

Occupational Therapy: Effective School-Based Practices within a Policy Context

Prepared for the Center on Personnel Studies in Special Education

by

Yvonne Swinth

University of Puget Sound

Karen C. Spencer

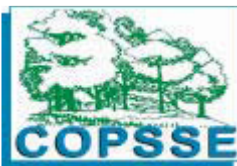
Colorado State University

Leslie L. Jackson

Easter Seals, Inc.

June 2007

COPSSE Document No. OP-3



Center on Personnel Studies in Special Education

UNIVERSITY OF FLORIDA

<http://www.copsse.org>

Center on Personnel Studies in Special Education

University of Florida

Johns Hopkins University

Vanderbilt University

University of Colorado - Boulder

Instructional Research Group, Long Beach, CA

COPSSE research is focused on the preparation of special education professionals and its impact on beginning teacher quality and student outcomes. Our research is intended to inform scholars and policymakers about advantages and disadvantages of preparation alternatives and the effective use of public funds in addressing personnel shortages.

In addition to our authors and reviewers, many individuals and organizations have contributed substantially to our efforts, including Drs. Erling Boe of the University of Pennsylvania and Elaine Carlson of WESTAT. We also have benefited greatly from collaboration with the National Clearinghouse for the Professions in Special Education, the Policymakers Partnership, and their parent organizations, the Council for Exceptional Children and the National Association of State Directors of Special Education.

The Center on Personnel Studies in Special Education, H325Q000002, is a cooperative agreement between the University of Florida and the Office of Special Education Programs of the U. S. Department of Education. The contents of this document do not necessarily reflect the views or policies of the Department of Education, nor does mention of other organizations imply endorsement by them.

Recommended citation:

Swinth, Y., Spencer, K. C., Jackson, L. L. (2007). *Occupational therapy: Effective school-based practices within a policy context. (COPSSE Document Number OP-3). Gainesville, FL: University of Florida, Center on Personnel Studies in Special Education.*



U. S. Office of Special
Education Programs

Additional Copies may be obtained from:

COPSSE Project
P.O. Box 117050
University of Florida
Gainesville, FL 32611
352-392-0701
352-392-2655 (Fax)

There are no copyright restrictions on this document; however, please credit the source and support of the federal funds when copying all or part of this document.

CONTENTS

Introduction.....	4
Background.....	5
Occupational Therapy.....	6
School-Based Occupational Therapy.....	9
Conclusions.....	27
REFERENCES.....	29
TABLES	
Table 1. Summary of CEBM Levels of Evidence.....	13
Table 2. Databases Used.....	14
Table 3. Search Terms.....	15
Table 4. Evidence for Occupational Therapy in the Schools.....	16

INTRODUCTION

The Individuals with Disabilities Education Act [IDEA] (2004) and the Individuals with Disabilities Education Improvement Act [IDEIA] (2004) require schools and early intervention programs to use appropriately qualified personnel to provide special education, related services, and early intervention services. These services are designed to help meet the academic, developmental, and functional needs of eligible children with disabilities. In the 2004 reauthorization of IDEA (P.L. 108–446), Congress determined that children’s education could be more effective by

...supporting high-quality, intensive preservice preparation and professional development for all personnel who work with children with disabilities in order to ensure that such personnel have the skills and knowledge necessary to improve the academic achievement and functional performance of children with disabilities, including the use of scientifically based instructional practices, to the maximum extent possible... (§601(c)(5)(E)).

Under the auspices of the federally funded Center on Personnel Studies in Special Education [COPSSE], the authors for this report were charged with the task of reviewing the research to identify evidence-based and effective practices for school-based occupational therapy [OT]. The purpose of this report, therefore, is to provide an overview of current research and evidence that supports OT practices in schools, specifically children serviced under Part B of IDEA. While Part C is equally important to address, this was not included in the charge for this report. School-based occupational therapists, addressing the needs of students in preschool through high school, are the primary audience for this report as are institutions of higher education that prepare occupational therapists for school-based practice, school administrators who hire and supervise occupational therapists, and the students and families who receive special education and related services.

BACKGROUND

COPSSE examined personnel preparation as well as personnel competency and recruitment in special education. The project's primary focus on special education teachers and administrators was supplemented with a secondary focus on related service personnel in OT, physical therapy, school psychology, speech language pathology/audiology, and school counseling. For each participating discipline, reports were developed to clarify the current status of personnel preparation, recruitment, and retention [For OT, see Swinth, Chandler, Hanft, Jackson, & Shepherd (2003)]. Following completion of the reports, a research panel of related service experts and researchers was convened to discuss the status of personnel preparation, competency, and personnel recruitment in their respective fields. These experts were charged to develop a comprehensive, interdisciplinary related service research agenda that identified a critical need for scientifically based studies of the related service personnel practices and the impact on targeted student outcomes (Rapport, 2004). Additionally, a consensus among panel members suggested that related service professionals, in general, lacked needed competencies to use the available research effectively to make everyday decisions regarding service planning and delivery.

