Insight Research and Practice in Visual Impairment and Blindness

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Association for Education and Rehabilitation of the Blind and Visually Impaired

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Association for Education and Rehabilitation of the Blind and Visually Impaired

Insight: Research and Practice in Visual Impairment and Blindness

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Original Research papers reflect the latest scientific discoveries in the fields of education and rehabilitation in vision impairment and blindness (maximum length: 4,000 words).

Practice Report papers reflect examples of best practice in the fields of education and rehabilitation of persons with visual impairments or who are blind. We expect not only academics but also practitioners to benefit from the contents (maximum length: 3,000 words).

Book Review papers are brief reviews of recently published books which will include a review of both the content and structure of the book (maximum length: 1,500 words).

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Insight: Research and Practice in Visual Impairment and Blindness

A quarterly journal in the field of education and rehabilitation of persons of all ages with low vision or blindness



Insight: Research and Practice in Visual Impairment and Blindness

Call for Manuscripts Special Theme Issue: Low Vision and Rehabilitation Issues in Children and Adolescents of School through College Age, Including Those with Multiple Impairments



In the general literature on visual impairment, there has been less attention paid to children than to adults. This may be because of the lower prevalence among this age group. In North America, the prevalence of low vision and blindness in 0- to 19-year olds is a fraction of overall prevalence. However, the life expectancy of a 65-year old Canadian in 1997, for example, was 17.7 years compared to a newborn's, which was 76.5 years in the same year. So when considered in terms of visual impairment years, the need for rehabilitation and

accommodative services is much greater. Low vision statistics on children have often not included children with multiple impairments and yet approximately half to twothirds of children with low vision also have other impairments.

So **Insight** is planning a special issue devoted to issues of vision rehabilitation surrounding children and young people of school and university/college age with visual impairment and blindness. We are interested in papers describing new research on educational issues and challenges at home for this age group. These

could include, but are not limited to:

- access to print and school materials
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- reading research
- O and M studies
- studies on encouraging independence and educational and home challenges

Guest Editor: Prof. Susan Leat

Manuscripts can be: Original Research; Practice Reports; Book, Film, or Literature Reviews; or Theory Pieces

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Volume 4 Number 1 Winter 2011

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We are pleased to announce Prof. Susan Leat, PhD, as Guest Editor for the upcoming *Special Theme Issue: Low Vision and Rehabilitation Issues in Children and Adolescents of School through College Age, Including Those with Multiple Impairments*, to be published in the Spring, 2012 issue.

Prof. Leat graduated in Optometry from the University of

Manchester (formerly UMIST), England. She obtained her PhD and undertook post-doctoral studies at Cardiff University (formerly UWCC), Great Britain. She founded the UWCC Low Vision Clinic and was instrumental in establishing the Special Assessment Clinic in UWCC. In 1991, she took up a faculty position at the University of Waterloo, Canada, where she is now a professor and a clinician in the Low Vision Clinic and the Paediatric and Special Needs Clinic. She teaches and conducts research in psychophysics, low vision, pediatrics, visual development, special needs, and gerontology. She also publishes in international optometric and ophthalmology journals and presents at international conferences.

Prof. Leat is a Fellow of the College of Optometrists (UK), a member of the College of Optometrists of Ontario, a Fellow of the American Academy of Optometry, and a member of the editorial board for the *Journal of Optometry*. She has co-authored a book on pediatric optometry entitled *Assessing Children's Vision—A Handbook*, published by Butterworth-Heinemann in 1999. She is Past Head of the Paediatric and Special Needs Clinic and is currently the Head of Residencies at the University of Waterloo.

Submission Deadline for the Special Issue on Low Vision and Rehabilitation Issues is October 1, 2011.

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This is the inaugural issue of *Insight: Research* and *Practice in Visual Impairment and Blindness*. What does this mean for the journal, for authors, and for you, the reader? Why change the name from *AER Journal*? I thought I would take this space to provide some context, and make clear our intentions and rationale for changing the name of the journal so soon after its inception.

I began to ask about the possible impact of a name change about one year ago, because I could see that there were many professionals working in the fields of education and vision rehabilitation who did not know what "AER" meant. When I asked about the idea of changing the name to something more generic and less puzzling, I discovered that I was not the only person having these experiences when attending conferences. While our publisher had been finding the journal held great appeal (for example, the covers and layout were well-liked) and drew attention at library association conferences and others, the constant question "what is AER?" was too challenging in these contexts. If we were to appeal to a wide range of interested parties, and attract new authors and readers from a wide assortment of researchers and practitioners, then a name change would help.

There were, however, many questions to answer in those early days, not the least of which was, "if a journal is going to change its name, when is the best time to do so?" After much study and consultation with our publisher, it was deemed far better to change a journal's name **early** in its life, rather than later. A very informative article by James Candon, Managing Editor of the *Journal of Studies on Alcohol and Drugs,* was shared with me. I began to wonder, "should we proceed?" However, I felt that while our learned AER colleagues had great questions, none were opposed to the idea, especially once they understood the rationale. With this kind of support, I felt we could move forward, as long as we could do so soon.

We began to take ourselves through a great many levels of discussion (the Editorial Advisory Board, the Associate Editors, and the Publications Committee all had input into the process) and then on to the Board for approval in the summer of 2010. As James Testa, senior director of editorial development and publisher relations at Thomson Reuters suggests: "Journal

What's in a Name?

name changes should be done with great care and only when absolutely necessary" (Candon, 2009).

Candon (2009) also states:

Choose the new name wisely. Given what you're about to go through, you'll never want to change the name again. So think it through, thoroughly. Will the new name draw in all the new readers and authors you're aiming for? Is it too broad? Too narrow?

Lists of names were submitted by the editorial group during the search for a new name. These were voted on, and many were discarded for a multitude of reasons. The name that got the most votes is the name we have chosen. It says what we want to say about what the journal provides. It will attract many new people and organizations to the journal's excellent contents, and it has "legs" as they say: it will last for a long, long time as the journal of AER.

The next step was to clear the name for conflicts, and while other publications have the same one, there is no copyright on any of them, so we were "cleared for take-off."

Along with the new title, I also want to welcome two new Editorial Advisory Board members: Mary Lou Jackson, MD and L. Penny Rosenblum, PhD. Dr. Jackson, Director, Vision Rehabilitation, Massachusetts Eye and Ear Infirmary, is a board-certified ophthalmologist and vision rehabilitation service practitioner. Dr. Rosenblum is an Associate Professor of Practice in the Department of Disability and Psychoeducational Studies at the University of Arizona. We are very excited for them to join the Board and look forward to their contributions.

The articles in this issue are indicative of both the quality and the diversity of the work being conducted in this field. Together, they represent our new title very well!

Until next time,

Deborah Gold, PhD **Editor-in-Chief**

Reference

Candon, P. (2009). A journal by any other name... Editorial Office News, publication of the International Society of Managing and Technical Editors. July.

Applied Behavior Analysis and Students with Visual Impairments: A Literature Review

Christine Clark-Bischke, PhD* E. Paula Crowley, PhD

Illinois State University Normal, IL

Abstract

This literature review analyzes the use of applied behavior analysis procedures to teach students with visual impairments. Conclusions focus on guiding professional practice within the field of visual impairments. In this review, we identified research articles published in peer reviewed journals since a 1994 review. An analysis was conducted on participants' ages, characteristics, placements, target behaviors, teaching methods, and the extent to which follow-up data were provided. Thirteen studies met the criteria for this review. Most studies included boys with multiple disabilities aged 7 to 14 years, focused on the development of independent living skills, and involved the use of positive reinforcement. Few studies included either short- or long-term follow-up data. Recommendations for future research and practice include an increased focus on young children, including those aged 0 to 3, and students aged 14 or older. In addition, a stronger focus is recommended on inclusion, development of literacy skills, expanded core curriculum, the use of technology, and follow-up data.

Keywords: applied behavior analysis, visual impairment, implications for practice, literacy skills, expanded core curriculum

Introduction

The education of students with visual impairments has been and continues to be influenced by recent changes in federal legislation (Individuals with Disabilities Education Improvement Act [IDEIA], 2004; No Child Left Behind [NCLB], 2001). A Report to the Nation: The National Agenda for the Education of Children and Youths with Visual Impairments, Including Those with Multiple Disabilities (Corn & Huebner, 1998) was created to address concerns related to the education of children with visual impairments, with an additional focus on the expanded core curriculum (ECC) (i.e., compensatory

* Please address correspondence to cclark@ilstu.edu.

or functional academic skills; orientation and mobility; social interaction skills; independent living skills; recreation and leisure skills; career education; technology; and visual efficiency skills). The changes, which recommend evidence-based practices, highly qualified educators, and accountability, necessitate the implementation of effective applied behavior analysis procedures to increase desired and decrease undesired behaviors.

Data on Using Applied Behavior Analysis Methods with Students with Visual Impairments

Applied behavior analysis procedures and singlesubject design methodology are uniquely suited for

studies of low-incidence populations. Applied behavior analysis is based on behavioral theory and involves direct observation of observable and measurable behaviors (Alberto & Troutman, 2009). The effective use of applied behavior analysis procedures to teach new academic and social behaviors has a long history in the field of special education (Alberto & Troutman, 2009; Cooper, Heron, & Heward, 2007). These procedures focus first on observable and measurable behaviors, such as raising a hand for permission to speak, orally answering questions, or writing words accurately. These methods include the use of positive reinforcement to teach desirable behaviors such as selfmanagement. Teachers may use these methods to teach individuals new behaviors by breaking tasks down into specific steps, thus using task analysis. Using applied behavior analysis, individuals may learn complex tasks in a step-by-step manner until all the steps are mastered, thus creating a behavioral chain (Alberto & Troutman, 2009).

Applied behavior analysis procedures have been used successfully to teach literacy skills (Alberto, Fredrick, Hughes, McIntosh, & Cihak, 2007), sight word vocabulary (Collins, Evans, Creech-Galloway, Karl, & Miller, 2007), statement inference, facts, and analogies (Flores & Ganz, 2007), and strategy instruction (Delano, 2007). Additionally, these procedures have been used to teach social skills (Maag & Anderson, 2007) and functional skills (Cavkaytar, 2007; Lee, Poston, & Poston, 2007; Reynhout & Carter, 2007). Furthermore, applied behavior analysis procedures have been used to teach essential skills to preservice and inservice teachers (Browder, Trela, & Jimenez, 2007).

Teachers strive to teach the skills necessary for "independence and successful integration into the community" to students with visual impairments (DeMario, 1994, p. 532). The ability of students with visual impairments to integrate into the school community is limited when they engage in stereotypic mannerisms or self-injurious/self-stimulatory behaviors (Caballo & Verdugo, 2007; McAlpine & Moore, 1995). The development of academic skills, social skills, and independent living skills requires the reduction of distracting behaviors and an increase in opportunities to develop academic and independent living skills. Evidence-based teaching strategies are essential in order to address the unique educational needs of students with visual impairments (Corn, 2007; Hatlen, 1996; NCLB, 2001). Lack of these strategies impacts students with visual impairments through teachers' potential "overuse of practices that could be ineffective or unresponsive to new teaching challenges" (Corn, 2007, p. 742). In addition, lack of knowledge also leaves educators with limited strategies for teaching students with challenging behaviors.

The literature review of 66 studies on the use of applied behavior analysis completed by DeMario and Crowley (1994) found that most research in this area focused on boys living in residential settings who were in elementary school and who engaged in selfstimulatory and aggressive behaviors. Of these studies, 82 percent focused on reducing undesirable behaviors and 12 percent focused on teaching positive behaviors, such as increasing academic and social skills. The findings also indicate that only 11 percent of the studies provided follow-up data of 1 year or more. The authors identified several recommendations for future research using applied behavior analysis procedures. Their recommendations included: (a) research in inclusive school and community-based settings; (b) inclusion of participants from a wider age range, including preschoolers; (c) focus on academic behaviors and effective instruction; (d) review of self-management procedures; (e) discussion of the effective use of praise; (f) ongoing follow-up data; and (g) increase of prosocial behaviors. DeMario and Crowley (1994) identified areas in need of significant research within the field of visual impairments. This review continues their work by identifying whether research on applied behavior analysis methods has occurred within those areas since the 1994 review. We analyzed the use of applied behavior analysis procedures to change behaviors of individuals with visual impairments in educational and community based settings. In addition, we examined the extent to which the recommendations provided by DeMario and Crowley (1994) have been addressed.

Methods

For this study, the articles we included were published in peer reviewed journals. We eliminated articles that focused on individuals with visual impairments who were more than 22 years old and were published before the 1994 review. We excluded articles that were literature reviews or methodological

analyses; we focused only on data-based research that involved the use of applied behavior analysis methods to change the behaviors of individuals with visual impairments.

The articles included in this review were identified using both hand and electronic searches of educational journals (e.g., Journal of Visual Impairment & Blindness, RE:view, and Behavioral Interventions) and databases (e.g., ERIC, Academic Search Premier, and LexisNexis Academic). The articles were identified following the criteria used by DeMario and Crowley (1994). The criteria included peer-reviewed articles that focused on individuals with visual impairments from birth to 21 years 11 months, were published since the 1994 review (including those published in 1994 but after the DeMario and Crowley review) through December 2009, and focused on the use of applied analysis procedures and single-subject design research methods.

