devices for students, parents, staff; first round of survey data (round A)
Winter 2004	Initial distribution of text messaging devices to second site (School N); training in use of pagers for these students, parents, staff; first round of survey data for School N (Round A); second round of survey data for School D (round B); pilot with six Grade 8 students in integrated setting for half school day.
Spring 2004	Third round of survey data from School D; Second round of survey data from School N
Fall 2004	Official launch of TOILS – signing ceremony; presentation of Year 1 data
Fall 2004-Winter 2005	Survey Round C at School D; Survey round D at School D
Spring 2005	OOPS: Announcement that Bell was discontinuing their Pager Service, which we were using for text messaging; Question arose as to whether project could continue; pagers recalled
Fall 2005	SURPRISE!: Service was continued especially and only for this project, equipment was redistributed to Schools D and N
Winter 2006	Phase II Impact survey at Schools D and N; Newspaper article published
Spring 2006	Distribution of text messaging devices to Grade 8s; Phase II Impact survey from Grade 8s; Requests come in from beyond congregated deaf programs at TDSB and other school districts
Fall 2006	Current technology replaced by Blackberries;

Winter, 2007	Impact surveys focusing on change in technology
Winter and Spring, 2007	Production of DVD
Fall, 2007	Closing ceremony

### Results

**The overwhelming majority of the students expressed satisfaction with access to the two-way text technology.** Only 4 out of 90 expressed dissatisfaction. Their dissatisfaction, however, was not with the technology. These students simply wished they had “much more freedom,” and they wished they could go out more often. In these cases, the students felt that they did not experience the anticipated benefits of the technology.

Students also said they used their two-way text messengers to communicate with their parents, school staff, and each other, as well as for other purposes. Following are two typical comments, taken verbatim from the students’ written survey responses:

- “The pagers helped me to send my dad and my dad is less worry. After school I allowed to play basketball, ball hockey with friends.”
- “The pagers help me that alarm helps me to homework, meet friend, and birthday. Help me to remains medican (sic), I feel good to help me the alarm. I feel more satisfied that I have often go out somewhere.”

Many students also reported that two-way text messaging was their main link with their friends. A few became experts at text messaging and helped to run workshops for both students and parents. One even became the troubleshooter for broken equipment.

This student could identify problems and fix them so the users did not have to send malfunctioning devices back to the manufacturer for repair.

**The parents were uniformly satisfied, and were gratified that the two-way text messengers had been introduced into the deaf and hard of hearing program.**

They reported being less worried about their children. Other benefits the parents mentioned were

- being in contact with their child more often
- being more aware of their child's movements
- taking comfort in knowing they could get in touch with their child any time, and keeping connected to other people through e-mail
- An advantage to the TDSB was that in some cases students could use public transit to move between TDSB facilities rather than call a special school bus even if it was just one student.

**The staff, particularly those who were deaf or hard of hearing, also expressed uniform satisfaction.** They said they were now able to coordinate schedules more easily and to contact each other. One staff member, who was in charge of cooperative education placements off campus, wrote, "My co-op students have many questions and concerns regarding their work placements. In addition to discussing issues in class, they contact me via...telephone and TTY, ...e-mail,...[and] pager [text messaging] system." (Among the school staff, the two-way text-messaging system was often referred to as the "pager system.") It also was easier to communicate with the students and make them responsible for their whereabouts. For example, if a student could text us that they would be absent, an interpreter might not be needed for a particular class, and would therefore

be free to work with another student, or in the office. This information could be communicated easily via text messaging.

Several students did mention that the two-way text messagers motivated them to improve their reading and writing skills. A key focus for our continued research will be a consideration of the ways in which the students used text in their messages, to examine some of these texts, and to determine how students' reading and writing levels come to bear on their use of the pager. One of the challenges of moving into this aspect of the research is concern with the confidentiality of the messages and the expectation of privacy that participants have. We are currently exploring options as to how we can ethically access this sort of data.

It is also possible that parents' needs to keep track of their children might have an influence on how often a student messages the parents and vice versa. Further, we know that some of the students were able to use a regular phone (with amplification), and they might be choosing to use the phone for certain purposes and the pager for others. Other students, usually those with greater hearing losses, might be using the pager exclusively. This would also impact on the frequency of two-way text messaging use.