Acting on the developed research agenda, the present report was prepared to help advance evidence-based OT practice in schools and to facilitate occupational therapists' accountability for targeted student outcomes, namely, educational participation to support academic achievement and performance within the general curriculum and to include functional life skills as required by IDEA and the No Child Left Behind Act. More specifically, this report describes OT and then begins to identify effective OT practices and interventions.

OCCUPATIONAL THERAPY

This first section provides the reader with an understanding of the domain and scope of OT services in educational settings. A basic understanding of OT therapy services in schools is assumed. OT practice within educational settings enables students with disabilities or those at risk for disability to engage in their everyday school *occupations*—comprised of many overlapping and interrelated activities, including academic, social, extracurricular, and self-care tasks.

In collaboration with other members of the education team, occupational therapists engage in evaluation, intervention, and outcome processes when serving children and youth. OT services always begin with the outcome in mind: What is it that the child and adolescent need or want to do in order to be successful as a student? Student performance of education-related activities based on access to and engagement in schooling represent the targeted outcomes for OT services. Toward this end, occupational therapists may work to enhance: (1) student performance skills, e.g., motor, process, communication/interaction skills; (2) performance patterns, e.g., needed or important school habits, routines, roles; (3) the student’s educational context, e.g., physical, social, cultural, technology; (4) the student-activity match, e.g., space, objects, timing, student function needed; and (5) individual student factors, e.g., body structures and functions. (American Occupational Therapy Association [AOTA], 2002).

The majority of occupational therapists who work with children provide their services under the auspices of the IDEA; and these services largely take place in schools and in early intervention programs (Parts B and C of IDEA). According to Part B of the law (§300.34(a)), OT is a “related service” for eligible children aged 3–21 who require assistance to benefit from special education and who have diagnosed disabilities that are physical, behavioral/psychosocial, cognitive, or other delays that interfere with the child’s ability to benefit from special education (§602(26)(A)). occupational therapists work not only with these children, but also with family members, teachers and other school personnel, school administrators, and community healthcare providers as needed. Education-related OT services may be provided in schools, early intervention programs, homes, daycare programs, and community settings as appropriate. Services are designed to enable students to access the general curriculum, perform educational activities, and participate in their various student roles.

Evaluation

To achieve targeted performance outcomes and to design needed services, occupational therapists start with an evaluation. Within an educational context, the evaluation uses assessment tools and strategies that are educationally relevant and focused on what a student currently does to participate in school activities and contexts. These assessment tools and strategies examine the combined influence of individual characteristics, performance skills, performance patterns (e.g., roles, routines); the educational context; and specific activity demands. Subsequent OT intervention uses evaluation findings to help a student achieve educational goals that have been established by the entire team, including family members (Giangreco, 1995; IDEA, 2004). Educational goals may focus on academic and non-academic (extracurricular) performance (Hanft & Place, 1996; IDEA, 2004).

Intervention

Occupational therapists working in educational settings with children from birth to age 21 use their professional judgment (i.e., clinical reasoning); knowledge of the literature and research in the field; findings from student evaluation processes; and team input before selecting an OT intervention model (i.e., frame of reference or practice model) that has a theoretical and research base. The intervention model or models determined to support optimally the student's performance and participation in his or her education are selected. The occupational therapist must also choose an intervention approach (i.e., how the services will be provided based on the selected intervention model). Alternative approaches include promoting health, remediation/restoration, maintaining or preserving current performance, compensation/adaptation, or disability prevention (AOTA, 2002). An example of the remediation/restoration approach is guiding a child's movement and posture on playground equipment during recess for a child who is very unsteady. An example of the compensation/adaptation approach involves analyzing the student's classroom environment with the teacher to find a quiet work area for the child who overreacts to sensory input, e.g., sound, visual stimuli.