A total of 13 studies met the criteria for inclusion in this literature review. The studies were then analyzed by setting, participant age, gender, disabilities referenced, targeted behaviors, procedures used for behavioral change, and documented follow-up data (see Table 1).

Results

The following section describes the results of our analysis. We organized our findings by describing the participants, target behaviors, behavior management procedures, effectiveness, and follow-up data. Interrater agreement was established at 100 percent.

Participants

A total of 23 participants were identified, 15 (65 percent) male and eight (35 percent) female (see Table 1). Three participants (13 percent) were aged 3 to 6 years, 14 participants (61 percent) were aged 7 to 14 years, and 6 participants (26 percent) were aged 15 to 22 years (see Table 1). DeMario and Crowley (1994) found 85 participants, 46 (54 percent) male and 39 (46 percent) female. Additionally, 23 (27 percent) participants were aged 3 to 6 years, 41 (48 percent) participants were aged 7 to 14 years, and 21 (25 percent) participants were aged 15 to 22 years. They found that 30 (35 percent) participants had a visual impairment only and 55 (65 percent) had a visual impairment and other

disabilities. In this review, 10 (43 percent) participants had a visual impairment only, whereas 13 (57 percent) had a visual impairment and other disabilities (e.g., mental retardation, communication disorders, deaf and hard or hearing, and physical disabilities).

Settings

Six studies (46 percent) took place in residential placements, six (46 percent) took place in public schools, and one (8 percent) took place in a clinical environment (see Table 1). Residential placements included residential schools, hospitals, and residential treatment centers. DeMario and Crowley (1994) did not provide specific data on how many studies took place in these settings.

Targeted Behaviors

In both reviews, the behaviors targeted for change were categorized as aggression, self-stimulation, independence, and academic (see Table 2). The target behaviors within the aggression category included disruptive behaviors, aggression toward others, noncompliance, destruction of property, and self-injurious behaviors. The self-stimulation category included head weaving, mouthing/biting, eye poking, body rocking, irrelevant vocalizing, moving hands or objects in front of eyes, and rotating one's body. The independence category included staying on task, eye contact/gaze, eating skills, meal preparation, jobrelated skills, appropriate waiting, bed wetting, mobility, posture/physical gestures, visual attention, assertive skills, appropriate sitting, dressing skills, social initiation/interaction, and sharing. The final category focused on academic skills, such as braille, spelling, and reading.

DeMario and Crowley (1994) identified that 48 (73 percent) of the studies focused primarily on aggression and self-stimulation, 19 (29 percent) studies focused on aggression, 29 (44 percent) studies focused on self-stimulation, and four (6 percent) studies focused on job interviewing and social skills. Data from our review (see Table 2) indicate that eight (62 percent) studies focused primarily on the development of independence skills, four (31 percent) studies focused on self-stimulation, and three (23 percent) studies focused on aggression. An assortment of other behaviors the researchers focused on included vocational skills, cleaning, sleep problems, and physical movement.

Behavior Management Procedures

Increasing Positive Behaviors

Positive reinforcement was used in 10 (77 percent) of the 13 studies that met the criteria for this study (Estevis & Koenig, 1994; Jindal-Snape, 2005; Jindal-Snape, Kato, & Maekawa, 1998; Kennedy & Souza, 1995; Lalli, Livezey, & Kates, 1996; Lancioni, Klaase, & Goossens, 1995; Lancioni, Oliva, Pellegrino, & Soresi, 1998; Lancioni, O'Reilly, & Oliva, 2001; MacDonald, Wilder, & Dempsey, 2002; Paclawskyj & Vollmer, 1995). Positive reinforcement procedures involve the use of primary and secondary reinforcers (positive reinforcers) to increase desired behaviors (Alberto & Troutman, 2009). One of these studies involved the use of primary reinforcers (Estevis & Koenig, 1994). Primary reinforcers are unconditioned desirable stimuli, such as food, drink, and physical comfort (Alberto & Troutman, 2009). Six studies (46 percent) involved the use of secondary reinforcers (Jindal-Snape, 2005; Jindal-Snape et al., 1998; Kennedy & Souza, 1995; Lancioni et al., 1998; Lancioni et al., 2001). Secondary reinforcers are conditioned desirable stimuli, such as tokens, points, stickers, and social privileges (Alberto & Troutman, 2009). Three studies (23 percent) involved the use of both primary and secondary reinforcers (Lalli et al., 1996; MacDonald et al., 2002; Paclawskyj & Vollmer, 1995). The current study indicates an increased use of positive reinforcers. DeMario and Crowley (1994) indicated that 14 (21 percent) of the studies involved the use of primary and/or secondary reinforcers. Three (4 percent) studies involved the use of primary reinforcers only, and nine (14 percent) studies involved the use of secondary reinforcers only. Furthermore, two (3 percent) studies indicated a combined use of primary and secondary reinforcers. The current study indicates an increased use of positive reinforcers in 10 (77 percent) of the articles. Secondary reinforcers were used in six (46 percent) of the studies, and primary reinforcers were used in one study (8 percent); a combination of primary and secondary reinforcers were used in three studies (23 percent).

Modeling, shaping, prompting, and combinations of these methods were used in 12 out of the 13 studies (92 percent). Modeling, which involves the demonstration of positive behaviors, was used in one study (8 percent) (Jindal-Snape et al., 1998), and

Applied Behavior Analysis

shaping, which involves the use of positive reinforcement of approximations of desirable behavior, was used in one study (8 percent) (Lalli et al., 1996). Prompting was used in all but one of the studies (Vervloed, Hoevenaars, & Maas, 2003). Prompts involve the use of additional cues to elicit correct responses (Alberto & Troutman, 2009). The most commonly used prompting systems were verbal and physical. Seven studies (54 percent) involved the use of both verbal and physical prompts (Estevis & Koenig, 1994; Jindal-Snape, 2004; Kennedy & Souza, 1995; Lancioni et al., 2001; MacDonald et al., 2002; Paclawskyj & Vollmer, 1995; Wiskochil, Lieberman, Houston-Wilson, & Petersen, 2007). Two studies (15 percent) involved the use of auditory prompts only (Jindal-Snape, 2005; Lancioni et al., 1998). Verbal prompts involved direct requests by an individual, whereas auditory prompts incorporated recorded messages, beeps, and other recorded sounds. The Jindal-Snape et al. (1998) study involved the use of verbal prompts only, and the Lalli et al. (1996) study involved the use of physical prompts only. Three studies (23 percent) involved a combination of three different kinds of prompts. Lancioni et al. (1995) combined the use of visual, auditory, and verbal prompts, whereas two studies involved the combined use of auditory, verbal, and physical prompts (Lancioni et al., 2001; Wiskochil et al., 2007).

DeMario and Crowley (1994) found that 15 out of the 66 studies (22 percent) focused on increasing positive behaviors by using modeling, shaping, and prompting. Based on this analysis, the use of modeling, shaping, and prompting has increased by 70 percent in the research published since 1994. This increase also indicates an increase in focus on the development of positive behaviors. The literature since 1994 indicates an increased focus on increasing desirable behaviors. The current study indicates that 62 percent of the articles focused on developing positive behaviors, whereas the 1994 data indicated that 18 percent of the articles focused on developing positive behaviors.

Reducing Undesirable Behaviors

The current study indicates that seven articles (54 percent) focused on the reduction of negative behaviors. This contrasts with the data from the DeMario and Crowley (1994) study, which indicated that 54 articles (81 percent) focused on reducing

		Visual			
Reference	Participant Ages, y	Impairment/ Other Disabilities	Setting/Grade	Target Behaviors	Procedures
Estevis & Koenig (1994)	ω	ROP/congenital blindness ^a	Elementary school/1st grade	Body rocking	Positive reinf.: primary & secondary Prompting: physical & verbal Self-monitoring
Jindal-Snape (2004)	9, 10	Totally blind Light perception	Integrated school	AO, DT, EC, SI Not responding to conversations Eve contact	Prompting: verbal & physical Self-evaluation
Jindal-Snape (2005)	9 [°] 8	Totally blind	Integrated school	On-task behavior Turn toward others	Positive reinf.: secondary Prompting: auditory Self-evaluation, peer evaluation
Jindal-Snape, Kato, & Maekawa (1998)	ω	Congenital blindness	Integrated school	Direction of gaze On-task behavior	Positive reinf.: secondary Prompting: verbal Modeling, self-evaluation, peer evaluation
Kennedy & Souza (1995)	19	Astigmatism/ptosis/ myopia/profound disabilities	Community-based special education program	Eye poking Self-injurious behavior	Positive reinf.: secondary Prompting: verbal & physical Response cost; nonseclusionary time-out
Lalli, Livezey, & Kates (1996)	4	Severe disabilities and visual impairment	Hospital	Eye poking	Positive reinf.: primary & secondary Shaping, prompting: physical Negative reinf.: DRO, DRI, disapproving comments, response cost
Lancioni, Klaase, & Goossens (1995)	13, 13	Congenital cataracts/ retinal abnormalities/ hearing impairment Congenital cataracts/ retinal abnormalities/ hearing impairment	Residential/center for multiple disabilities	Meal preparation/ prevocational skills	Positive reinf.: secondary Prompting: visual, auditory, & verbal

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Table 1. Summary of Students, Settings, Behaviors, and Procedures

		Visual			
Reference	Participant Ages, y	Impairment/ Other Disabilities	Setting/Grade	Target Behaviors	Procedures
Lancioni, Oliva, Pellegrino, & Soresi (1998)	18	No light perception (OD)/ severely limited vision (OS)/congenital cataracts	Activity setting	Meal preparation/ prevocational skills	Positive reinf.: secondary Prompting: auditory
Lancioni, O'Reilly, & Oliva (2001)	19, 21, 22	Totally blind Severe visual impairment/ spasticity No light perception (OD)/ severely limited vision (OS)	Educational activity center	Meal preparation/ practical jobs	Positive reinf.: secondary Prompting: auditory, visual, & physical
MacDonald, Wilder, & Dempsey (2002)	ى ب	Cortical visual impairment	University/clinical setting	Eye gouging/poking	Positive reinf.: primary & secondary Prompting: verbal & physical Negative reinf.: DRO Conditioned aversive procedures
Paclawskyj & Vollmer (1995)	8–13	ROP/optic atrophy/optic nerve hypoplasia/ mental retardation	Residential school for visual impairments	Other (reinforcer selection)	Positive reinf.: primary & secondary
Vervloed, Hoevenaars, & Maas (2003)	4	Lebers congenital	Home	Sleep problems/ noncompliance	Prompting: verbal & physical Extinction
Wiskochil, Lieberman, Houston-Wilson, & Petersen (2007)	9, 11, 14, 16	2 students with low vision and 2 students are blind	Integrated physical education classes	PE skills/mobility	Prompting: auditory, verbal, & physical
ROP = retinopathy reinf. = reinforceme dexter (i.e., right eye	of prematurity; A ent; DRO = diffe e); OS = oculus	O = aggression toward off rential reinforcement of ot sinister (i.e., left eye); PE	hers; DT = staying on tas, her behaviors; DRI = diff = physical education.	k; EC = eye contact-gaze erential reinforcement of	; SI = social initiation/interaction; indirect behaviors; OD = oculus

Table 1. Continued

Applied Behavior Analysis

	Participant	Target		+ Target Behavior	Effective	Follow-
Reference	Ages, y	Behaviors	Procedures	Change	Procedures	Up
Estevis & Koenig (1994)	8	BR^a	Positive reinf.: primary & secondary Prompting: physical & verbal Self.monitoring	Yes	Yes	No
Jindal-Snape (2004)	9, 10	AO, DT, EC, SI	Prompting: verbal & physical Self-evaluation	Yes	Yes	Yes
Jindal-Snape (2005)	ð Ó	DT, EC	Positive reinf.: secondary Prompting: auditory Self-evaluation. peer evaluation	Yes	Yes	No
Jindal-Snape, Kato, & Maekawa (1998)	ω	DT, EC	Positive reinf.: secondary Prompting: verbal Modeling, self-evaluation, peer evaluation	Yes	Yes	Yes
Kennedy & Souza (1995)	19	AS, EP	Positive reinf.: secondary Prompting: verbal & physical Response cost; nonseclusionary time-out	Yes	Yes	No
Lalli, Livezey, & Kates (1996)	4	£	Positive reinf.: primary & secondary Shaping, prompting: physical Negative reinf.: DRO, DRI, disapproving comments. response cost	Yes	Yes	N
Lancioni, Klaase, & Goossens (1995)	13, 13	MP, JS	Positive reinf.: secondary Prompting: visual, auditory, & verbal	Yes	Yes	No
Lancioni, Oliva, Pellegrino, & Soresi (1998)	18	MP, JS	Positive reinf.: secondary Prompting: auditory	Yes	Yes	No

Table 2. Summary of Behavior Management Studies on Students with Visual Disabilities

Applied Behavior Analysis

Reference	Participant Ages, y	Target Behaviors	Procedures	+ Target Behavior Change	Effective Procedures	Follow- Up
Lancioni, O'Reilly, & Oliva (2001)	19, 21, 22	MP, JS	Positive reinf.: secondary Promotina: auditorv. visual. & physical	Yes	Yes	No
MacDonald, Wilder, & Dempsey (2002)	ъ	ЕЪ	Positive reinf.: primary & secondary Prompting: verbal & physical	Yes	Yes	Yes
			Negative reinf.: DRO Conditioned aversive procedures			
Paclawskyj & Vollmer (1995)	8–13	Other (reinforcer selection)	Positive reinf.: primary & secondary Prompting: verbal & physical	Yes	Yes	No
Vervloed, Hoevenaars, & Maas (2003)	4	NC	Extinction	Yes	Yes	Yes
Wiskochil, Lieberman, Houston-Wilson, &	9, 11, 14, 16	≥	Prompting: auditory, verbal, & physical	Yes	Yes	No
Petersen (2007)						
^a AO = aggression toward poking/gouging; JS = jot	1 others; AS = sei 5-related skills; M	f-injurious behavio = mobility; MP =	rs; BR = body rocking; DT = staying meal preparation; NC = noncompliand	on task; EC = ce; SI = social	eye contact-gaz initiation/interact	e; EP = eye ion; reinf. =

reinforcement; DRO = differential reinforcement of other behaviors; DRI = differential reinforcement of incompatible behaviors.