Low English literacy levels among many of the families may also have influenced frequency of use within the family. However, it did not stop parents from communicating as best they could in English. For example, one parent reported "it changed us better to have pager like to contact my son from pager. It did help us pagers and it helped us to know where my son is."

Additionally, English difficulties did not stop the students from paging each other, resulting in one two-way text messenger within a family recording far more calls than the

other two-way text messagers in that family. Some students did express a wish for other languages (by which they meant orthographic systems such as Cyrillic, Chinese, Tamil, etc.) to be available on the two-way text messagers.

Issues that the project seemed to address. One of the most pressing issues, both from the parents' and the students' point of view was that of developing independent living skills. Difficulties with distance communication rendered the development of independence difficult for the youth because their parents were reluctant to allow them to travel independently. The parents and students both reported that text-messagers alleviated this concern by making it easy to communicate and keep in touch with each other in a very convenient manner. Moreover, the school staff reported that the main office had communication access to deaf students and staff, which encouraged good communication with all staff and students, particularly with deaf staff.

Examples of this impact include the following anecdotes.

- One deaf student used to feel anger and didn't have a feeling of success in his life. Now that he knows how to use two way mobile text messaging well, it is his main link to his friends. This is especially important as he goes out of the school on co-op work projects. He has become an expert and is now helping to run further workshops for both students and parents. He has also become the troubleshooter for broken pagers that are sent my (vice principal) way and has been able to identify problems and correct them so they don't need to be sent away. He is also changing the software to update them for the next workshop. As a result of his successful leadership in this area his self esteem has increased remarkably. So much so that he has been assigned as a mentor and role model for an elementary school deaf student. This has been extremely successful for both students.
- The students in grade 8 are now allowed to take the subway to school in the morning, again, great for learning independence. They also page the vice principal if they are going to be late or absent, learning accountability, commitment, and communication.
- One troubled student messaged a teacher with a suicide warning. The teacher was able to contact emergency services and get this student help.

Parents had this to say about increased communication:

- It's easy to get in touch with my son. If he's out I can page him or he can page me to let me know where he is. I feel more trust[ing] letting my son go out to different places. Without the pager I feel lost with not being able to communicate with [my son].
- I can have direct contact with my kids so that if any incident happens I could page them. And obviously with pager my [life] is easier. I feel light and no tension and could have a lot of contact my children. Without the pager I feel nervous about the well being of my kids, because I won't be able contact them while they are out.
- [The pagers have] improved my ability to communicate (make plans), similar to using a telephone. With the pager I feel less anxious, more in control. Life is far less complicated; you can be more free to do more things. Without the pager I feel not a flexible, somewhat helpless since I've become accustomed to it.
- [My life is] safer and it's easy to know where the child was. Such as when my child was late to go home, I can use it to send a message to know what's going on. [It's] more convenient.
- I know where my son is at all times and that removes anxiety.

A second issue, reported mainly by students was that of social isolation. Students reported that they could call family and friends, chat, and send or leave messages. This resulted in feelings of increased connectedness among the students.

- The parent of one student passed away over the summer. This student received a lot of emotional support during this time from her friends through constant messaging.
- My mom has to go to the hospital a lot. I never knew when she was going before. Now she pages me every time she goes. Now I don't worry so much about my mother when I come home and she is not there. The bad thing is now she thinks I am old enough to make my own dinners.

A third issue, reported by all participants was that of restricted opportunities for independent problem solving by the students. The students found increased opportunities for such problem solving. For example, they noted that they could tell their teacher(s) that you will be late, text someone or use the text messagers to communicate with someone if they were lost, tell the teacher if they missed any homework, use it as a

reminder, organizer or even as an alarm clock, keep up to date with people and inform each other of any last minute changes.

- Before I had my pager, I had to go home after school before my mother would let me go out again – so I could tell her where I was going. Now I send her a message to tell her and I don't have to go home. It's so much better .... (he grins) of course, I don't always tell her where I'm really going!
- The pager helps me most by letting me talk to my hearing teacher when the interpreter is not present.
- For the first time ever, I can go on the subway by myself. My mom still pages me every 15 minutes, but boy, am I glad to go by myself.

The text messagers were used to deal with issues of safety. They were used for emergency messages, and to call in students after a fire drill. The students' concerns around privacy at school were alleviated because it was possible to send direct messages to them, so they did not need an interpreter at all times.

