KT & OT

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Power of partnership: Development of *Printing Like a Pro!* using the knowledge-to-action framework

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This column is devoted to knowledge translation (KT) activities in occupational therapy. Multiple definitions of KT exist (Graham et al., 2006), but simply put, KT is a systematic process to bridge the gap between research knowledge and its application to clinical practice. The focus of KT is to ensure that "what is learned through research is shared rapidly in a focused and accessible manner so that practitioners are evidence-informed and clients benefit" (Law, Missiuna, & Pollock, 2008, p.3).

A commonly used framework to articulate the KT process is the knowledge-to-action (KTA) framework adopted by the Canadian Institutes for Health Research (Graham et al., 2006; Figure 1). In this article, we aim to use this KTA framework to demonstrate a successful partnership of an occupational therapy clinician scientist and a practicing occupational therapist in using research evidence to develop and implement a printing program, *Printing Like a Pro!*, for use in school-based occupational therapy practice. We will briefly describe the KTA framework and then explain the activities that were undertaken for each phase of the process.

Context of the partnership

Before we describe how we applied this KTA framework to the development and implementation of *Printing Like a Pro!*, we will first introduce ourselves. Dr. Jill Zwicker is a clinician scientist with over 20 years of clinical experience as an occupational therapist, most recently in school-based practice. Jill is currently doing a post-doctoral fellowship in the Department of Pediatrics at the University of British Columbia in Vancouver. Ivonne Montgomery is an occupational therapist with 25 years of clinical experience and is currently working in the School Aged Therapy Program at the Sunny Hill Health Centre for Children in Vancouver. Ivonne and Jill joined forces to integrate research evidence into a practical printing program called *Printing Like a Pro!,* a useful resource to address the needs of students who require support to develop their handwriting skills. Based on motor learning theory, cognitive strategies, and current evidence, the program includes both instructional resources, and worksheets for use by students in home and school settings.

Knowledge-to-action framework

The KTA framework (Figure 1) can be briefly described as a two-part interactive process: knowledge creation and action (Cramm & White, 2011; Graham et al., 2006). *Knowledge creation* is represented as a funnel, where useful knowledge is extracted and becomes more refined through knowledge inquiry, knowledge synthesis, and the development of knowledge products (Graham et al., 2006). The *action cycle* represents the activities needed for knowledge implementation or application (Graham et al., 2006). This process involves identifying a problem, reviewing knowledge, adapting knowledge to the local context, assessing barriers to knowledge use, implementing necessary changes, monitoring use, and evaluating outcomes (Cramm & White, 2011).

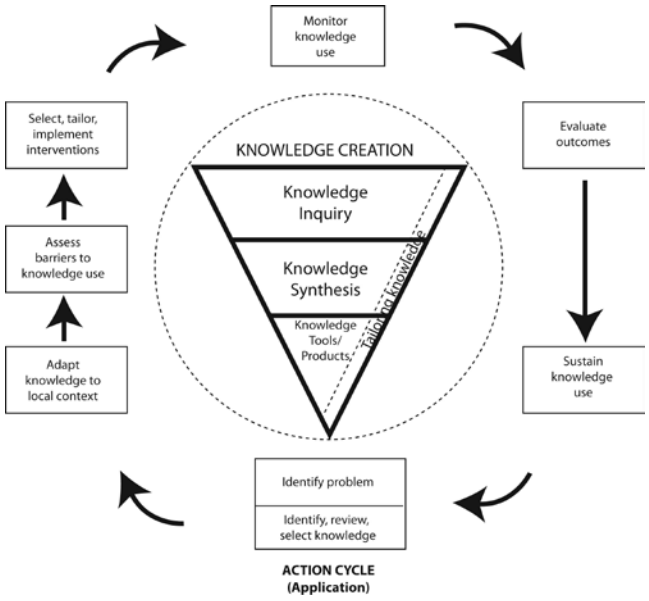

***Figure 1*. The knowledge-to-action process. Reprinted from "Lost in knowledge translation: Time for a map?" by Graham et al., *Journal of Continuing Education in the Health Professions,* Vol. 26, pp. 13–24. Copyright © 2006 The Alliance for Continuing Education in the Health Professions, The Society for Academic Continuing Medical Education, and The Council on CME, Association for Hospital Medical Education. Reprinted with permission.**

Knowledge creation

As can be seen in Figure 1, the core of the KTA process, knowledge creation, occurs through a funnel of knowledge inquiry, knowledge synthesis, and knowledge products (Graham et al., 2006). The first phase of our *knowledge inquiry* began

with a clinical research question that related to best practice for handwriting intervention and fulfilled part of Jill's master's degree. Jill conducted a randomized clinical trial to compare the effectiveness of cognitive and multisensory approaches to handwriting intervention (Zwicker & Hadwin, 2009). Ivonne first learned of Jill's work when Jill presented preliminary results of this study at the Canadian Association of Occupational Therapists (CAOT) Conference in Vancouver (Zwicker & Hadwin, 2005). Ivonne was intrigued by the research findings favouring a cognitive approach to handwriting intervention and perceived the research findings to be relevant, applicable to school-based occupational therapy practice, and congruent with therapy recommendations most typically used by school staff. Ivonne began to look at other sources of literature to confirm these findings. She reviewed and critically appraised recently published studies of handwriting interventions (Sudsawad, Trombly, Henderson, & Tickle-Degnen, 2002; Denton, Cope, & Moser, 2006; Weintraub, Yinon, Bar-Effrat Hirsch, & Parush, 2009; Zwicker & Hadwin, 2009; Mackay, McCluskey, & Mayes, 2010), as well as a systematic review of handwriting studies (Hoy, Egan, & Feder, 2011). These findings, paired with clinical observations, led to Ivonne's acceptance of a cognitive approach to handwriting intervention. Meanwhile, Jill was invited to give a keynote address at the Handwriting in the UK conference in York, England, which prompted her to also review the current state of the evidence related to handwriting intervention. These *knowledge synthesis* activities culminated in an invited paper to the *Dyspraxia Foundation Professional Journal* (Zwicker, 2011).