Table 2. Continued

negative behaviors. Differential reinforcement is a method for decreasing negative behaviors by using positive reinforcement (Alberto & Troutman, 2009). MacDonald et al. (2002) used only differential reinforcement of other behaviors (DRO), and Lalli et al. (1996) combined the use of DRO and differential reinforcement of incompatible behaviors (DRI). Differential reinforcement of other behaviors involves positively reinforcing the nonoccurrence of the targeted behaviors, whereas DRI involves reinforcing behaviors that are incompatible with the behaviors targeted for behavior change (Alberto & Troutman, 2009).

Response cost was used in two studies (Kennedy & Souza, 1995; Lalli et al., 1996). DeMario and Crowley (1994) identified one article (2 percent) that focused on response cost. Response cost involves the removal of positive reinforcers (Alberto & Troutman, 2009). Kennedy and Souza (1995) used a nonseclusionary time-out procedure, and Lalli et al. (1996) denied access to preferred objects. Vervloed et al., (2003) was the only study that involved extinction procedures. Extinction involves the removal of positive reinforcement for previously reinforced behaviors (Alberto & Troutman, 2009).

Self-Management Procedures

This review indicated that self-management instructional procedures were used in four out of 13 (31 percent) studies. DeMario and Crowley (1994) identified no studies that focused on self-management. We found that the self-management procedures used were self-monitoring (Estevis & Koenig, 1994), self-evaluation (Jindal-Snape, 2004), and selfevaluation with peer evaluation (Jindal-Snape, 2005; Jindal-Snape et al., 1998). Self-management procedures involve students' management of their own behaviors (Alberto & Troutman, 2009). Task analysis was used in 1 out of 13 (8 percent) studies (Lancioni et al., 2001). Task analysis involves breaking down complex tasks into their component parts (Alberto & Troutman, 2009).

Outcome and Follow-Up

As shown in Table 2, the applied behavior analysis procedures reviewed were effective in changing the targeted behavior in the desired direction in 100 percent of the studies. The most commonly used effective procedures relied on positive reinforcement of desired behaviors. These are among the least intrusive methods used to change challenging behaviors. Recent literature supports modeling, prompting procedures, response cost, self-management, differentiated reinforcement procedures, and extinction as effective methods educators may use when teaching individuals with visual impairments (Estevis & Koenig, 1994; Kennedy & Souza, 1995; Lalli et al., 1996; Vervloed et al., 2003). DeMario and Crowley (1994) found 40 (61 percent) studies that provided follow-up data; in this review, follow-up data were provided in 4 of the 13 (38 percent) studies. In two studies, the follow-up took place from one to three months after the initial study (MacDonald et al., 2002; Vervloed et al., 2003). Jindal-Snape (2004) conducted follow-up from four to six months and Jindal-Snape et al. (1998) conducted follow-up after eight months. Jindal-Snape (2005) conducted follow-up on the generalization of self-evaluation and peer-evaluation skills. Follow-up data in three of the four studies indicated a continuation of behavior change in the desired direction.

Discussion and Recommendations

Since 1994 valuable, data-based information has become available for educators of students with visual impairments. Of concern is a significant decrease in the number of studies and participants. Proposed explanations for this decrease might include decreased funding for research, low-incidence population, and contemporary placement trends. Despite decreased research, the information available can guide intervention selection for increased academic, independence, or social skills. The development of these skills encourages students with visual impairments to develop behaviors that will enhance their integration with their nondisabled peers and maximize their potential as learners. This review provides direction to educators and related service personnel as they seek to use effective evidence-based practices that are humane, positive, and least intrusive when increasing appropriate behaviors (i.e., socialization, independence, academic, and work skills) or decreasing inappropriate behaviors (i.e., eye poking, off-task behavior, and noncompliance). Although an increase in self-evaluation, the use of positive reinforcers, and the development of positive behaviors and a

lessened focus on decreasing negative behaviors were noted in the research published since 1994, the following section identifies areas for future research.

Settings and Personnel

Because federal legislation continues to encourage inclusion when appropriate, future research in neighborhood (public) schools is encouraged. De-Mario and Crowley (1994) found that 59 percent of the participants involved were placed in residential facilities. Our data indicated that 46 percent of the participants were in residential placements. Conversely, DeMario and Crowley (1994) found that 33 percent of the participants, compared with 46 percent from the current review, were placed in public school settings as encouraged through IDEA and a push to educate students with disabilities along with their peers in the least restrictive environment. These data indicate a decrease in research being done in residential settings and an increase in public settings, potentially due to student placement within inclusive settings. Continued research, focused on students in a wide range of placements, is essential in order to inform placement decision making.

For many years, concerns have been voiced regarding the itinerant teacher model (Correa-Torres & Howell, 2004; Olmstead, 1995; Swenson, 1995). DeMario and Crowley (1994) noted that the "itinerant teacher model is currently the most prevalent type of service delivery system for students with visual impairments in public schools" (p. 537). Large student caseloads, and differing student needs, limit the amount of time an itinerant teacher can spend working with a student. Student caseloads and direct service time have been areas of concern within and outside the field of visual impairments for many years (Olmstead, 1995). We recommend research on personnel services, itinerant and residential, in order to inform individualized education program (IEP) teams in determining the appropriate service model for students with visual impairments. Possible research might seek to review the different service models (i.e., itinerant and residential schools) and the possible impact of these models on the behaviors of students with visual impairments; the impact of teaching strategies used by the teachers; the impact of large caseloads for itinerant teachers; and the impact of teachers certified in specialties other than vision within residential schools

Participants

DeMario and Crowley (1994) found that the majority of participants were between the ages of 7 and 14 and recommended more studies covering a wider age range. In this review the majority of participants were between the ages of 7 and 22. As recommend by DeMario and Crowley, we affirm the need for more research on students with visual impairments across all ages, especially focused on younger children in center-based and home-based early intervention programs. Research on children aged 0 to 6 is essential in order to increase the understanding of the development of children with visual impairments and maximize the potential of students in later years.

Deaf-Blind/Multiple Disability

The number of students with deaf-blindness, multiple disabilities, or both has increased (U.S. Department of Education, National Center for Educational Statistics, 2006) in the past several years. These students had been receiving services from teachers of students with visual impairments prior to 1975 because it was the "right thing to do" (Hatlen, 2007, p. 744). Teachers working with students with multiple disabilities need access to more evidence-based practices to provide strategies that may improve the outcomes for the students within their classrooms (Corn, 2007).

Targeted Behaviors

Follow-up research is needed to examine the impact of selected strategies with all age groups on the maintenance of behavior over time. Our data largely indicated that positive approaches to behavioral change are used. Three studies incorporated the use of self-monitoring, self-evaluation, and self-management. Though there has been an increase in the use of self-management, we highly recommend the continued use of this method. Data on self-management indicate that the benefits of this method include enhanced independence, generalization of skills, and the increased ability to manage one's own behavior (Alberto & Troutman, 2009).

Educational Programming/ Academics

Although educational programming, academics, and teaching are a high priority within IDEA and NCLB, no studies using applied behavior analysis

designed to increase academic knowledge and skills of students with a visual impairment were identified. An increase in evidence-based research on braille instructional strategies, literacy programs, and student achievement in mathematics/science courses is needed to guide teachers as they work to assist students in developing the skills necessary for independence (Corn, 2007; Hatlen, 1996); to identify strategies that increase positive academic behaviors (e.g., organization and study skills); and to guide effective instruction of students with visual impairments.

Technology

In recent years, the inclusion of the ECC has caused technology to move to the forefront in the education of students with visual impairments. Technology is being used by students for computer access, note taking, orientation and mobility training, and many other areas. Research that can be used to guide the development of academic skills, social skills, and independent living skills and incorporates the use of technology is long overdue. Thus, we recommend that more studies should involve the use of technology in order to promote student independence in academic, social, and independent living skills.

Expanded Core Curriculum

The emphasis on the ECC in the last five years provides another area with a significant need for current research. As a field, we recognize the importance of academic and compensatory skills, assistive technology, and independent living skills. The ECC also identifies the importance of orientation and mobility, social interaction skills, recreation and leisure skills, career education, and visual efficiency skills. Current research does not provide professionals and parents with adequate resources or supports for the educational implementation of the ECC. Specific areas of need include instructional strategies for students and family members in braille, assistive technology, handwriting, listening, and organizational skills. An additional area of high need is the review of current strategies used to allocate time to incorporate the ECC within the school day. Research that focuses on all areas within the ECC should be a key priority for individuals within the field. A focus on skill development in the ECC may increase a student's ability to succeed. Thus, identifying strategies for

increasing these skills, within school and home settings, is essential to the field of visual impairments.

Follow-Up

The studies included in this review indicate the need for more serious attempts at documenting follow-up data. Compared with 40 studies in the previous review, 4 of the current 13 studies included follow-up data. Follow-up data are imperative to the field and researchers in order to gain a more thorough understanding of the overall impact of the strategies. Did the students with a documented behavior change maintain the desired behavior over time or did they revert to preintervention behaviors? Would follow-up data from the other nine studies in this review show a positive behavior change for the participants?

Need for Future Research

As stated by Ferrell (2007) the lack of evidencebased research leaves many educators following practices based on tradition rather than evidence. An increase in research on effective instructional procedures will assist school personnel in meeting the NCLB requirement for evidence-based research and will support professionals in identifying appropriate practices for educating students with visual impairments.

Conclusion

Following an overall analysis, there is an identified decrease in research in the area of visual impairments within residential settings and a slight increase within inclusive settings. In addition, the research continues to focus primarily on boys 7 to 14 years of age with visual impairments and accompanying disabilities (e.g., intellectual disability, communication disorders, deaf and hard of hearing, and other disabilities). Unlike earlier research that focused primarily on aggression and self-stimulation, recent research focused on the development of independent living skills and on the use of applied behavioral analysis procedures that increase positive behaviors. As described in the discussion section. there continues to be a need for research within the area of visual impairments. Research areas of greatest need may include settings and personnel, targeted behaviors, and educational programming/ academics as described in this review. Although

individuals working within the field would benefit from future research in all of the areas mentioned within the discussion, research on the aforementioned areas could assist in providing a strong foundation for services within the area of visual impairments.

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View of Dual-Certified Vision Education Professionals across the United States

Nora Griffin-Shirley, PhD Rona L. Pogrund, PhD* Eric Grimmett, MEd

Texas Tech University Lubbock, TX

Abstract

In 2008, a national online survey and a telephone interview of dual-certified vision education professionals was conducted to provide a comprehensive picture of the efficacy of the dual-certification itinerant service delivery model for the education of students with visual impairments.

Keywords: dual-certified, itinerant service delivery, personnel preparation

Introduction

Previous studies examining the roles and responsibilities of vision education professionals have generally addressed only the single-certified vision education professional (Beliveau-Tobey & De l'Aune, 1991; Uslan, Hill, & Peck, 1989). The focus of this earlier research was on the efficacy of either the certified teacher of students with visual impairments (TVI) or of the orientation and mobility (O&M) specialist. It has only been fairly recently that researchers have begun exploring the role of the dual-certified professional (those individuals certified in both areas) in the field of vision education. Griffin-Shirley, McGregor, and Jacobson (1999); Smith, Griffin-Shirley, Pogrund, Lan, Dignan, and Marsh (2007); and Griffin-Shirley, Pogrund, Smith, and Duemer (2009) have all examined the increasingly common role of the dual-certified vision professional.

The study by Griffin-Shirley et al. (2009) was conducted in Texas in 2007 in three distinct phases to provide a multidimensional picture of the dualcertified vision professional service delivery model The results of the study were similar to the results of previously mentioned studies conducted between 1991 and 2007 (Beliveau-Tobey & De l'Aune, 1991; Griffin-Shirley et al., 1991; Smith et al., 2007; Uslan et al., 1989), stressing the continued need for vision professionals, the lack of O&M services for students, and the overall lack of time to complete job tasks.

The authors suggested that the dual-certified vision education professional service delivery model be investigated at the national level. The current study was presented to and approved by the Texas Tech University Human Subjects Institutional Review Board, and preliminary work began in spring of 2008. To accomplish this goal, a national online survey was administered by the researchers, followed by 30 more in-depth telephone interviews of some of the online survey participants.