According to the Occupational Therapy Practice Framework (AOTA, 2002), occupational therapists may use four types of interventions. Each is briefly described here within an education context. First, the "therapeutic use of self" includes the occupational therapist's strategic use of his or her own personality, insights, or perceptions to affect the student's performance. It may be used to form or maintain a motivating therapeutic alliance with the student, a group of students, parent, or teacher. Second, occupational therapists may engage in the "therapeutic use of occupations and activities." By engaging the student or groups of students in activities that naturally occur within the educational context, the occupational therapist can provide opportunities for students to become an active participant or to practice needed skills that will enable full participation (in collaboration with teachers and other educational staff). Third, occupational therapists may consult with the student, teachers, family members, or others by collaborating with them to identify problems and potential solutions. Through collaboration with other educational staff, the occupational therapist enables the "client" to solve identified problems and is not solely responsible for the outcome. Fourth, occupational therapists may provide education which includes sharing information and knowledge so that others may use it to facilitate student performance and participation. For example, occupational therapists may educate school staff about disability and its impact on student performance or conduct in-services about child development. As with the intervention approach, specific type of OT intervention should be described as part of the OT intervention plan, not within the IEP document.

Outcomes

OT intervention must ultimately enable individuals, groups, or populations to engage in needed and valued occupations. Such engagement can then facilitate participation in a variety of real-life contexts (AOTA, 2002). Taken together, engagement and participation represent the desired outcomes of the OT intervention process and are consistent with the educational outcome expectations put forth by IDEA and NCLB.

In targeting engagement in occupation to support participation as the broad, overarching outcome of the occupational therapy intervention process, the profession underscores its belief that health and well-being are holistic and that they are developed and maintained through active engagement in occupation. (AOTA, 2002).

SCHOOL-BASED OCCUPATIONAL THERAPY

Schools, which represent a major practice arena for occupational therapists, are also a critical performance setting for children and youth in the U.S. Children may spend six or more hours a day, five days a week in school—a sizable amount of time that carries with it high expectations for learning and performance. In their student role, children and youth are expected to engage in a wide variety of activities such as boarding and exiting the school bus, completing assignments in math and language arts, playing kickball during recess, checking out library books, participating in a school club or sport, taking standardized achievement tests, socializing with peers at lunch or in the hallways, and managing personal care activities throughout the school day. Successful access to educational activities by the student is obviously needed prior to engaging in or “doing” the activity, and engagement is essential if the student is to participate in the occupation of “student” at school (context). Meaningful student participation within the educational context represents the desired outcome of OT services within a school setting. The specific activities that comprise the “student role” are largely determined by teachers and other members of the education team, not the occupational therapist. By collaborating with general and special education teachers and participating as a member of the IEP team, occupational therapists can help students access and engage in available education activities. For example, for a kindergartener who is having difficulty manipulating classroom tools, e.g., pencil, ruler, or scissors, the occupational therapist may work with the teacher to adapt the tools so the student can complete classroom assignments and activities. For a third grader with autism who has difficulty following classroom routines, the occupational therapist may work with the teacher to help establish a picture schedule so the student can independently follow the routines. For a Junior High student with cerebral palsy who is unable to participate in physical education [PE], the occupational therapist may collaborate with the physical therapist and PE teacher to modify and adapt the PE curriculum.

As part of providing OT services, as in the previous examples, the occupational therapist must account for OT contribution to a student’s education through measures or data that evaluate activity access, engagement, participation, and ultimately student achievement within the general curriculum. Occupational therapists’ strategies to demonstrate positive student outcomes from their efforts (e.g., data-based planning and decision-making strategies, effective use of interventions based on evidence-based practice) will be discussed later.

Perspectives on Student Outcomes

Occupational therapists in the schools must consider outcomes within the context of the environment and expectations their services are provided. In addition to the expectations of parents, teachers, and students themselves, two federal education laws have established outcome expectations for students with disabilities enrolled in public schools. The Individuals with Disabilities Education Improvement Act of 2004 [IDEA] (P.L. 108-446) and earlier versions of the law dating back to 1975 established clear outcome targets for children and youth with disabilities receiving special education and related services in public schools. The Amendments to the long-standing Elementary and Secondary Education Act, now entitled the No Child Left Behind Act of 2001 [NCLB] (P.L. 107-110), specifies important educational outcome targets for all students, including students who have disabilities. Educational outcome expectations based

on federal policy will be presented below and shown to be consistent with the OT profession's view of appropriate student/client outcomes. It is critical for school-based occupational therapists to have a good understanding of their professional domain of practice and expertise and to understand the policy context within which they work. IDEA and NCLB laws and regulations are essential reading for all school-based OT practitioners.

According to IDEA 2004, effective education for students with disabilities is based on high expectations, participation, and progress in the general education curriculum alongside peers without disabilities to the maximum extent possible. The law also expects students with disabilities to ultimately exit school ready to assume productive and independent adult living roles (§601(c)(5)(A)). Measurable student progress within the general curriculum based on the student's Individualized Education Program (IEP) is critical, but post-school performance outcomes are the strongest indicators of the overall effectiveness of special education and related services. Post-school engagement in paid employment, independent living, and post-secondary education are among the post-high school outcome expectations for young adults with disabilities as specified in IDEA (§601(d)(1)(E)).