In 2010, Ivonne approached Jill to work with her to develop a printing program based on the research evidence. A partnership ensued with the overarching goal being the co-production of a *knowledge product* with knowledge exchanged and translated into action (CIHR, 2009). This collaborative partnership resulted in the creation of a free practice resource, *Printing Like a Pro!*

Action cycle

1. Identify the problem.

The problem identified was three-fold. First, many occupational therapists use a multisensory or sensory-motor approach to treat handwriting difficulties (Feder, Majnemer, & Synnes, 2000; Woodward & Swinth, 2002), yet the research evidence for such an approach is sparse and inconclusive (Zwicker & Hadwin, 2009; Zwicker, 2011). Second, we observed limited compliance with the then current practice of multisensory strategies to support handwriting development. Third, there was a lack of inexpensive, readily accessible, evidence-based handwriting tools for clinical practice (Montgomery & Zwicker, 2011).

2. Identify, review, and select knowledge.

To solve the knowledge-practice gap outlined above, the *Printing Like a Pro!* program was implemented in local schools in the Coquitlam School District in British Columbia and shared with school-based occupational therapists locally, provincially, and in the United Kingdom.

3. Adapt knowledge to local context.

With the local context in mind, Ivonne adapted a multisensory printing program that was being used in school-based consulting to focus more on instruction using a cognitive approach. While using earlier versions of the program with students, she requested specific feedback from teachers and caregivers, as well as several school-based occupational therapists in the province. Specifically, Ivonne wanted to know what would make this program (especially the worksheets) be easily incorporated into a student's day for optimum compliance and practice intensity. Most recently, additional worksheets (i.e., letter review and word practice worksheets) were developed in more formal collaboration with teachers and school-based occupational therapists.

4. Assess barriers to knowledge use.

Two main barriers were identified. First, we needed to make occupational therapists and school personnel aware of the printing program and how to access it. The second potential barrier was how therapists perceived the effectiveness of cognitive approaches as compared to the more traditional multisensory approach to handwriting intervention.

5. Select, tailor, and implement interventions.

We have aimed to overcome the first barrier by having the program available online for free. We have notified therapists of the program's existence through the provincial pediatric therapists' network, as well as through a local workshop (presentation posted on-line at http://www.childdevelopment.ca/School-Age_Therapy_Practice_Resources.aspx) and a presentation to occupational therapists in the province (Pediatric Update Symposium, Vancouver, February 2011). We will also be presenting our work at a national conference (CAOT Conference, Victoria, May 2013). Articles such as this and those in other practice journals (Montgomery & Zwicker, 2011) also help to spread the word about the *Printing Like a Pro!* program to national and international audiences. From a local school district staff perspective, notification of the program has been provided through an intranet newsletter, as well as personalized interactive educational sessions to school staff. The newly developed resources are also linked to the school district's intranet for easy access.

To address the second barrier, we have attempted to share the current state of the evidence through the presentations mentioned above, as well as internationally through a keynote

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address at the Handwriting in the UK conference. We have also prepared summaries of the evidence and rationale for *Printing Like a Pro!* through publication in practice journals (Zwicker, 2011; Zwicker & Montgomery, 2012).

6. Monitor use.
We are currently informally monitoring knowledge use. First, on a practical level, we are following up with school-based clients (educators and parents) on an individual basis by monitoring monthly printing practice tracking charts. In a more general sense, we are tracking website visits to monitor the number of hits we receive for *Printing Like a Pro!*

7. Evaluate outcomes.
Currently, the impact of the knowledge use, in terms of evaluating whether application of the knowledge improves written output, is being carried out on an individual client level. This is done using standardized assessments to measure change over time, as well as informal clinical observations. A formal research study would be ideal to better evaluate outcomes of implementation of *Printing Like a Pro!,* including investigating the best method of delivery (individual versus group/classroom) and which diagnostic groups are most appropriate to use this program. We also encourage therapists using this program to give us feedback on its use and effectiveness in their practice, as well as ideas for its further development.

8. Sustain use.
The sustainability phase should set in motion a feedback loop that cycles through the action phases. This is occurring currently with continued collaboration between the researcher and the clinician during updates of the program, as well as with consumers (educators and occupational therapists) in developing additional resources for the website.

A product of the KTA process

This printing program is a great example of how a partnership between a clinical researcher and an occupational therapist can move knowledge gained in research into a clinically useful tool. While the program has not been empirically validated, *Printing Like a Pro!* is grounded in motor learning theory (Zwicker & Harris, 2009; Zwicker & Montgomery, 2012) and based on the latest research evidence (Zwicker, 2011). More importantly, it is a product that would not have been possible without the collaborative efforts and commitment to translate new knowledge into action.

How to access the program

The *Printing Like a Pro!* program, including worksheets, is available for free download and instructional use from the Sunny Hill Health Centre for Children Child Development and Rehabilitation website (in the section, School-Age Therapy Practice Resources): http://www.childdevelopment.ca/School-Age_Therapy_Practice_Resources.aspx.

School and home versions are available to specifically target use by teachers or families. We have also created "Legibility Checklists" with guidelines for occupational therapists to use to guide intervention in a consultative model.

We encourage you to access this printing program and use it in your practice. Queries or feedback about the program can be directed to Ivonne Montgomery at imontgomery@cw.bc.ca. Please regularly check back on the website as we are continuing to refine the program and develop additional materials.

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