Method

National Online Survey

In spring 2008, a national online survey through Select Survey was developed, and this survey was then e-mailed to the 2,336 members of the O&M and Itinerant Teacher divisions of the Association for Education and Rehabilitation of the Blind and Visually Impaired (AER) who were listed in the association's

^{*} Please address correspondence to rona.pogrund@ttu.edu.

database as possibly being dual-certified professionals. The survey was developed based on an earlier telephone survey conducted with vision professionals from Texas. A total of 115 vision professionals responded to the national survey indicating they were dual-certified, but only 108 met the criterion to be included in the study; those excluded were not dualcertified. This national survey covered a number of areas, including demographic information, roles and responsibilities of dual-certified vision professionals, the need for this type of employee in their workplaces, satisfaction with their professional training program, and their perception of the effectiveness of the dual-certified vision education service delivery model. Survey respondents also were asked if they would be willing to participate in the planned follow-up telephone interviews. In reports of the results of the survey, the numbers of respondents for some items vary because some of the respondents did not answer each item.

Participants

The majority (n = 63, 58 percent) of the respondents were middle-aged, ranging from 46 to 65 years of age with 35 percent (n = 38) between 25 and 45 years. They were mostly White (n = 91; 84 percent), with 4 percent (n = 4) Hispanic, 2 percent two or more races (n = 2), 1 percent African American (n = 1), 1 percent Asian (n = 1), and 1 percent Native American (n = 1).

Three of the participants did not answer the question regarding when they received their initial certification. The majority of the responding participants (n = 75, 69 percent) received their initial certification in O&M between 1968 and 2000, with the remaining 28 percent (n = 30) receiving it after 2000. There was one inaccurate response and two missing data (3 percent). Similarly, 78 percent (n = 82) of the participants received their initial certification as a teacher of students with visual impairments between 1965 and 2000, whereas 22 percent received it after 2000.

The average number of years participants taught in either general or special education was 21 years (standard deviation [SD] = 10.3), whereas they functioned as a dual-certified professional for an average of 10 years (SD = 7.7). They were, however, certified as a dual-certified professional for an average of 12 years (SD = 8.5).

National Telephone Survey

Participants

In summer 2008, this national online survey was followed with a telephone survey of 30 dual-certified professionals who agreed to a more in-depth interview; this number reflects 27 percent of the original 108 participants. The interviewees were asked a total of 22 questions primarily concerning their roles and the responsibilities of their current positions, the demographics and numbers of their students, the current and future need for more personnel in their employment settings, the efficacy of their personnel preparation training in preparing dual-certified vision professionals, and their own professional development needs. Telephone interviews were scheduled and conducted at the participants' convenience and then recorded and transcribed.

Analysis

The survey and telephone interview data were analyzed using qualitative and quantitative methods. Descriptive statistics were used for the quantitative data, whereas the authors identified emerging patterns and themes in the participants' qualitative responses. For the open-ended questions, the three authors worked separately to develop categories grounded in the collected data, then coded and examined it for emerging themes. These themes were then compared by the researchers in order to reach a consensus among authors to ensure more reliable results.

Results

National Online Survey

Primary Role

Five of the 108 participants did not answer the question regarding place of employment. Of those responding (n = 103), the participants' current place of employment included public schools (n = 48, or 47 percent), residential schools (n = 13, or 13 percent), private agencies/state rehabilitation agencies (n = 10, or 10 percent), intermediate units or education service centers (n = 8, or 8 percent), county/state departments of education (n = 8, or 8 percent), colleges (n = 5, or 5 percent), and other (e.g., doctoral student, unemployed) (n = 5, or 5 percent).

The total number of participants (n = 108) were employed in 35 different states with the largest pools of respondents from Texas (n = 20, or 19 percent) and Missouri (n = 4, or 4 percent). A combination of urban, rural, and suburban (n = 52, or 48 percent) was the most common geographic area where the participants served their students, with 21 percent (n = 23) serving only in suburban areas, 16 percent (n = 17) only in rural, and 16 percent (n = 17) only in urban areas.

The current job classifications of the respondents varied, with 53 percent working as dual-certified vision professionals incorporating the responsibilities of both TVIs and O&M specialists; 14 percent being O&M specialists only; 9 percent, TVIs only; 8 percent, consultants; 5 percent, teachers in either general or special education classrooms; 4 percent, administrators; and 2 percent, professors. Five percent of the respondents were a student, a speech pathologist, a researcher, or currently unemployed.

During 2007–2008, the approximate percentage of their weekly schedule that respondents (n = 100) served children as TVIs or O&M specialists was 75 percent and 79 percent, respectively. Thirty-five percent of the participants spent their time in other roles such as being employed at a state agency or public school as another type of professional, unemployed, a doctoral student, a travel trainer, an administrator, or working with adults only. Likewise, during 2006–2007, the approximate percentage of their weekly schedule that respondents (n = 97) served children as a TVI or an O&M specialist was 76 percent and 75 percent, respectively.

Service Delivery Preference

Fifty-two (48 percent) of the participants preferred the dual-certified professional service delivery model, whereas 44 (41 percent) preferred the two singlecertified teacher model.

Challenges Faced in the Workplace

The respondents reported that the most challenging aspects of their work included the following:

- Time issues: n = 15 (14 percent)
- Scheduling: n = 9 (8 percent)
- Paperwork: n = 9 (8 percent)
- Teaching students with visual impairments who have additional disabilities: n = 7 (6 percent)

- Caseload size: n = 6 (5 percent)
- Knowledge needed to practice: *n* = 6 (5 percent)
- Serving in dual role: n = 6 (5 percent)
- Interacting with administrators, teachers, parents: n = 6 (5 percent)
- Travel: n = 5 (4.6 percent)
- Communication issues: n = 3 (2.7 percent)
- Transporting students: n = 3 (2.7 percent)
- Funding: n = 3 (2.7 percent)
- Balancing academics and O&M: *n* = 2 (1.8 percent)
- Follow through with staff: n = 2 (1.8 percent)
- The need to teach the expanded core curriculum (ECC): *n* = 2 (1.8 percent)

The following challenges were only mentioned once: adaptation of information for a student, assessment, more pay, teaching in a rural area, teaching the same students annually, the itinerant nature of the work, a lack of braille transcribers, and the difficulty in obtaining adapted textbooks.

Efficacy of Personnel Preparation Program

A majority of 67 (n = 108) participants felt their personnel preparation program prepared them in an excellent/favorable manner to meet the demands of the dual-certified role. On the other hand, 19 felt they were not fully prepared in a number of areas such as research, early childhood, assistive technology, teaching children with cortical/cerebral visual impairment or with deaf-blindness, and the ECC.

There were several specific topics participants would have liked to have covered more extensively in their personnel preparation program, and these same challenges were repeated in the subsequent telephone interviews. These areas of need included the following:

- Teaching children with visual impairments who have additional disabilities (n = 24)
- Early childhood (n = 14)
- Assistive technology (n = 13)
- Other (i.e., collaboration, vision therapy, reading, legal aspects, low vision, behavior management, eye conditions, parents) (n = 11)
- Braille and Nemeth (n = 10)

- Assessment (n = 9)
- O&M (n = 5)
- Nature of itinerant work (n = 4)

National Telephone Survey

Primary Role

Most of these individuals provided some type of direct service to students with visual impairments on an ongoing basis (26 of the 30). Nearly half (14 of 30) of the total interviewees were currently providing both educational services as a TVI and O&M services to their students. Twelve of the respondents, however, were currently acting in only one of their professional capacities. Of these individuals, those acting as O&M specialists outnumbered those acting as TVIs by a two to one ratio (four TVIs vs. eight O&M specialists).

In reporting primary roles, a third of the respondents (10 of 30) did not provide direct services to their students with visual impairments as TVIs, resulting in an overall low mean number of direct-service students: 5.7. In fact, the highest reported number of students served directly by TVIs was just 15. The number of students being served on a consultation basis, of course, ranked much higher, with an overall mean of 13.76. Again, for O&M, direct-service students ranked at about a two to one ratio, with an overall mean of 9.83.

Service Hours

When asked for a weekly hour amount spent teaching the ECC, 11 of the interview participants answered this question by reporting that they spent either no time at all teaching the ECC (n = 3), 1 hour or less teaching the ECC (n = 6), or just a small amount of time (n = 2). When accounting for the six participants who reported that this was not part of their current position, this finding makes for roughly half of all reporting participants (11 of 23). In fact, only five of the participants actually reported spending more than 10 hours a week teaching the ECC to their students. These numbers were even lower when participants were asked for an estimated weekly hour amount spent teaching the academic curriculum. For this question, a dozen respondents reported not spending any time at all working on the academic curriculum with their students, and only two respondents reported spending more than 7 hours on any academic topics.

Interview participants reported a much larger weekly average of time spent teaching O&M, which actually is one of the nine areas of the ECC. Eleven interviewees spent more than 10 hours a week working on O&M skills with their students, and only one individual reported spending no time at all working on O&M; the mean number of O&M teaching hours was 14.65, a stark contrast to the 5.83 mean hours spent teaching the academic curriculum. Ten of the 30 interviewees also were contracting out O&M instructional services to a number of different agencies, including but not limited to, their local school district.

Student Characteristics

The common characteristics reported for both TVIs and O&M specialists were that the students ranged in age from birth to 21; were in either elementary or secondary schools; were in general education, special education, or a combination of the two; and either had low vision or were totally blind. However, it is important to note that 19 of the dualcertified respondents interviewed reported that they served students who had some type of additional impairment; this finding also was evidenced in the reported characteristics of the O&M students, with 15 of the interview participants providing O&M instruction for students with multiple impairments. These students posed a reported challenge to many of the interviewees, with 11 of these dual-certified professionals reporting that their teacher preparation programs did not fully prepare them to work with this population of students.

Service Delivery Preference

It is interesting that more than a third (n = 11) of the dual-certified professionals interviewed for this study reported their belief that services are best provided by a single teacher of students with visual impairments and a single O&M specialist. They reasoned that this type of delivery system simply benefits the student more by providing better services, pointing to the difficulty of defining clear boundaries between a TVI's and an O&M specialist's roles as a major challenge. One comment made was, "I think dual is good, but in some cases, they may need two separate ones so that the student gets more than just one person for 12 years."

However, 10 of the interview participants rated the dual-certified service delivery system as superior, citing this method of delivery as more efficient and

easier to facilitate. According to one participant, "If one person does both, it's just easier. I can do both roles at the same time. It's easier to facilitate when you've got one person. They have enough specialists in their life as it is."

The remaining nine participants remained undecided, reporting that either system can be effective depending on the individual needs of the student as well as the personal style of the teacher. Representative statements for these individuals primarily concluded that what is best is determined by the needs of the individual student and his or her family.

Discussion

The purpose of this study was to ascertain what dual-certified vision education professionals nationwide felt about the efficacy of this type of service delivery model. The participants' responses from both the online survey and the telephone interviews were, of course, very similar. However, it is also evident that the results are very similar with those found in previous studies. The most prevalent role for individuals in each group was as a dual-certified vision professional.

Preference of Dual- vs. Single-Certified Service Delivery

With an almost even division between service preferences, it is impossible to conclude that one method of delivery is preferred over another by the interview participants. However, the fact that two thirds of the dual-certified professionals interviewed did not automatically choose the dual-certified service delivery system in which they were trained does not support this system of service delivery as necessarily superior.

Major Challenges

When taken as a whole, time and scheduling issues were the major challenges faced in their employment settings by the participants. These challenges are described in the following statement: "Because I travel great distances every day, the time that I spend on the road is a challenge in that it reduces the time I have for students."

Satisfaction with Personnel Preparation Program

However, telephone interview participants overall felt they were well or adequately prepared by their

personnel preparation program. That being said, both groups overwhelmingly would have liked more information on teaching children with visual impairments who have additional disabilities while they were in their training programs. Additional areas of need included more exposure to working with infants and toddlers, additional training in assistive technology, and more training in working with students with cortical visual impairment. The telephone interviewees also called for more information concerning mobility for students in wheelchairs and the use of other adaptive mobility devices as well as O&M for young children, whereas the survey participants listed early childhood and assistive technology as their second and third choices. Concerning distance education, one participant wrote: "being able to have more opportunities to apply and practice what we learned would make distance education programs better." The dual-certified service delivery model, from the perspective of the dually-trained professionals themselves, appears to have both its strengths and shortcomings. Balancing both roles, along with the logistical demands of the job, is a challenge for many of these professionals. It is clear from previous demographic data on the population of students with visual impairments (Dote-Kwan, Chen, & Hughes, 2001; Hatton, 2001) and from these selfreports that the largest group of students being served are those with visual impairments and additional disabilities. The lack of confidence by vision professionals in how to effectively serve this population of students is reflected in this study's results. Such findings continue to support the need for personnel preparation programs to place a greater emphasis on meeting the needs of students with multiple impairments.

Service Time

The issue of increased caseload size, some reporting up to 72 students, may also be a factor in the lack of direct-service time available. The perception that students served by dual-certified professionals are getting less O&M and more services from the role as a TVI, as indicated in previous studies, was not fully supported by the findings of this study because more students seemed to receive direct O&M services than direct TVI services. Questions need to be asked as to whether the increase in students with visual impairments and additional disabilities, funding resources, and/or lack

of preparation are all contributing factors to the findings of this study.