The importance of post-school outcomes as a measure of education effectiveness cannot be overstated. After students with disabilities have received up to 19 years of publicly supported instruction (general education, special education and related services), it is reasonable for family members, general taxpayers, and policy makers to expect the vast majority of these students to be prepared to assume productive and positive adult roles in their communities. Even teachers and related service personnel who work with young children must hold high expectations for these children to become productive and valued adults in their communities eventually.

During high school and as students prepare to leave the public education system; the special education team must increase its focus on preparing students to make the transition to post-school roles and activities. By law, transition planning must begin when students are 16; however, planning may begin earlier when needed. According to IDEA, transition is

...a coordinated set of activities for a child with a disability that—(A) is designed to be within a results-oriented process, that is focused on improving the academic and functional achievement of the child with a disability to facilitate the child's movement from school to post-school activities, including post-secondary education, vocational education, integrated employment (including supported employment), continuing and adult education, adult services, independent living, or community participation; (B) is based on the individual child's needs, taking into account the child's strengths, preferences, and interests; and (C) includes instruction, related services, community experiences, the development of employment and other post-school adult living objectives, and, when appropriate, acquisition of daily living skills and functional vocational evaluation. (§602(34)).

NCLB further reinforces IDEA's focus on student performance outcomes. Applicable to all students, including students with disabilities, NCLB's call for accountability in the area of educational achievement is one of the law's four main pillars; the others are greater freedom for

states and communities, a focus on using proven educational methods, and more choices for parents. (<http://www.ed.gov/nclb/overview/intro/4pillars.htm>)

Educators and related services professionals are by now familiar with their own state's education accountability system of written education standards and statewide testing of student achievement. While controversial, accountability provisions in NCLB must be understood by all personnel who work with students. Student outcomes-based state standards measured by state tests (including approved alternative assessments for select students with disabilities) have become a critical bottom line for schools and school districts. Education and related service personnel who clearly contribute to this bottom line of student performance and achievement within the general curriculum will be viewed as effective and valued team members. Related service personnel may risk distancing themselves from responsibility for student performance on NCLB accountability measures because they do not teach core academic subjects within the general curriculum. These professionals are reminded that their job is to "assist a child with a disability to benefit from special education" (IDEA, §602(26)(A)) and ensuring student "access to the general education curriculum in the regular classroom, to the maximum extent possible" (§601(c)(5)(A)). Clearly, occupational therapists and other related service personnel share responsibility with other members of the education team for student academic performance in addition to developmental and life skill performances.

Research

Terminology and background. Different terms are used to refer to interventions supported by research. In the education field, one sees the terms *research-based intervention* and *scientifically based research* used interchangeably. In OT, one finds the term *evidence-based practice* [EBP]. In general, all these terms refer to the central role that high-quality research plays in determining which interventions are most likely to produce the targeted or desired outcomes for students who have disabilities. There is, however, a difference between how the education field and the OT profession view evidence.

This report uses the term *evidence-based practice* to mean practices that are well supported by high-quality research. By comparison, the term *effective practice* describes practices that have preliminary research support (including qualitative studies) or are "promising practices" based on the systematic collection of student performance data and student participation outcomes.

In OT, evidence-based practice concepts are rooted in the field's early ties with healthcare and medicine. OT has adopted the definition put forth by Sackett, Rosenberg, Gray, Haynes, and Richardson (1996), who view EBP as the "conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients" (p. 71). Further, they recognize that

...the practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research. By individual clinical expertise we mean the proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice. Increased expertise is reflected in many ways, but especially in more effective and efficient diagnosis and in the more thoughtful

identification and compassionate use of individual patients' predicaments, rights, and preferences in making clinical decisions about their care. (pp. 71-72).

Thus AOTA recognizes that EBP is the integration of best research evidence with clinical expertise and client values. When these three elements are integrated, clinicians and clients form a diagnostic and therapeutic alliance that optimizes clinical outcomes and quality of life (Tickle-Degen, 1999, 2000).

AOTA has made EBP a high priority within their national agenda. As a result, several years have been spent developing evidence-based literature reviews related to OT outcomes. The overarching goal of AOTA's Evidence-Based Literature Review Project is to contribute to an international effort to promote an outcome-based orientation among occupational therapists that focuses on the effectiveness and cost of providing quality services to a broad range of clients in a broader range of settings (Lieberman & Scheer, 2002).