All participants mentioned that they used “instant messaging” (IM)-types of abbreviations in their texting. Examples from each participant group are presented in Table 1. (See Table TXT TLK on page 28)

### **The Policy Implications of Our Research**

One of the central features of the IEPs of most deaf and hard of hearing students is the requirement to make note of the accommodations that must be provided for any particular student in order for that student to have access to the program and to be successful. Particularly for students who have minimal English skills, curriculum could be developed that focused on the functional literacy that two-way text messengers allow. If it could be shown that text messengers afforded students access in the way that other

technologies have done, then it would be reasonable to suggest that two-way text messengers be added to the list of recommended accommodations.

Text messaging naturally works best among people who have at least a minimal level of English-literacy skills. We do not know what that minimum is. Low English-literacy levels among many of the families may have influenced their frequency of use. The students did express a wish that other languages (orthographic systems such as Cyrillic, Chinese, and Tamil) be available on the two-way text messengers. In any event, low English-literacy levels did not stop parents from communicating as best they could in English. For example, one parent reported, “It changed us better to have pager...like to contact my son from pager. [Pagers] did help us, and it helped us to know where my son is.”

As a result of seeing the safety benefits to the student participants in our study, the TDSB has purchased two-way text-messaging devices for all staff working with students who are deaf or hard of hearing throughout the school board. It appears that this technology not only has much to offer deaf and hard of hearing students, but is also making an impact beyond what it was originally designed to address, either by the manufacturers or by this project.

The data collected on this project to date confirms that two-way text messaging technology is indeed useful for deaf adolescents and helps alleviate some of the concerns that have kept them from developing independence as quickly or readily as their hearing peers. There are potential policy implications for this research that need to be considered. It is the case that teachers are required to write Individual Education Plans (IEP) for the vast majority of D/HH students in the education system. One of the central features of

the IEP is making note of the accommodations that must be provided for any particular student to access the program and to be successful. Typically is it under the heading of accommodations that individualized equipment is identified. This includes “any type or item of equipment or any electronic product or system, whether commercially produced, adapted or custom-made, that the student needs” (Ontario Ministry of Education, 2004, p. 28), and would include technologies like sound field systems, TTYs, and signaling devices.

If it can be shown that text messagers afford students access, in the way that other technologies have done, then it would be reasonable to suggest that two-way text messagers should be added to this list of recommended accommodations. In fact, there is an expectation that “in addition to established accommodations, new strategies and assistive devices are constantly emerging as teaching practice is enhanced through new research and technological innovations” (Ontario Ministry of Education, 2004, p. 28). As well, an aspect of adding two-way text messagers to this list would be an expectation that they would be made available and funded by the school system. As recently as May 2005, the Expert Panel on Literacy and Numeracy Instruction for Students with Special Education Needs (Ontario) recommended that all school boards needed to create institutional structures that support responsible use of assistive technology. They went further to suggest that stating how assistive technologies are used should be a mandatory part of each district school board’s special education plan (Ontario Ministry of Education, 2005). If one accepts that this attitude is representative of other large education systems, it seems clear that further research on the use of newer technologies with the school-age population is warranted.

To extend the policy implications beyond the school board, an argument for the funding of two-way text messagers through Assistive Devices Programmes could also be made. In a climate where the rights of persons with disabilities have become central to public discourse, there is a place to think about the ways in which two-way text messagers and other such technologies provide access and remove barriers for D/HH individuals.

What began as a little pilot study to see whether high-school deaf students would use a two-way text messaging system has expanded to include middle-school deaf students and deaf staff. The demand for the system has spread to another school with deaf students (in a different school board) based on word of mouth. It would appear that this technology has much to offer deaf students, and is making an impact beyond what it was originally designed to address, either by the manufacturers or by this study.