Amount of Time Teaching ECC

One of the findings of this study that is of concern is the small amount of time many of the dual-certified professionals in an itinerant model reported actually teaching areas of the ECC to their students. It raises the question as to whether these professionals are primarily serving in a consultant role with little time devoted to direct teaching in the specialized areas of the ECC, other than those teaching O&M skills. Is this finding due to caseload size and lack of time to adequately evaluate and meet the specialized needs of these students, to lack of confidence and knowledge on the part of professionals as to how to evaluate and teach the ECC, or to the impact of the focus on inclusion to the point of neglecting other significant areas of instruction that may be in the best interest of students with visual impairments?

If dual-certified vision professionals are not providing direct instruction in the ECC or in the core curriculum to their students and are not academic tutors, then the question must be asked as to what these professionals are actually doing with their students. Are they only serving in a consultative role to other general and special education teachers regarding accommodations and modifications and providing accessible materials? If so, then who is teaching all of the significant areas of the ECC that have been identified in the National Agenda (Huebner, Merk-Adam, Stryker, & Wolffe, 2004)? Are students just not getting instruction in these critical areas, other than O&M, that are needed for independence and success as an adult after they are out of the educational setting? This finding lends itself to further scrutiny of the itinerant service delivery model in general, and particularly, services provided by dual-certified vision professionals, as to whether the needs of students are actually being met

Limitations of the Study

There are a number of limitations inherent in the chosen methodological approach of the researchers. These limitations include the low survey-response rate, the use of convenience sampling, and the interviewees' subjective biases. The obvious issue with an overall low response rate is that the results will reflect only the perceptions of the sample and not the population as a whole. The cover letter for the survey stated potential participants should not complete the survey if they were not a certified O&M specialist and a TVI. Of the 2,336 AER members who received the survey, the authors do not know how many individuals actually met this criterion, making the actual response rate hard to determine. Therefore, these perceptions cannot be generalized to the total population of dual-certified vision education professionals. Kumar (2005) mentions the disadvantages of a guestionnaire as being a low response rate (20 percent) combined with a selfselecting bias among the people who return surveys. Participants may have consulted with one another prior to completion of the survey. Additionally, they may have not understood an item or they may have read the survey prior to completing it, which may have influenced their answers to a particular item because they have answered a previous item in a certain manner (Kumar, 2005).

Gall, Borg, and Gall (1996) define a *convenience sample* as "a group of cases that are selected simply because they are available and easy to access" (p. 756). Gall et al. (1996) caution readers of studies using convenience samples about making generalizations. The sample used for the online survey comprised the members of the Orientation and Mobility and Itinerant Divisions of the Association for Education and Rehabilitation of the Blind and Visually Impaired (AER). Other professional organizations were not contacted for potential subjects. All of the authors are members of AER. If replicated, a future study needs to access other dual-certified vision education professionals through other professional organizations.

In addition, the disparity in caseload numbers between itinerant vision professionals and consultants often skewed the data to a certain degree, resulting in large standard deviation results. For instance, when asked about caseloads, half of the respondents had 20 students or fewer currently receiving services, whereas those individuals acting as consultants might have as many as 72 students. The resulting standard deviation of 17.2 is problematic when attempting to determine an exact mean for this population.

The telephone interviews were conducted by a graduate assistant with biases that may have

influenced a participant when he probed for more information on some of the open-ended items. To minimize this problem, only one interviewer conducted the interviews.

Conclusion

In summary, the results of the Griffin-Shirley et al. study (2009) conducted in Texas are similar to those of this national study's findings. In the Texas study, the preference for dual- or single-certified professionals was almost equal. However, in this national survey, there was a slightly higher preference for the dual-certified model by the participants. This opinion was in line with the administrator preference in the previous study. According to the findings of both the Texas and the national studies, dual-certified vision professionals face unique challenges due to the combination of their dual roles, foster a multiplicity of responsibilities beyond even that of a TVI or an O&M specialist in serving this very diverse student population, have mixed opinions on the effectiveness of using this service delivery model with students with visual impairments, and have mixed perspectives about the future need for more dual-certified vision professionals. The majority of these professionals indicated that their respective personnel preparation programs did an exceptional job in preparing them (Griffin-Shirley et al., 2009).

Still, there are questions that remain unanswered regarding this service delivery model, and these questions are important enough to require further study. One area of particular need that remains is examining the perspective of parents of children with visual impairments regarding the effectiveness of the dual-certified vision professional. An investigation of student outcomes related to this type of service delivery model also needs to be undertaken to determine its ultimate efficacy in meeting the individual needs of students with visual impairments.

Future research also needs to include observing dual-certified professionals nationwide and evaluating student performance in both the core and expanded core curricula when being served by dualcertified vision professionals on an itinerant basis to truly answer the question of the efficacy of the dualcertification professional model of service delivery. As more research is conducted on the dual-certified model, personnel preparation programs in visual impairment can better adapt to changes in this constantly evolving field of education. Public policy makers and educational experts can then evaluate if current service delivery models are indeed meeting the needs of the students they are intended to serve.

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View of Dual-Certified Vision Professionals

The Effectiveness of the Nemeth Code Tutorial for the BrailleNote

Gaylen Kapperman, EdD* Jodi Sticken, MSEd Thomas J. Smith, PhD

Northern Illinois University DeKalb, IL

Abstract

This study evaluated the effectiveness of a software tutorial that can be installed on the BrailleNote and used by students who are blind to learn the Nemeth Code of braille mathematics notation. Performance on reading and writing mathematical symbols for students with visual impairments who completed the tutorial was compared to the performance of a matched control group. Results indicated that the students who used the tutorial showed significantly greater growth in both reading and writing mathematical symbols. Additionally, the amount of time students spent on the tutorial was significantly associated with growth on both performance measures.

Keywords: Nemeth Code, braille, mathematics, BrailleNote, blind students

Introduction

It has been nearly 50 years since Dr. Abraham Nemeth (1962) published the braille code of mathematics that he developed, yet many students who are blind still do not have the opportunity to learn to read and write braille mathematics. Research has shown that the major reason for lack of instruction in the Nemeth Code is that teachers of students with visual impairments are not being trained in the Nemeth Code in their preparation programs (Amato, 2002; DeMario, Lang, & Lian, 1998; DeMario & Lian, 2000; Kapperman, 1994; Kapperman & Sticken, 2003; Wittenstein, 1993). In the most recent study, Rosenblum and Amato (2004) reported that little change had taken place in spite of earlier findings. In a national survey of teachers of children with visual impairments, they found that 71

* Please address correspondence to gkapperman@niu.edu. percent of 128 respondents (who emanated from 36 universities and were practicing in 41 states) reported that their preparation in the Nemeth Code was either poor or nonexistent.

This consistency of research findings over the past decade is remarkable. It is therefore not surprising that students who are blind achieve so poorly in mathematics, given that their teachers possess less than adequate knowledge and expertise in the braille code that would enable them to read and write basic mathematical symbols.

Unfortunately, at the present time, it is difficult in many cases for individuals who are blind to become proficient in the Nemeth Code without formal instruction. The Nemeth Code Tutorial for the BrailleNote was developed as a tool for students to use independently to learn to read and write the braille symbols for mathematics. It was also designed to facilitate teachers' efforts to provide appropriate instruction in the reading and writing of the Nemeth Code. If effective, this interactive tutorial could make it possible for capable braille readers to improve their

	Mean	Mean Grade	Mean Math	Mean Reading
	Age	Level	Grade Level	Grade Level
Treatment ($n = 28$)	13.3	6.9	6.7	6.4
Control ($n = 28$)	12.7	6.4	6.1	6.2

Table 1. Mean Grade Levels for Treatment and Control Groups

access to fields that rely upon knowledge of mathematics. The purpose of the present study was to examine the effectiveness of the Nemeth Code Tutorial for the BrailleNote on the reading and writing of mathematical symbols among 5th- through 11th-grade students with visual impairment.

Method

Participants

Announcements inviting participation by teachers and students were forwarded to all instructional materials centers in the United States that provide services for students who are blind. The researchers requested that officials of those organizations use their communications networks to inform teachers in their states regarding the opportunity to participate in the project.

To be eligible for participation in the study, students had to be enrolled in at least the 5th grade but no higher than the 11th grade at the beginning of the treatment period. They had to be competent braille readers, functioning academically within 2 years of their grade placement in reading and mathematics. Each student had to have ready access to a BrailleNote with a braille display and be proficient in the operation of this device. Grade placement, reading and math instructional levels, and braille competence were reported by each applicant's vision teacher, based on the standards specific to each student's school district. Proficiency with the BrailleNote was also reported by each applicant's teacher, based on the application of a skills checklist developed by the researchers.

The project staff received inquiries from 63 teachers who expressed interest in participation. For various reasons, 6 of these individuals did not complete the process for enrolling in the project or failed to complete the tasks required within the project. Thus, the treatment period concluded with a total of 57 students and 55 different teachers (with 2 teachers having 2 students each enrolled in the

project). Students in the treatment and control groups were then matched based on grade placement, math achievement grade level, reading achievement grade level, and the discrepancy between grade placement and math achievement grade level. One student from the control group was omitted from the sample due to the lack of a matched counterpart from the treatment group. Tables 1 and 2 provide descriptive information about the participants.

Instrumentation

The math symbol knowledge instruments were developed during the 2006–2007 academic year. They consisted of two equivalent forms of the two instruments: (1) a writing test and (2) a reading test. Each of these tests contained 75 items that were representative of the content of the tutorial. Teachers were instructed to administer the tests without providing any prompting or assistance to their students; audiotapes of all test sessions were used to verify that teachers adhered to that requirement.

The writing test required the students to braille Nemeth Code expressions with a braillewriter as their

	Treatment Group Frequency (Percent)	Control Group Frequency (Percent)
Gender		
Male	15 (54)	14 (50)
Female	13 (46)	14 (50)
Ethnicity		
Caucasian	20 (71)	22 (79)
African-		
American	3 (11)	2 (7)
Asian	4 (14)	3 (11)
Other	1 (4)	1 (4)

Table 2	2. De	mographic	Characteristics	of	Treatment
and Co	ontrol	Groups			

Nemeth Code Tutorial and the BrailleNote

teachers read the expressions to them (e.g., "Write the fraction, two thirds, in horizontal format using the regular fraction line for this type of fraction."). Teachers were instructed to terminate the writing test when a student was unable to braille five items in a row in the sequence of test items and then to commence with the reading test. Students were instructed to read as many of the symbols (items) as they could from the reading test until they could no longer successfully read five test items in a row in the sequence of test items. Both writing and reading tests and audiotapes were returned to the project staff in self-addressed stamped envelopes.

At the conclusion of the treatment period (spring 2008), equivalent forms of the writing and reading tests were administered as posttests following the same procedures described previously. Three raters from the project staff independently evaluated test responses by judging the accuracy of the written responses and by listening to the audiotapes of the students reading their responses on the reading evaluation instrument. The mean rate of consistency for the three raters across items on the math reading test was 96 percent (pretest) and 92 percent (posttest). Rater consistency for the math writing test was 95 percent (pretest) and 92 percent (posttest). Where discrepancies in the raters' evaluation of an item occurred, the item score was recorded as the rating for the majority of the raters (i.e., the rating given by two of three raters). For each student, a total score for the reading and writing tests was then computed as the sum of the correct responses to the items. Split-half reliability was strong for scores from the math reading test (.97 and .96 for the pretest and posttest, respectively) and also for scores from the math writing test (.94 and .95 for the pretest and posttest, respectively).

Procedure

The study of the efficacy of the Nemeth Code Tutorial for the BrailleNote was implemented using an experimental design incorporating matched pairs of students. One student of each pair was randomly assigned to the treatment group and the remaining individual of each pair was assigned to the control group. Pretest and posttest instruments assessing knowledge of math symbols were developed to be administered at the beginning and conclusion of the treatment period.

The researchers began by developing the content of the tutorial as well as collaborating with the programmers employed by Humanware Group, the manufacturer of the BrailleNote. This work began in 2005 and continued through 2006. During the 2006– 2007 academic year, the research staff undertook a nationwide recruitment effort to enlist the participation of students who were blind along with their special education teachers. Plans for the research effort were approved by the members of the institutional review board of the researchers' home institution, and informed consent was obtained from parents, students, and teachers. During that same period, the pretest and posttest instruments were developed to assess knowledge of mathematics symbols and expressions.

Before the beginning of the 2007–2008 academic year, information packets were sent to teachers of both groups. These packets contained a DVD in which the project director demonstrated the pretest administration method, a brief questionnaire pertaining to the content of the DVD, and a BrailleNote competency checklist. Questionnaires were completed and returned to ensure that the participating teachers had viewed the DVD and understood the instructions and that participant students had the requisite proficiency in operation of the BrailleNote.

After the project staff received verification that the teachers had viewed the DVDs and that their students were proficient with the BrailleNote, the staff of Humanware Group sent a copy of the tutorial to each student-teacher team to be installed on each student's BrailleNote. The teachers also received a CD that displayed the content of the tutorial in print format, and two braille-reading teachers received an additional copy of the software to be installed on their personal BrailleNotes.