The AOTA project conducts its own topic-specific research reviews (i.e., handwriting, children's behavior, neurodegenerative diseases, autism) using a Critical Appraisal of Topics (CATs) format. Reviews have led to the development of Occupational Therapy Practice Guidelines, online evidence briefs for AOTA members, and articles published in peer-reviewed journals. An evidence-based resource center is now available for members on the AOTA website that includes the evidence reviews and other resources (www.aota.org). Some of these reviews and resources are relevant to school-based OT.

For each research article review, AOTA defines each study's interventions and outcomes using the International Classification of Functioning, Disability and Health (World Health Organization, 2001) and the Occupational Therapy Practice Framework (AOTA, 2002). All reviews emphasize the available Level I and II research studies that have been ranked using the hierarchy developed by the Centre for Evidence Based Medicine [CEBM] in Oxford, England (2006) Thus, a medical framework is used for interpreting and summarizing data from the reviewed studies.

Scientifically based practice. IDEA states that "the use of scientifically based instructional practices, to the maximum extent possible" will be done by qualified educational personnel and that scientifically based research "...means research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs" (§9101(37)(A)). According to Whitehurst (2002), evidence-based education is the preferred term, which is defined as "the integration of professional wisdom with the best available empirical evidence in making decisions about how to deliver instruction" (Whitehurst, 2002).

Considering the previous EBP and policy concepts, many research studies were reviewed for this report. Research quality was examined using evidence hierarchies developed by the CEBM (2006) and the American Academy of Cerebral Palsy and Developmental Medicine [AACPD] (2002). AOTA currently uses the CEBM framework for all evidence reviews completed by the Association. The CEBM framework has been accepted by the Institute for Educational Sciences within the U.S. Department of Education [USDOE], which is responsible for supporting high-quality efficacy research in special education. This report also uses the CEBM framework;

however, in some ways, the framework developed by AACPDM may be more applicable to the needs of the student population typically served by occupational therapists in the schools. While these hierarchies can help occupational therapy practitioners make decisions regarding the credibility, reliability, and generalizability of a specific intervention or outcome, it should be noted that some scholars question this hierarchical approach to evidence-based decision making and whether it reflects the actual practice of OT (Hammel, 2001; Hyde, 2001; Tomlin, in press).

CEBM levels are defined based on the research methodologies used to examine an intervention and its effect or outcome. These five levels of evidence help a reader decide how much confidence to place in a particular study's findings. Randomized control trials are the "gold standard" at Level I of the hierarchy. Expert opinion about intervention methods and associated outcomes, e.g., an opinion presented at a workshop, is ranked as the lowest, Level V. Descriptions of the types of studies considered within each level are detailed in **Table 1**.

Table 1. Summary of Levels of Evidence

LEVEL	DESCRIPTION
Level I	Large randomized controlled trials, producing results with a high probability of certainty.
Level II	Small randomized trials, producing uncertain results, outcomes research, or ecological studies
Level III	Non-randomized prospective studies of concurrent treatment and control groups; cohort groups
Level IV	Non-randomized historical cohort comparisons; case series with controls
Level V	Case series without controls; expert opinion, anecdotal, and qualitative research

Use of EBP. With this increasing emphasis in school-based practice on the use of the best research available, competent therapists find themselves asking what evidence is available. *Competency* (Ilott, 2004; Law, Pollock, & Stewart, 2004; Muhlenhaupt, 2003) is the practitioner's ability to make informed decisions about OT service provision using available research-based evidence; professional judgment; the client's (e.g., student, teacher, parent) values and preferences; and effectiveness data collected systematically and evaluated against targeted student outcomes. However, a recent study by Hess (2003) found that many school-based occupational therapists developed competency on the job and used in-services and continuing education to maintain competency. Less frequently, they reported using published materials; but it is unknown from these data the extent to which these published materials were research-based.

Do school-based occupational therapists practice evidence-based education and use scientifically based research? Some studies are beginning to answer this question. A recent survey by Spencer, Turkett, Vaughan, and Koenig (2006) found that occupational therapists in Colorado more frequently delivered therapy services in a pullout treatment area (61%), contrary to evidence that supports the use of inclusive service delivery. Previous studies have found similar results on both state and national levels (Case-Smith, 1997; Case-Smith & Cable, 1996). In a survey (Cooley, 2006), a large number of school-based occupational therapists who were members of the School Systems Special Interest Section [SSSIS] reported using research to

support their interventions, e.g. *American Journal of Occupational Therapy* and *Occupational Therapy Advance*, to inform their interventions. While the former is a peer-reviewed journal, the latter is not peer-reviewed and thus conclusions may have limited validity and reliability when generalized to everyday practice. Most encouraging about this study were the school-based therapists (90%) who were aware of the principles of EBP and reported attempting to use research to inform practice.