### References

- Altshuler, K., Deming, W., Vollendeider, J., Rainer, J., & Tendler, R. (1976). Impulsivity and profound early deafness: A crosscultural inquiry. *American Annals of the Deaf*, 121, 331-345.
- Bodner-Johnson, B., Sass-Lehrer, M., Gatty, J. C., & Hafer, J. (2004). Future directions in early education for deaf children and their families. In D. Power & G. Leigh (Eds.), *Educating deaf students: Global perspectives* (pp. 114-123). Washington, DC: Gallaudet University Press.
- Bugental, D. B. & Goodnow, J. J. (1998). Socialization processes. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (5<sup>th</sup> ed., pp. 390-462). New York: Wiley.
- Calderon, R. & Greenberg, M. (2003). Social and emotional development of deaf children: Family, school, and program effects. In M. Marschark & P. E. Spencer (Eds.), *Oxford handbook of deaf studies, language, and education* (pp. 177-189). New York: Oxford University Press.
- Cates, D. & Shontz, F. (1990). Role-taking ability and social behavior in deaf school children. *American Annals of the Deaf*, 135, 271-221.
- Erting, C., Presizio, C., & O'Grady Hynes, C. (1990). The interactional context of deaf mother-infant communication. In V. Volterra and C. J. Erting (Eds.), *From gesture to language in hearing and deaf children* (pp. 97-106). Berlin: Springer-Verlag.

- Greenberg, M. & Kusché, C. (1987). Cognitive, personal, and social development of deaf children and adolescents. In M. C. Wang, M. C. Reynolds, & H. J. Walberg (Eds.), *Handbook of special education: Research and practice: Vol. 3. Low incidence conditions* (pp. 95-129). New York: Pergamon.
- Greenberg, M. & Kusché, C. (1989). Cognitive, personal and social development of deaf children and adolescents. In M.C. Wang, M. C. Reynolds, & H. J. Walberg (Eds.), *Handbook of special education: Research and practice* (Vol. 1, pp. 95-129). Oxford: Pergamon Press.
- Greenberg, M. T. & Kusché, C. A. (1993). *Promoting social and emotional development in deaf children: The PATHS Project*. Seattle: University of Washington Press.
- Greenberg, M. T., & Kusche', C. A. (1998). Preventive intervention for school-aged deaf children: The PATHS curriculum. *Journal of Deaf Studies and Deaf Education*, 3, 49-63.
- Gregory, S. (1976). *The deaf child and his family*. New York: Halstead.
- Harris, R. (1978). Impulse control in deaf children: Research and clinical issues. In L. S. Liben (Ed.). *Deaf children: Developmental perspectives* (pp. 217-234). New York: Academic
- Harris, R. (1978). Impulse control in deaf children: Research and clinical issues. In L. S. Liben (Ed.). *Deaf children: Developmental perspectives* (pp. 217-234). New York: Academic
- Kusche, C. & Greenberg, M. (1983). Evaluative understanding

- and role-taking ability; A comparison of deaf and hearing children. *Child Development, 54*, 141-147.
- Kusché, C., & Greenberg, M. (1994). *The PATHS curriculum: Promoting Alternative Thinking Strategies*. Seattle, WA: Developmental Research and Programs.
- Lamb, M. E., Hwang, C. P., Ketterlinus, R. D., & Fracasso, M. P. (1999). Parent-child relationships: Development in the context of the family. In M. H. Bornstein & M. E. Lamb (Eds.), *Developmental psychology: An advanced textbook* (4<sup>th</sup> ed.) (pp. 411-450). Mahway, NJ: Lawrence Erlbaum Assoc.
- Lederberg, A. (1993). The impact of child deafness on social relationships. In M. Marschark & D. Clark (Eds.), *Psychological perspectives on deafness* (pp. 93-199). Hillsdale, NJ: Erlbaum.
- Marschark, M. & Spencer, P. E. (2003). *Oxford handbook of deaf studies, language, and education*. New York: Oxford University Press.
- Marschark, M., Lang, H., & Albertini, J. (2002). *Educating deaf students: From research to practice*. NY: Oxford.
- Meadow, K. (1976). Personality and social development of deaf people. *Journal of Rehabilitation of the Deaf, 9*, 1-12.
- Moore, D. (date?). *Educating the deaf: Psychology, principles, and practices* (5<sup>th</sup> ed.). Boston: Houghton Mifflin.
- Moore, D. F., & Meadow-Orlans, K. P. (Eds.) (1990). *Educational and developmental aspects of deafness*. Washington, DC: Gallaudet University Press.
- Ontario Ministry of Education (2004). *The Individual Education Plan (IEP): A Resource Guide*. Toronto, ON: Queen's Printer for Ontario.

<http://www.edu.gov.on.ca/eng/general/elemsec/speced/iep/iep.html#n3>.