At the start of the 2007–2008 school year, teachers in both groups administered the pretest and returned them to the project headquarters. The teachers of the treatment group were instructed to begin using the tutorial with their students while the teachers of the control group led their students through their regular educational program without using this software. Students in both groups took the posttest at the end of the 2007–2008 school year; their teachers then forwarded the results to the project staff.

Results

Table 3 shows descriptive statistics for scores from the reading and writing tests. When the

	Read Pret	ling est	Read Post	ling test	Writ Pret	ing est	Writ Post	ing test
	М	SD	М	SD	М	SD	М	SD
Control group (n = 28)	26.46	13.47	32.21	13.78	11.57	10.03	15.36	9.75
(n = 28)	29.11	17.70	41.57	18.65	15.14	13.34	29.18	16.43

Table 3. Descriptive Statistics for Math Reading Test and Math Writing Test Scores

difference in math reading growth scores (posttest minus pretest) was evaluated, a paired-samples *t* test indicated a statistically significant difference in growth between the treatment group and control group, t(27) = 2.58, p = .02, with a moderate effect size for the group difference (d = 0.49). Here, the treatment group showed greater growth than the control group. Similarly, a paired-samples *t* test indicated that the treatment group showed significantly greater growth than the control growth, t(27) = 5.37, p < .01, with a large effect size (d = 1.01). Table 4 provides descriptive statistics for these growth scores and the graphs shown in Figures 1 and 2 depict the growth differences.

Because the distribution of growth scores for the reading and writing tests showed moderate positive skewness, Wilcoxon matched pair (nonparametric) tests for group differences (Siegel & Castellan, 1988) were also calculated. Results again indicated significantly greater growth in math reading (z = -2.46, p = .01) and math writing (z = -4.11, p < .01).

Scores from the treatment group were next examined to determine whether specific student characteristics—gender, ethnicity, age, and amount of time the student spent on the tutorial—could explain variability in scores. No statistically significant gender differences were evident in mean math reading test growth, t(26) = 0.06, p = .95, or in

math writing test growth, t(26) = 0.58, p = .57. Similarly, when ethnicity was considered as a predictor, no statistically significant mean differences were apparent between ethnic minority (non-White) students and ethnic nonminority (White) students for math reading growth, t(26) = 0.22, p = .83, or math writing growth, t(26) = 0.82, p = .42. When student age was considered as a predictor, no statistically significant correlation was observed for math reading growth (r =math writing .19. р = .33) or growth (r = .09, p = .67). Amount of time spent by a student using the Nemeth tutorial, however, did significantly predict growth in math reading (r = .52, p < .01) and math writing (r = .46, p = .01). Figures 3 and 4 provide scatterplots that illustrate this relationship.

The tutorial, then, appears to work equally well with males and females, with minority and nonminority students, and across the age groups used in this study. The amount of time spent using the software, however, does appear to influence the effectiveness of the tutorial, with students spending more time with the software showing greater growth in both math reading and writing than students spending less time with the software.

Discussion

If an individual who is blind cannot read or write the braille symbols representing mathematics, potential for

	Reading	Growth	Writing	Growth
	М	SD	М	SD
Control group ($n = 28$)	5.57	5.76	3.79	3.94
Treatment group ($n = 28$)	12.46	11.70	14.04	10.04

Table 4. Descriptive Statistics for Growth in Math Reading Test and Math Writing Test Scores

Nemeth Code Tutorial and the BrailleNote



Figure 1. Growth in math reading test scores by treatment condition.

math achievement is dramatically diminished. The data demonstrate that the use of the Nemeth Code Tutorial results in a significant increase in the ability of students who are blind to read and write the code of

braille mathematics. This software can be used to enhance the ability of students who are blind to access and study mathematics with the logical result of enabling students who are blind to attain higher levels







Figure 3. Scatter plot of growth in math reading test scores by time spent on tutorial.

of achievement in mathematics. Consistent use of the Nemeth Code Tutorial, according to the results of this study, will eventually result in increased levels of achievement in mathematics by the nation's students who are blind.

A disadvantage of the Nemeth Code Tutorial is that the software has been designed to operate only on Humanware Group's BrailleNote; it will not function on any other device. This results in two major drawbacks. First of all, not all students who are blind have access to a BrailleNote. Some students use competitors' products. A second major problem is that many students who are blind in the United States receive no assistive technology training and, therefore, do not have access to or proficiency in operating the BrailleNote (Kapperman, Sticken, & Heinze, 2002; Kelly, 2008). These two conditions will hinder the use of the tutorial by a number of otherwise qualified students who are blind. Continued research and development of a variety of learning tools for reading and writing the Nemeth Code is an important endeavor to improve access for students who are blind and subsequent achievement in mathematics. Additionally, teacher training should include intensive instruction in the Nemeth Code. Finally, a major area that requires considerable attention by our profession is the provision of appropriate training in assistive technology for students who are blind or visually impaired. These three efforts should result in increased achievement in mathematics by the nation's students who are blind.

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Nemeth Code Tutorial and the BrailleNote

Figure 4. Scatter plot of growth in math writing test scores by time spent on tutorial.

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Depression and Burden in Spouses of Individuals with Sensory Impairment

Lisa Westaway, MSc Walter Wittich, PhD*

MAB-Mackay Rehabilitation Center Montreal, Quebec, Canada

Olga Overbury, PhD

University of Montreal Montreal, Quebec, Canada

Abstract

Vision, hearing, and dual-sensory impairments are common causes of disability in older people. Most care for these individuals rests with their spouses. This study examined the level of burden on caregivers of spouses with visual, hearing, or dual-sensory impairment and age-matched controls and examined the correlation between burden and depression. Spouses (age 65–93) of 19 individuals diagnosed with unisensory or dual-sensory loss and 6 controls completed the Caregiver-Burden Scale and the Geriatric Depression Scale. Mann–Whitney *U* tests only indicated a statistically significant higher level of burden in spouses in the control group when compared to those of hearing-impaired participants. When comparing depression scores among groups, no statistically significant differences were found. Pearson's correlation coefficient indicated a statistically significant relation between burden and depression across all groups. These findings replicate the association between burden and depression in older people and suggest a more widespread link, independent of disability or health status.

Keywords: burden, depression, spouse, sensory impairment

Introduction

Although rehabilitation is typically focused on the client with the impairment, spouses are an integral part of the rehabilitation process, yet their needs are rarely addressed. Service providers are often forced to neglect caregivers and place priority on service delivery for their clients based on budgetary and strategic planning priorities. This paves the way for higher anxiety, increased stress, increased physical needs, and overall burden in these individuals. A question of much concern is, therefore, how a visual, hearing, or dual-sensory loss can impact the spouse or partner who is also a caregiver. Furthermore, do the effects differ depending on the type of loss and is the level of burden compounded when caring for a person with dual-sensory impairment? The present study examined differences in level of burden on the caregiver of a person with a visual impairment, a hearing impairment, or a dual-sensory loss.

Demographics and Aging

Today, Canadians live on average 20.4 years longer than at the beginning of the 20th century, are

^{*} Please address correspondence to wwittich@ssss.gouv.qc.ca.

financially better off and better educated, have an increased knowledge of technology, and are more active (Turcotte & Schellenberg, 2006). Between 1981 and 2005, there was an increase from 2.4 million to 4.2 million seniors across all provinces and territories. Although health tends to decline with age, Statistics Canada has documented that seniors, in general, are less psychologically distressed and less stressed and have an increased level of well-being than their younger counterparts, citing resilience and life experience as the cause. However, when activity limitations become a consequence of health-related issues, quality of life and integration into society are often affected (Turcotte & Schellenberg, 2006).

Age-Related Vision Loss

In 2002, Statistics Canada reported that 40.5 percent of the total population aged 65 and older had some type of disability. Vision-related problems were ranked third (after rheumatism and high blood pressure) as the most chronic disabling conditions in later life. Almost 21 percent of the 40.5 percent of seniors with disabilities were afflicted with a vision loss. The percentage of individuals affected with an untreatable vision loss was estimated at 4 percent for seniors aged 75 and older, increasing to 8 percent at age 80 or older. Vision loss was greatly underreported in the elderly population with only 50 percent being appropriately diagnosed. According to the World Health Organization (WHO; 2010), 161 million people worldwide were visually impaired in 2002. Of these, 37 million were blind and another 124 million had low vision. By the year 2020, the WHO estimates that there will be 76 million people who are blind in the world with 54 million being 60 years of age and older. In Canada alone, there are an estimated 666,500 persons who are blind or who have low vision. The main conditions resulting in vision loss in persons aged 65 and older in developed countries include macular degeneration, glaucoma, and diabetic retinopathy (Maberley et al., 2006).

Age-Related Hearing Loss

Hearing loss is a disability that initially often goes unnoticed, but in fact more than 50 percent of Canadians older than the age of 65 have an inner ear hearing loss (Government Services Canada, 2006). Statistics Canada (2002) reported hearing impairment as affecting 39.6 percent of individuals aged 65 and older, an estimated 575,000 individuals. The WHO (2010) estimated in 2005 that 278 million people worldwide have moderate to profound hearing loss in both ears. The most prevalent condition affecting hearing for elderly people is presbycusis, an age-related decline in frequency sensitivity that reduces the perception of high-pitched sounds and certain consonant sounds in speech. This sensoryneural hearing loss is caused by damage to the receptors that can no longer generate electrical signals. Amplification, speech reading, communication strategies, or cochlear implants can be helpful in diminishing the effects of this loss. Finally, tinnitus is a common hearing-related problem. It can be an extremely debilitating condition characterized by the sensation of sound when there is no external noise. The sounds vary from ringing or chirping to buzzing or whistling, to name a few (Government Services Canada, 2006).

Age-Related Dual-Sensory Loss (Hearing and Vision)

Approximately 9 percent to 21 percent of people aged 70 and older have some degree of dualsensory loss and the prevalence tends to increase with age (Brabyn, Schneck, Haegerstrom-Portnoy, & Lott, 2007; Saunders & Echt, 2007). Dual-sensory loss can be classified into four categories: congenital deaf-blindness, congenital visual impairment with acquired hearing loss, congenital hearing impairment with acquired vision loss, and acquired hearing and vision impairment. In the context of the present study, the focus was on the lattermost of these four groups because their number is rapidly increasing as the population ages. Research in single sensory impairments can provide us with insight into the losses associated with dual-sensory impairment. However, these individuals present with unique and complex issues pertaining to the combined loss of both hearing and vision. A strong relationship between the two impairments has also been documented, showing that, for each one-line reduction in best-corrected visual acuity, hearing loss prevalence increases by 18 percent (Brabyn et al., 2007).

Living Arrangements and Care Giving

Kane, Penrod, and the Center for Practice Innovations (1995) reviewed ground-breaking research from over 20 years ago, demonstrating the significance of the family caregiver as the center-

piece of the long-term care system, a situation that has not substantially changed since then. Families now provide 80 percent to 90 percent of assistance to retired individuals. When spouses are available and capable, they are the first to become caregivers. Horowitz (1985) reported similar findings, stating that caregiving to frail elderly was most extensively provided by spouses. Research has shown that approximately 4.2 million Americans provide care to an impaired spouse, a number that has most likely increased by now (Kane et al., 1995). The living arrangements of older people can have a significant impact on the type of care they receive. For example, an older person in need, living with a spouse, has easier access to support and care than one living alone. In 2001, 93 percent of seniors older than the age of 65 were living in private households. Of those aged 65 to 74, 54 percent were living with a spouse, although this number decreased in the over-85 age group due to women's higher life expectancy. Additionally, in 2002, 26 percent of seniors living in private dwellings stated that they received help necessitated by chronic health problems that affected their ability to perform activities of daily living. Persons aged 85 and older were four times more likely to require support than 65- to 75-year-olds (Turcotte & Schellenberg, 2006).

Informal care giving has almost always been associated with increased burden on the family member. Some respite programs and respite strategy courses exist for caregivers; however, the system appears to be failing this important group, evidenced by burnout, stress, and illness in the caregiver. Horowitz (1985) described one of the negative consequences of caregiving to be decreased physical health due to the considerable amount of physical labor. Ekberg, Griffith, and Foxall (1986) found that caregiving spouses exhibit symptoms of emotional and physical exhaustion, resentment, and negativity. Caregivers report poorer physical health and chronic conditions such as hypertension, arthritis, or back pain (Kane et al., 1995). Caregiving has also been shown to cause emotional strain, psychiatric issues, depression, anger, and anxiety. Therefore, the burden associated with caregiving is extremely important to address (Kane et al., 1995).

Impact of Visual Impairment on Spouse

Very few studies exist examining the effect of vision impairment on a spouse. In one study by

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Strawbridge, Wallhagen, and Shema (2007), a spouse's vision impairment was correlated with partner depression, decreased physical functioning, decreased well-being, limited social involvement, and decreased marital quality. Pearlin (1989) described visual impairment as the primary stressor on the caregiver, whereas secondary stressors would be the physical and psychological effects. Strawbridge et al. (2007) specifically examined to what extent the vision impairment of an older spouse can impact his or her partner's health and well-being. A range of variables were explored, such as physical functioning, mental health, social involvement, and marital quality. The results demonstrated that a spouse's vision impairment was significantly correlated with negative partner outcomes in all variables studied with the exception of social involvement. However, getting the caregiver involved in and educated about the rehabilitation process has been shown to be beneficial by, for example, reducing the level of perceived burden (Dumas & Sadowski, 1984).