While there is not an extensive literature addressing EBP in school-based OT, a number of studies address the OT profession and the use of research to support practice. A Critically Appraised Topic [CAT] completed by Cooley (2005) addressed the question: “What are the current supports and/or barriers that impact effective evidence-based practice methods [EBP] among occupational therapy practitioners?” and found that

The majority of studies reviewed were at a ‘III’ level of evidence; no studies were found at a ‘I or II’ level. Rather than utilizing research-based evidence to guide their practice, many therapists (more often veteran therapists) rely on their clinical experience, consultation with colleagues, continuing education, and the monitoring of their patients’ progress when selecting treatment interventions. This supports two of the three prongs of evidence-based research; but practice may be further enhanced if all three prongs (research evidence in addition to clinical expertise and data) are considered during decision making. Only a handful of occupational therapists read books and attended workshops related to EBP; a larger number of therapists read journal articles and utilize low level evidence to guide their practice (between 1-5 x’s per year).

Common barriers OTs encountered in the workplaces were shortages of time, limited ability to find and understand research articles, high caseloads, high turnover and staff shortages, lack of computer skills and/or access to computers, limited evidence to support OT practice, difficulty generalizing evidence into therapeutic intervention, and the growing costs of continuing education. (p. 5).

Cooley (2005) also reviewed several Level IV and qualitative studies with similar findings, concluding generally that the OT profession is still learning how to apply EBP as part of everyday decision making.

Research review. This review began with a search of the literature that utilized a variety of databases (see **Table 2**) and various combinations of search terms found in **Table 3**.

Table 2. Databases Used

OTSeeker
ERIC: Education Resources Education Center
Ebsco
EBP Resources at www.aota.org
OTSearch
library.ups.edu/simon/summit
CINAHL
Medline
PubMed

Table 3. Search Terms

PRIMARY	SECONDARY
school-based OT	effective practices
intervention	sensory integration
decision-making	ball chairs
assessment	evidence-based practice in OT
efficacy in school-based OT	handwriting
collaboration	consultation
schools	transition
	data collection

An emphasis was placed on finding any research that directly addressed the impact of OT services on student outcomes in the schools that provided Level I or II evidence. Also emphasized were practices unique to OT or that represented a cost-effective and good use of the unique skills and expertise of an OT. After an exhaustive search, a limited number of Level I or II research that may help inform school-based OT services were found. These included two systematic reviews completed as part of AOTA's EBP project addressing psychosocial needs of children and school-based interventions, including a number of articles on handwriting interventions.

The published literature currently contains limited Level I and II research that supports or refutes interventions utilized by school-based therapists. However, several CATs of Level III, IV, and V evidence were useful. Also some evidence reviews that summarized Level I and II evidence from other practice areas were also relevant to the services occupational therapists provide in the schools.

A summary of the results of the search are provided in **Table 4**. The research is organized according to the main steps in the OT intervention process: evaluation, intervention, and outcomes as identified by the Occupational Therapy Framework (AOTA, 2002). This table is not an exhaustive summary of all research found. It includes key research with an emphasis on the relevant summaries and CATs. In some cases, a research website is referenced.

Table 4. Evidence for Occupational Therapy in the Schools

EVALUATION			
OT Practice Question	Type of Evidence	Evidence Summary	Reference
Is there evidence that the School Function Assessment and the Vineland Adaptive Behavior Scales are valid measures of social skills for children and adolescents?	CAT (Level III only)	<ul style="list-style-type: none"> Valid assessment of social skills in children and adolescents with disabilities can be achieved with the use of the SFA & the VABS; assessment could also include observation & interview. The SFA correlates with the VABS in all sections except communication. 	Lopez, M. (2004). Is there evidence that the School Function Assessment and the Vineland Adaptive Behavior Scales are valid measures of social skills for children and adolescents? UPS Evidence-Based Practice Symposium, retrieved 4/6/2006 from www.ups.edu/~ot
What assessments are most appropriate to support effective decision-making in the schools?	Website (Levels II, III, IV, and V)	<ul style="list-style-type: none"> A variety of summaries, reports, and links to published research that addresses assessments such as the Gross Motor Function Measure [GMFM], Peabody Developmental Motor Scales, CAPE, PAC, PEGS, and Canadian Occupational Performance Measure (COPM) 	http://www.canchild.ca

Table 4. Evidence for Occupational Therapy in the Schools (cont.)