**Retrieved April 29, 2008.**

Ontario Ministry of Education (2005). *Education for All: The report of the expert panel on literacy and numeracy instruction for students with special education needs, Kindergarten to Grade 6*. Toronto, ON: Queen's Printer for Ontario.

Paul, P. (1998). *Literacy and deafness: The development of reading, writing, and literate thought*. Boston: Allyn & Bacon.

Power, M. R. & Power, D. (2004). Everyone here speaks TXT: Deaf people using SMS in Australia and the rest of the world. *Journal of Deaf Studies and Deaf Education*, 9, 343.

Power, M. R., Power, D., & Horstmanhoff, L. (2007). Deaf People Communicating via SMS, TTY, Relay Service, Fax, and Computers in Australia. *Journal of Deaf Studies and Deaf Education*, 12, 80 - 92.

Rhone, S. S. and Cox News Service. (2002). Pagers answer a call: Hearing-impaired people stay in touch more easily with text messaging. *The Cincinnati Enquirer*. Retrieved April 29, 2008, from

[http://www.enquirer.com/editions/2002/01/17/tem\\_pagers\\_answer\\_call.html](http://www.enquirer.com/editions/2002/01/17/tem_pagers_answer_call.html) .

Schlesinger, H. & Meadow, K. (1972). *Sound and sign: Childhood deafness and mental health*. Berkeley: University of California Press.

Siple, 1997 Universals, generalizabilty, and the acquisition of signed language. In: M. Marschark, P. Siple, D. Lillo-Martin, R. Campbell, & V. S. Everhart. *Relations of Language and Thought: The view from sign language and deaf children*.

- Cognition, Memory & Language Counterpoints series*. New York: Oxford University Press.
- Siple, P., Akamatsu, C. T., & Loew, R. (1990). Acquisition of American Sign Language by fraternal twins: A case study. *International Journal of Sign Linguistics*, 1, 3-13
- Power, M. R., & Power, D. (2004). Everyone here speaks TXT: Deaf people using SMS in Australia and the rest of the world. *Journal of Deaf Studies and Deaf Education*, 9, 343.
- Swisher, V. (1991). Conversational interaction between deaf children and their hearing mothers: The role of visual attention. In P. Siple & S. D. Fischer (Eds.). *Theoretical issues in sign language research: Psychology* (pp. 111-134). Oxford: Oxford
- Swisher, V. (1993). Perceptual and cognitive aspects of recognition of signs in peripheral vision. In M. Marschark and D. Clark (Eds.). *Psychological perspectives on deafness* (pp. 209-227). Hillsdale, NJ: Erlbaum
- Toronto District School Board. (2004). *Parents' guide to special education..* Toronto, ON: Toronto District School Board.
- Traxler, C. B. (2000). Measuring up to performance standards in reading and mathematics: Achievement of selected deaf and hard-of-hearing students in the national norming of the 9<sup>th</sup> Edition Stanford Achievement Test. *Journal of Deaf Studies and Deaf Education*, 5, 337-348.