Impact of Hearing Impairment on Spouse

Research evaluating the impact of hearing loss on intimate relationships is more readily found but still remains scant. Hallberg and Barrenäs (1993) documented the impact of middle-aged men's noise-induced hearing loss on their intimate relationships. Variables of interest included severe communication problems, a perception that the relationship had become less personal, and irritation and aggressiveness of the partner in relation to annoying behavior (not answering the telephone or setting the volume of television or radio too high). In interviews with men affected by noise-induced hearing loss, the spouse was often described by the husband as the person with the least understanding of the disease (Hallberg, 1996). Hétu, Jones, and Getty (1993) evaluated the effects of hearing impairments on the intimate relationships of older people. They believed that the onset of the hearing impairment leads to a process of adaptation and ambiguity for both partners, which could have a straining effect on the intimate relationship. In adjusting to the sudden or progressive hearing loss, each partner may experience increased effort, stress, anxiety, isolation, negative self-image, and difficulties in family relationships as a result of communication breakdown. Problems reported by the unimpaired partner include

stress, tension, irritation, fatigue, frustration, anger, resentment, and guilt. A longitudinal study by Wallhagen, Strawbridge, Shema, and Kaplan (2004) examined the relationship between a spouse's hearing loss and the partner's physical, psychological, and social well-being 5 years after onset. Their results demonstrated statistically significant impacts in all spheres—physical, psychological, and social.

Impact of Dual-Sensory Loss on Spouse

Very little research exists concerning the effects of a dual-sensory loss on an individual or a caregiver. Much of the research is based on combining the effects of the vision loss with that of the hearing loss, but the simultaneous loss of vision and hearing creates a unique experience with its own characteristics. The situation makes all aspects of daily living more complicated and unsafe. The double loss affects communication, self-esteem, and self-perception and alters relationships (Heine & Browning, 2002). It is believed that the effects of the dual loss far outweigh that of a single sensory impairment due to the fact that the person cannot rely on the other sense (Saunders & Echt, 2007).

The present study examined the level of burden experienced by the caregiver of a person with a visual, a hearing, or a dual-sensory loss as well as agematched persons with no sensory impairments. It was hypothesized that the spouses in the sensory loss groups would report statistically significantly higher levels of both burden and depression when compared to age-matched normals. In addition, spouses of individuals with dual-sensory impairment were expected to report higher levels of burden and depression when compared to either unisensory impairment group. Previous work demonstrated that increased levels of burden have consistently been associated with an increase in depression among caregivers of patients affected by cancer (Stommel, Given, & Given, 1990), stroke (Han & Haley, 1999), Alzheimer's disease (Mittelman et al., 1995), and dementia (Covinsky et al., 2003). Therefore, it was hypothesized that depression would be more prevalent when levels of burden were increased for the sensory-loss population.

Method

The protocol received approval from the institutional ethics review board at the University of Montreal and adhered to the Canadian Tri-Council Statement for Research Conducted with Humans.

Participants

The sample of participants was drawn from spouses of registered clients of the MAB-Mackay Rehabilitation Center, an agency that serves individuals with vision and/or hearing loss. The criteria for participation were the following: English speaking; age 65 and older; and spouse or partner of a person exhibiting a visual, hearing, or dual-sensory impairment according to the Quebec Ministry of Health criteria: visual acuity in each eye less than 6/21 (20/70) or a visual field in each eye less than 60° in the 180° and 90° meridians after correction by appropriate ophthalmic lenses and/or mild to profound hearing loss of 25 dB or greater (Regie de l'assurance maladie du Quebec/RAMQ, 2006). The control group (individuals with no sensory impairment whose spouses are without sensory impairment) was recruited from spouses of family, friends, and colleagues of the primary researcher.

A total of 25 participants was recruited. There were 6 (24 percent) participants who were partners of persons diagnosed with age-related vision loss, 8 (32 percent) participants were partners of individuals diagnosed with age-related hearing loss, and 5 (20 percent) were partners of individuals diagnosed with age-related dual-sensory loss (at least partially sighted and ranked as having a mild to profound hearing loss), as well as 6 (24 percent) age-matched control participants from couples where neither partner experienced sensory impairment. Of the 25 participants, 16 (64 percent) were women, and their ages ranged from 65 to 93 years (M = 75, SD = 7).

Materials

The Caregiver Burden Scale was administered to each participant and determined the level of burden experienced by the spouse (Zarit, Reever, & Bach-Peterson, 1980). This measure has previously demonstrated high levels of sensitivity and specificity in populations such as caregivers for Alzheimer's patients (Martin-Carrasco et al., 2002) as well as good internal validity (Martin-Carrasco et al., 2010). Four of the 29 questions were reverse-scored. Topics covered by the measure included caregiver's health, psychological well-being, finances, social life, and the relationship between the caregiver and the receiver of care. The respondents indicated how much

Impairment of Spouse	<i>n</i> (M/F)	Age M (SD)	Burden Score <i>M</i> (<i>SD</i>)	Depression Score <i>M</i> (<i>SD</i>)
Visual	6 (1/5)	80.2 (8.3)	16.7 (12.9)	9.2 (8.4)
Auditory	8 (3/5)	76.0 (6.2)	6.8 (7.7)	2.8 (2.8)
Dual	5 (2/3)	76.4 (6.7)	23.2 (25.6)	11.6 (12.2)
None	6 (3/3)	68.0 (3.2)	28.4 (16.4)	6.8 (4.3)

Table 1. Descriptive Statistics of the Participant Groups

discomfort their concern caused them by selecting the most appropriate response from 0 (*not at all*) to 4 (*extremely*). A total burden score was calculated and used in the analysis with the four reverse-scored items being subtracted from the total according to previous scoring methodologies (Zarit et al., 1980). Higher scores indicated higher levels of burden.

The Geriatric Depression Scale (Yesavage et al., 1982) was administered to each participant and determined level of depression. This measure also shows high levels of sensitivity and specificity in populations such as older hospitalized patients (Koenig, Meador, Cohen, & Blazer, 1988) as well as persons with visual impairment (Shmuely-Dulitzki & Rovner, 1997). This scale consists of 30 questions with ves or no answers. Participants were asked to respond in reference to feelings over the past week. Ten of the 30 questions were framed positively and scored with one point for a "no" answer. The 20 negatively framed questions were scored with one point for every "yes" response. Scores below 9 indicated a normal state (no depression), scores 10 to 19 equaling mild depression, and scores 20 and over equaling severe depression.

Procedure

Potential participants were identified by professionals of the MAB-Mackay Rehabilitation Center during their global assessment of needs. Basic information was provided to each participant such as the researcher's name, research institution, and goals and procedures of the study. If a client expressed interest, written informed consent was obtained with the knowledge that he or she could withdraw from the study at any time. After having signed the consent form, either the Caregiver Burden Scale or the Geriatric Depression Scale was randomly presented first and completed by the participant during regular service delivery to their partner or spouse. All data were coded without identification on the questionnaires in order to preserve anonymity and privacy at all times.

Results

Summary descriptive statistics of the participants are listed in Table 1. Two-tailed Mann-Whitney U tests were used to conduct pair-wise comparisons among the four groups on their total scores on each measure because the sample sizes were small and the data were not normally distributed. A total of 6 comparisons for each level of burden and depression were carried out. For the results on perceived burden, only one comparison showed statistically significant differences: comparing the level of burden between the spouses of hearing-impaired participants and those in the control group, the level of burden was higher in the control group, U(8, 6) =40, p < .05. None of the comparisons on depression were statistically significantly different. A Pearson's correlation coefficient indicated a statistically significant relationship between level of burden and depression, r = 0.65, p < .01, across all participants indicating that, as burden increased, so did depression (see Figure 1). The sample sizes for subgroup correlations were too small to be meaningful.

Discussion

This pilot study focused on the impact that a spouse's visual, hearing, or dual-sensory impairment has on the level of burden or level of depression in the partner. It was hypothesized that there would be a significant difference in level of burden and depression among the four groups (vision, hearing, dual, and control). In all comparisons but that between spouses of the hearing impaired and the control group with regard to level of burden, no differences were found.



Figure 1. Depression scores as a function of burden scores for all participants. Depression and perceived burden by spouses were statistically significantly correlated across all participants, independent of whether the spouse had impaired vision, hearing, or both or was unimpaired. As depression scores increased, so did perceived burden scores, and vice versa.

The significant difference in level of burden between spouses of the hearing-impaired individuals and the control group is intriguing, considering the fact that the level of burden for the control group was higher. In fact, the levels of burden and the levels of depression in the control group varied widely and were, at times, higher than the levels found in the caregivers of spouses with sensory impairments. Considering that the participants were chosen from a rehabilitation center, it could be argued that these couples were receiving some support that, in itself, could contribute to the well-being in both the person with the impairment and his or her spouse. The control group may not have a similar support system in place, indicating that the beneficial effects of rehabilitation extend beyond the impairment and the actual client.

The considerable variability in the scores, the small sample size, as well as the presence of burden and depression among the groups indicate that burden and depression may be a regular part of the aging process, irrespective of health and disability. Perception of burden and the presence of depression may depend on other factors not considered within this study protocol, such as personality traits, prior family dynamics, economic factors, and family or social support. These factors may significantly contribute to the perception of burden and depression and are worthy of further investigation.

The previous issues point to some limitations of the study. The inclusion and exclusion criteria for control subjects did not consider the possibility of other stressors or impairments in the relationship that may impact burden or depression. Furthermore, several physical, economic, social, and/or personality factors can contribute to the perception of burden or depression and may have contributed to the variability in the data. In addition, recruitment of control individuals from the social circle of the primary researcher may have caused a bias with regard to their social strata. The limited number of participants also weakened the results. Finally, caregiver was defined as a person who is responsible for assisting his or her spouse with activities of daily living. This definition did not take into consideration that even couples with no identifiable health impairment or need for assistance in activities of daily living could be experiencing caregiver burden and depression.

The physiological, social, and psychological changes related to the aging process could impose a similar burden on the spouse. Although older individuals in general are less psychologically distressed than younger people, quality of life often

decreases in the older population and could be reflected in the increased levels of burden and depression (Turcotte & Schellenberg, 2006). Studies examining the association between changes related to the normal aging process and levels of burden and depression could provide valuable insight into the support that couples require as they age.

The positive correlation between level of burden and depression does not indicate which variable caused the other, although they replicate previous findings that level of burden is associated with depression (Covinsky et al., 2003; Han & Haley, 1999; Mittelman et al., 1995; Stommel et al., 1990). Several theories may help to explain why vision impairment can impact a spouse or caregiver's wellbeing. According to Strawbridge and colleagues (2007), the communication theory explains how a relationship can be affected by changes in communication patterns that often rely on nonverbal cues. When a spouse has a visual impairment, much communication and interaction may be lost through unseen gestures, facial cues, and body language, thus having an effect on understanding between the partners. This interpretation, however, needs to be considered carefully because previous research on the constructs of burden and depression has indicated that the general emotional states associated with depression may be reflected in (and thereby largely explain) burden perception (Stommel et al., 1990).

It has been demonstrated that burden is strongly associated with caregiving (Desbiens, Mueller-Rizner, Virnig, & Lynn, 2001; Hallberg & Barrenas, 1993; Hannum Rose et al., 2007; Heine & Browning, 2002; Hetu et al., 1993; Strawbridge et al., 2007; Uttl, Santacruz, Litvan, & Grafman, 1998; Wallhagen et al., 2004); however, not all of these studies made comparisons to age-matched control groups. The positive correlation between burden and depression indicates that when completing an evaluation of client needs, it may also be important to evaluate the spouse's level of burden and/or level of depression in order to provide the necessary support to the client as a whole.

In summary, care giving is most frequently provided by a spouse (Kane et al., 1995), burden is associated with care giving, and burden and depression are positively correlated. This leads to important areas of investigation that have not received substantial attention in recent years, such as whether spouses are caring for their partners effectively, whether any type of support is offered to spouses during the rehabilitation process, and what other variables may have an impact on perception of burden and depression. Although spouses are consistently invited to participate in the rehabilitation process of their partner, clinicians typically provide services to the client only with little consideration of the partner. The results of the present study indicate a link between the client's well-being and the level of burden and depression in the caregiver, pointing toward the need for increased psychosocial intervention with the couple, liaison with community resources, and increased participation from the spouse as a means of improving the rehabilitation process and decreasing levels of burden and depression.

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Practice Report

Facilitating Academic Skills Development by a University Student with Deaf-Blindness

Kate Chanock, PhD*

La Trobe University Melbourne, Victoria, Australia

Abstract

Although the literature on university students with dual sensory impairment discusses the transition from secondary school and accommodations provided by higher education institutions, there is little guidance on the role of academic tutors in supporting such students' development of academic skills. This report describes how a learning advisor and a student have developed ways of working together to improve the student's writing of assignments for her bachelor's degree course. Regular dialogue about these assignments develops familiarity with routines of inquiry in the disciplines, and a streamlined form of response to written work facilitates correction, elaboration, and revision.