INTERVENTION			
OT Practice Question	Type of Evidence	Evidence Summary	Reference
<p>What techniques or programs other than 1:1 therapy have proven effective for helping children with Asperger syndrome achieve age-appropriate social and emotional skills?</p>	<p>CAT (Levels I through V)</p>	<ul style="list-style-type: none"> • The computer program, Emotion Trainer, is effective in improving a person’s ability to recognize and predict emotions in others. • Parent training programs are effective in helping parents manage their child, increase their feelings of competence, decrease problem behaviors, and increase the parents’ satisfaction in how they handle behaviors. • Social skills training groups are effective in teaching a person to read nonverbal communication, improving their ability to read both adult and child facial expressions. Social skills training groups are also effective in improving skills in greeting, conversation, and play, helping establish and maintain friendships and improving perceptions of social support. • Social stories can be effective in managing behaviors and social difficulties. • Social skills training groups can increase a person’s confidence in social skills as well as help in developing skills to make friendships in and outside of the group. 	<p>Savage, A. (2005). What techniques or programs other than 1:1 therapy have proven effective for helping children with Asperger syndrome achieve age-appropriate social and emotional skills? UPS Evidence-Based Practice Symposium, retrieved 4/6/2006 from www.ups.edu/~ot</p>

Table 4. Evidence for Occupational Therapy in the Schools (cont.)

INTERVENTION (cont.)			
OT Practice Question	Type of Evidence	Evidence Summary	Reference
		<ul style="list-style-type: none"> • Circle of friends, social skills training groups, and social story interventions seem to work best in improving social skills and supporting inclusion in the mainstream setting. 	
Do children with disabilities who are included in the general education classroom have better academic achievement than children in special education classrooms?	CAT (Level III only)	<p>Several strategies increased the likelihood of increased student performance. These included:</p> <ul style="list-style-type: none"> • Collaboration with school personnel in order to provide each student the best opportunity. • Adequate adaptations implemented. • Increased awareness of OT skills and expertise <p>**OTs may want to consider these factors when working in general education settings</p>	Hoss, S. (2004). Do children with disabilities, who are included in the general education classroom, have better academic achievement than children in special education classrooms? UPS Evidence-Based Practice Symposium, retrieved 4/6/2006 from www.ups.edu/~ot
Does auditory training result in improved attention, expressive language, and a reduction of behavior problems for children with autism?	CAT (Levels I, II, and III)	<ul style="list-style-type: none"> • Most studies showed improvements in sound sensitivity, behavior problems, language, comprehension, and attention. • Behavior improvements could be due to better attentiveness to one's surroundings, which leads to decrease in confusion, stress, and anxiety. • No significant relationships were found between behavioral improvement and age, degree of sound sensitivity, and amount of variability in the pre-AIT audiogram. 	Peters, K. (2004). Does auditory training result in improved attention, expressive language and a reduction of behavior problems for children with autism? UPS Evidence-Based Practice Symposium, retrieved 4/6/2006 from www.ups.edu/~ot

Table 4. Evidence for Occupational Therapy in the Schools (cont.)

INTERVENTION (cont.)			
OT Practice Question	Type of Evidence	Evidence Summary	Reference
What is the effectiveness of family-centered services?	Research summaries and briefs	Family-centered services have many advantages and should be utilized.	www.canchild.ca
What interventions are most effective when working with a child with developmental coordination disorder in the schools?	Research Summary (Level V)	The OT in the schools is primarily a consultant when working with a child with developmental coordination disorder and helps the child develop strategies to practice motor skills that need to be learned.	Missiuna, C. (2003). Children with developmental coordination disorder: At home and in the classroom. (5th Ed.) [Booklet]. McMaster University, Hamilton, ON: CanChild Centre for Childhood Disability Research. Also available at www.fhs.mcmaster.ca/canchild/
Is direct service or collaborative consultation more effective in the schools?	Level II	Both service delivery models were equally effective in regard to student goal achievement. However, teachers from the collaborative consultation group reported more positive interactions.	Dunn, W. (1990). A comparison of service provision models in school-based occupational therapy services: A pilot study. <i>The Occupational Therapy Journal of Research</i> , 10, 300-320
What are effective methods of serving school children with disabilities: Large-group therapy combined with small-group therapy, and large group therapy combined with consultation with classroom teacher?	Level II	The consultation group improved significantly more in motor skills than the therapist-directed group. The therapist-directed group improved more in visual-perceptual skills than the consultation group, but the improvement was not statistically significant.	Palisano, R. J. (1989). Comparison of two methods of service delivery for students with learning disabilities. <i>Physical and Occupational Therapy in Pediatrics</i> , 9, 79–100.
Should school-based OTs address psychosocial skills through activity-based interventions for children with disabilities?	Research Summary (Levels I through V)	CAT indicates that it may be appropriate and there is a high likelihood that addressing psychosocial skills through activity-based interventions may lead to increased student performance and student outcomes in this area	Jackson, L., & Arbesman, M. (2005). Children With Behavioral and Psychosocial Needs: Occupational Therapy Practice Guidelines. AOTA, Bethesda, MD

Table 4. Evidence for Occupational Therapy in the Schools (cont.)