Table 1. TXT TLK

<p><b>Students use—</b></p> <ul style="list-style-type: none"> <li>• *!!</li> <li>• 2 (to)</li> <li>• 4 (for)</li> <li>• 6r6</li> <li>• 929 [=g2g?]</li> <li>• asap</li> <li>• b (be)</li> <li>• BB</li> <li>• BRB = be right back</li> <li>• btw (by the way)</li> <li>• cum (come)</li> <li>• cuz – because/cause</li> <li>• cya – see you</li> <li>• da (the)</li> <li>• dat (that)</li> <li>• Don (don't)</li> <li>• G2G = got to go</li> <li>• GA</li> </ul>	<ul style="list-style-type: none"> <li>• gl</li> <li>• gtg</li> <li>• haha / lol - same</li> <li>• hf</li> <li>• ic</li> <li>• k</li> <li>• l8r (later)</li> <li>• latz</li> <li>• laugh</li> <li>• ll (will)</li> <li>• Lmao</li> <li>• LOL</li> <li>• LUV U</li> <li>• msfl.</li> <li>• no (know)</li> <li>• ok = okay</li> <li>• olc</li> <li>• ole</li> <li>• omg</li> </ul>	<ul style="list-style-type: none"> <li>• plz (please)</li> <li>• r</li> <li>• sk</li> <li>• skewl</li> <li>• TTY</li> <li>• TTYL = talk to you later</li> <li>• tw</li> <li>• u (you)</li> <li>• ur (you are)</li> <li>• ur (your)</li> <li>• wun (won't)</li> <li>• w'sup.</li> <li>• y = why</li> <li>• Y U</li> <li>• Lulas</li> <li>• Sk.</li> <li>• :) :(</li> <li>• WRU (where are you?)</li> <li>• z = dead</li> </ul>
<p><b>Parents use –</b></p> <ul style="list-style-type: none"> <li>• :) – THANK YOU.</li> <li>• g2g</li> <li>• Lol</li> <li>• Luv</li> <li>• PL.C.M</li> <li>• Pls – please</li> <li>• R – ARE</li> <li>• Syl</li> <li>• Sys</li> <li>• Thx – thanks</li> <li>• Ttyl</li> <li>• U – YOU</li> <li>• WRU – where are you</li> </ul>		
<p><b>Staff use –</b></p> <ul style="list-style-type: none"> <li>• &lt;grin&gt; or :) for humour.</li> <li>• b/c = because</li> <li>• B4 – before</li> <li>• btw = by the way</li> <li>• CU = see you</li> <li>• Cuz –</li> <li>• etc....</li> <li>• FYI,</li> <li>• Gd. MRN – good morning</li> </ul>	<ul style="list-style-type: none"> <li>• MSG – message</li> <li>• hm – home –</li> <li>• LOL</li> <li>• OK</li> <li>• OMG – Oh my God!</li> <li>• Pg – page</li> <li>• PLS – please</li> <li>• R = are</li> <li>• RU – are you</li> <li>• Sch – school</li> </ul>	<ul style="list-style-type: none"> <li>• TDY – today</li> <li>• TMR – tomorrow</li> <li>• TTY</li> <li>• ttyl</li> <li>• TY – thank you</li> <li>• u = you</li> <li>• w/ = with</li> <li>• W8T – wait</li> <li>• YeST – yesterday</li> </ul>



Further information on this project can be found at

[http://www.rotary7070.org/eglinton/projects/projects\\_toils.html](http://www.rotary7070.org/eglinton/projects/projects_toils.html)

## **PUBLICATIONS**

Akamatsu, C. T., Mayer, C., & Farrelly, S. (2008). Using two-way text messaging solves key socialization issues for teens, parents. *Odyssey*, 9 (1), 46-49.

Akamatsu, C. T., Mayer, C., & Farrelly, S. (2006). An investigation of two-way text messenger use with deaf students at the secondary level. *Journal of Deaf Studies and Deaf Education*, 11, 120-131. Electronic version available at <http://www.oxfordjournals.com/>

## **PAPERS PRESENTED: NATIONAL AND INTERNATIONAL**

Akamatsu, C. T., Mayer, C., & Farrelly, S. (2008). Towards Optimizing Independent Living Skills Among Deaf High School Students. Paper presented at the National Association of School Psychologists, New Orleans, Feb 6-9.

Akamatsu, C. T., Mayer, C., & Farrelly, S. (2007). Towards Optimizing Independent Living Skills (TOILS): Text messaging among secondary deaf students. Paper presented at the Hawai'i International Conference on Education, Honolulu, HI, Jan 6-10.

Mayer, C., Akamatsu, C. T., & Farrelly, S. (2006). An investigation of pager use with deaf students at the secondary level. Paper presented at the American Educational Research Association, xxx, April.

Mayer, C., Akamatsu, C. T. & Farrelly, S. (2005). An investigation of pager use with deaf students at the secondary level. Paper presented at the International Congress on Education of the Deaf, Maastricht, July.

Mayer, C., Akamatsu, C. T. & Farrelly, S. (2005). An investigation of pager use with deaf students at the secondary level. Presented at Association of College Educators in Deaf/Hard of Hearing, Banff, AB, Feb 24-26.

## **LOCAL PRESENTATIONS**

Mayer, C., Akamatsu, C. T. & Farrelly, S. (2005). An investigation of pager use with deaf students at the secondary level. Presented at Leading Learning: An e-Conference, York University, Toronto, ON, Feb. 14-15.

Akamatsu, C. T., Mayer, C., & Farrelly, S. (2004). Towards optimizing independence and life skills: The "Pager Project". Media event with Toronto District School Board, Toronto, ON, Nov 2 and Nov 17.