Keywords: dual sensory impairment, tutoring

Introduction

This article, by a learning advisor in an Australian university, is a contribution to practice in supporting the development of academic skills by students with deaf-blindness in higher education. It indicates a role for learning advisors, or senior writing center staff, in working collaboratively, one-to-one, with students with a dual sensory impairment. Dialogue about the assignments the student is doing for his or her regular classes develops familiarity with routines of inquiry in the disciplines, and a streamlined form of response to written work facilitates correction, elaboration, and revision.

Literature Review

Publications about students with deaf-blindness in higher education deal mostly with the challenges of transition from home and school to living independently; assessing the capacity of particular institutions to support a student with dual sensory impairment; making plans, in consultation with relevant staff, about living arrangements, mobility, and accommodations such as alternative modes of assessment or exam conditions; and accessing assistive technology, interpreters, and/or notetakers (Enos & Jordan, n.d.; Everson & Enos, 1995; Ingraham, Belanich, & Lascek, 1998; Pasupathy, 2006; Transition Guide, n.d.). Social issues are also touched upon, from the emotional experience of dealing with people unfamiliar with deaf-blindness to establishing classroom routines that ensure effective communication and inclusion (e.g., Talbot-Williams, 1996). Considerable thought has been given to raising students' awareness of their own skills. preferences, and needs and of what their postsecondary institutions may offer, and some effort has been made to orient teaching staff to the difficulties that students with deaf-blindness may experience and to explain how they can create a good environment for learning (Bhattacharyya, 1997; Bourguin, 1994; Jordan, 2001; Lago-Avery, 2001; Spiers & Hammett, 1995; Stodden & Conway, 2003).

There is very little, however, on the way that students who are deaf-blind work with academic support staff. Tutors are mentioned among the

^{*} Please address correspondence to c.chanock@latrobe.edu.au.

services that students may require, but it is not clear what their role is in the student's academic work. An exception is the NETAC Teacher Tipsheet devoted to tutoring students who are deaf or hard-of-hearing (Orlando, 1998), but the kind of tutor expertise it describes is guite different from that available in my region, Australia and New Zealand, where responsibility for helping students to develop academic skills rests with academic language and learning (ALL) advisors who are specialists in academic discourse but not in particular discipline subjects and different again from the role of writing centers in North America, which often respond more generically to students' writing. Orlando (1998) is explicit that a tutor must be "either a teaching faculty member or a special education staff member" who "should be familiar with all the requirements for courses they tutor, including classroom lectures, reading assignments, individual and group presentations, and preparation for exams." I would like to suggest, however, that ALL advisors or senior writing center staff, with less subject expertise than Orlando posits but with a broader range of experience, could take on this role, as I have done in working with a student with deaf-blindness who is studying for a B.A.

Description of Subject

Michelle's premature birth at 28 weeks damaged her retinas. She began losing her hearing during early childhood as a result of cholesteatoma and frequent ear infections. She attended a school for the blind up to 8th grade, with moderate hearing loss that did not affect her acquisition of spoken language. Although others assumed that she would go into sheltered workshops after school, Michelle resisted this idea and pursued her passion for music at the Royal National College for the Blind in London. As both her hearing and her vision have continued to deteriorate over the five decades of her life, Michelle has responded resourcefully by adopting new methods of communication. Now living in Australia, she has learned to sign in Auslan (Australian Sign Language: for a description, see Johnston & Schembri, 2007); she has had a cochlear implant; and when her vision worsened to the point where she was no longer able to use magnification to read text, she learned braille. At present, Michelle speaks and/or uses tactile signing with an interpreter for face-to-face communication and uses a refreshable

braille display to read texts accessed via her computer (for a description of this, see Ingraham, Belanich, & Lascek, 1998).

In the second half of her forties Michelle returned to academic study; she finished her secondary schooling while also taking a qualification in Auslan and then enrolled in the B.A. at La Trobe University. At first, this proved frustrating despite the university's provision of all the usual kinds of support: conversion of readings into accessible formats, extended deadlines for assignments, sign language interpreters and note takers in classes, and library assistance. Although all these provisions are essential, they do not deal with the problem of understanding the purposes of the disciplines, which dictate the focus, scope, and kinds of inquiry expected in assignments and, in turn, the structures of writing. For many students, these remain opaque well into their course of study, and ALL advisors are available to clarify academic expectations, approaches, and conventions; to respond to students' efforts to articulate their ideas; and to help them gradually adopt the discourses of their disciplines. The Deaf and Disability Liaison Officer arranged for Michelle to consult me in this capacity, and together we began to evolve ways of working within the constraints of her very limited vision and hearing.

Developing a Way of Working

Many students find it helpful to talk about what an assignment requires, how they plan to approach it, what they know, and what they need to find out. An ALL advisor can draw them out on this, and at the same time help them to identify the kinds of questions that their disciplines ask, judging from the subject guides that students bring to their appointments. The advisor need not know all about the question and the information needed; his or her role is to develop the student's awareness of why that question has been asked, getting him or her to think about it in the context of the theories and problems under discussion in that subject, and helping him or her to decide what information is relevant to answering it.

To enable Michelle and me to work in this way, we set up a weekly session with her interpreter. In most respects, these sessions proceed as they would with a student who has hearing and vision: I ask Michelle

about the assignments she is working on, and draw out what she knows and what she needs to know. However, as she cannot take notes for herself while her hands are occupied with tactile signing, I take notes as we talk, and then type them up and e-mail them to her within a couple of days after each session. In this way, we create a record of our discussions (not a transcript, but the main points that we have covered), which serves as a reminder for Michelle and, at the same time, can be shared with her lecturers if Michelle wishes to include them in the discussion.

The following is an example of such a record, in which it is possible to see how the discussion progressed:

- From Michelle's initial ideas
- To a joint focus on how these ideas related to the role of discourse, a theoretical concept deployed in this history subject
- To some questions that would take Michelle's thinking further
- To her own observation about the contradictory messages being conveyed in the discourse she is looking at

In addition, the e-mail served as a reminder of various practical arrangements that needed to be made, and, in this respect, it went beyond the functions of a session involving a student without a disability.

Dear Michelle,

Here are my notes of today's discussion with you, with Sally interpreting. As we discussed, you will forward this message to [your lecturer] so that she is in the picture about your ideas about your history essay, and what advice you need on reading or viewing material for that essay.

You chose the first option, question 1 on page 31 of your subject guide. It says, "War was an invitation to manliness' (George Mosse, Nationalism and Sexuality, p. 114.) Discuss in light of Australians' response to WW1 or WW2. How were women positioned in the national discourse of either war?"

You decided to focus on WW2 because the changing role of women at that time interested you more, and you may want to make the point that women were positioned differently in WW2 from the way they were positioned in WW1, when their role

was essentially passive, as vulnerable people to be protected by their menfolk, and their contribution to the war was seen in terms of the traditional female role of caring for their families at home and supporting the efforts of the men overseas. In WW2, you told us, women (like your grandmother) moved into heavy work in factories, and you quoted a source saying that war brought women from behind the kitchen sink into the war front. I asked you whether these changes were reflected in the national discourse, and we talked about what discourse means-that is, what was said or shown about women, the way they were represented publicly in the media, talk or writing. Were they represented as active and powerful in their own right, or as supporting and looking after men? Were they seen as having new responsibilities? You said that they were called heroes, but you had the sense that this was said in a patronizing way-that they were "good little women" helping out. This seemed like a good keynote idea for your essay, if your research continues to bear it out.

The other thing to check is what readings and maybe films are most relevant to what you want to do, so you can get them in an accessible form. Sally said that [your lecturer] had already been wondering how you were going to access the visual materials used in the subject, and we thought you could watch with an interpreter, who could talk about what was happening on the screen, and you could record the audio and get a transcript made if you want to quote it. Obviously this is a lot of work and time, so it's best if you can narrow it down to the most important visual sources, and we hope that [your lecturer] can advise you on those. Also, she may tell you which of the readings on your list are most relevant to your essay, so that you can get [the Alternate Formats technician] to change those into an accessible form. See vou next week-Kate

In another way, too, our sessions are different from those I hold with students without a disability, where we are usually looking together at the student's work-in-progress, writing all over their pages as we talk about the structure of their text, choices of language, problems of grammar or punctuation, and so forth. Michelle cannot see her text on paper, so we keep that part of our work for email exchanges. She sends me her drafts and I

respond with comments, questions, and corrections. For this purpose, we have had to evolve a format for my input that is clear, simple, and easily recognizable via her refreshable braille display. After trying out various methods over the course of several months, we have settled on a format that may be of use to others in this situation. I type my comments in capitals, within square brackets, two ways of making them stand out from the text around them. I put them immediately after the word or phrase that they refer to, so that Michelle does not have to move back and forth between comments and text. I use just a few instruction words—"ADD, DELETE, CHANGE ... TO ..."-to recommend corrections, and when I have a comment or question I distinguish this from a correction by beginning with "[MICHELLE,]." The following example illustrates this method:

As women were liberated in the Women's Auxiliary Air Force the important question had to be asked, "Liberated from what?" Government posters showed women liberated from [ADD THEIR] concerned mothers, the boss at the office, [ADD AND] household chores. They now can [CHANGE CAN TO COULD] do a victory job.¹

If we look at successive drafts of Michelle's essay for this assignment, we can see how the exchange of ideas and response continued to help the writing to develop. The introduction Michelle produced, in the following, reflected the discussion recorded previously and pointed to the approach she would take as the essay unfolded. (Her choice of examples came from two films she was able to view as she and her lecturers pursued the problem of access to visual materials, and an interpreter was organized to help with that.):

I believe that women were positioned differently in World War 2 from the way they were positioned in World War 1, when essentially a woman's role was to look after "men folk" and their children, and support the troops overseas. Throughout World War One, women did what everybody thought of as "women's work," whereas in World War Two, they were doing what most people thought of as "men's work." This can be seen when we look at examples from the Land Army and women volunteers in the auxiliary armed forces. In this essay I will focus on how women were represented in the national discourse. It is interesting to note that men's work being done by women was represented during World War Two with contradictory representations.

At this point, I asked Michelle to elaborate on the (key, but mysterious) idea "that men's work being done by women was represented during World War Two with contradictory representations," because the focus of her history subject was not so much on what happened as on the more theoretical question of how discourse shapes what happens. In response to my probing, Michelle added the following:

On one hand, the media were saying how valued women were, especially for their work in the Auxiliary forces, but at the same time the media were patronising in the way they represented these contributions. While women were asked to put an all-in effort into the war work, there were evidently low expectations of how well they could do that work. The role of the media seems to have been manipulative at times, aiming to persuade women to do what the government wanted them to do, either to take up men's work or to leave it after the war.

Thus, the dialogue about ideas, which served to scaffold Michelle's thinking as a history student, continued through the process of developing her writing as well.

Over the last 2 years, Michelle has improved her grades from the low passes she was receiving before we began working together, to high Cs and Bs at present. American readers may not find this remarkable, but in the Australian system, Bs are high marks; along with As, they are regarded as indicating a student's suitability for further study above the bachelor's level. More specifically, our discussions have instilled in Michelle the habit of questioning her assignments, her sources, and her own ideas; she has told me that she does this increasingly, because I ask her so many questions. Further, our process of (Michelle) drafting, (my) commenting, and (Michelle) redrafting has led her to expect that writing will entail revision and that this will involve rethinking her ideas and re-searching her sources, as well as editing to improve her use of language.

On the basis of one case study, it is not possible to say how generally effective the methods described would be for other students with a dual sensory

¹What Did You Do In The War Mummy?

impairment. Each student uses a different combination of ways to access information and to produce assignments. It is possible that a student who reads magnified print would not need comments to appear in capital letters within square brackets but would prefer marginal comments, perhaps color-coded to distinguish corrections from questions. Depending upon the severity of either impairment, a student who cannot see but can hear with the help of technology might be able to take his or her own notes of discussions, and a student with sufficient vision to see sign language within a limited field might take notes likewise. Thus, the methods could be adapted to accommodate whatever each student is able to do unaided. However, it seems likely that any student could benefit from the routine of weekly discussions followed up with an exchange of drafts and response. This is expensive in terms of the time commitment by advisors and interpreters, but if the student makes such good use of it as Michelle has done, the expense may be judged to fall within the scope of "reasonable accommodations."

Conclusion

In these brief excerpts from the work we have been doing together, I have tried to illustrate a role for ALL advisors in working with students who are deaf-blind, to help such students-as they would help any other student-to enter into the modes of inquiry of the disciplines they study and to develop their thinking in dialogue with a more experienced member of the academic community. Bhattacharyya (1997) remarks that, in addition to disability staff needing to arrange support of various kinds, "Faculty are also challenged with learning effective methods to help deaf-blind students to successfully complete academic endeavours." To facilitate this, we have developed the procedures discussed previously-the recording of discussions and the format for responding to a student's writing-that other advisors may find useful in their work and that they can share with teaching faculty who wish to communicate more effectively with students in their classes who have a dual sensory impairment.

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Due to an oversight during the editing process for the Bourquin et al. (2010) article, incomplete information was reported on page 144 regarding statistical tests. Although all the relationships between variables are correctly stated, determinations of the non-significance between the reported bivariate data were made using chi square tests. The first author regrets this oversight.