INTERVENTION (cont.)			
OT Practice Question	Type of Evidence	Evidence Summary	Reference
What is the best treatment for the management of upper extremity spasticity in children with cerebral palsy?	CAT (Levels I through V)	<ul style="list-style-type: none"> • BTA is a useful adjunctive therapy to OT in the treatment of children with cerebral palsy (i.e., decrease spasticity with BTA & acquire fine motor skills through OT intervention). • SPR can have a positive effect on UE function & trunk control & should be evaluated pre- & post-surgery. • BPDR is effective in decreasing UE spasticity & improving UE function for at least 15 months post-procedure. • Conflicting evidence supporting the effectiveness of UE weight-bearing to reduce muscle tone & improve UE function. 	Feller, A (2005). What is the best treatment for the management of upper extremity spasticity in children with cerebral palsy? UPS Evidence-Based Practice Symposium, retrieved 4/6/2006 from www.ups.edu/~ot
What performance components and variables in OT intervention influenced fine motor and functional outcomes in preschool children?	Level V	<ul style="list-style-type: none"> • The influence of play on therapy outcomes suggests that a focus on play in intervention activities can enhance fine motor and visual motor performance. 	Case-Smith, J. (2000). Effects of Occupational Therapy Services on Fine Motor and Functional Performance in Preschool Children. <i>American Journal of Occupational Therapy</i> , 54(4), 372-380.
What is the effect of school-based OT on handwriting?	Level IV	<ul style="list-style-type: none"> • Students who received OT services demonstrated improved letter legibility, but speed and numeral legibility did not demonstrate positive intervention effects. 	Case-Smith, J. (2002). Effectiveness of school-based OT intervention on handwriting. <i>American Journal of Occupational Therapy</i> , 56(1), 17-25.
Will preschool children who receive OT demonstrate improvement in their visual-motor skills?	Level IV	<ul style="list-style-type: none"> • The results of this study demonstrate that intervention, including OT, can effectively improve visual-motor skills in preschool-aged children. 	Dankert, H. L., Davies, P. L., & Gavin, W. J. (2003). OT effects on visual-motor skills in preschool children. <i>American Journal of Occupational Therapy</i> , 57(5), 542-549.

Table 4. Evidence for Occupational Therapy in the Schools (cont.)

INTERVENTION (cont.)			
OT Practice Question	Type of Evidence	Evidence Summary	Reference
What is the effect of sensorimotor and therapeutic practice on handwriting?	Level III	<ul style="list-style-type: none"> Therapeutic practice was more effective than sensorimotor-based intervention at improving handwriting performance. The study included random assignment and a control group. 	Denton, P. L., Cope, S., & Moser, C. (2006). The effects of sensorimotor-based intervention versus therapeutic practice on improving handwriting performance in 6- to 11-year-old children. <i>American Journal of Occupational Therapy, 60</i> (1), 16–27.
Can nonproficient handwriters be distinguished by biomechanical ergonomic factors as well as by measures of handwriting proficiency?	Level IV	<ul style="list-style-type: none"> Nonproficient handwriting is a work activity often characterized by inferior biomechanical ergonomics, handwriting quality, efficiency, and significantly different handwriting process measures. 	Rosenblum, S., Goldstand, S., & Parush, S. (2006). Relationships among biomechanical ergonomic factors, handwriting product quality, handwriting efficiency, and computerized handwriting process measures in children with and without handwriting difficulties. <i>American Journal of Occupational Therapy, 60</i> , 28–39.
Should an OT include typical peers when working on play schools with preschool children?	Level IV	<ul style="list-style-type: none"> An OT working with a preschool child with play delays and wanting to facilitate the child’s initiation and response in play situations should consider pairing the child with play delays with a child who has higher play skills. 	Tanta, K. J., Deitz, J. C., White, O., & Billingsley, F. (2005). The effects of peer-play level on initiations and responses of preschool children with delayed play skills. <i>American Journal of Occupational Therapy, 59</i> , 437–445.
Is the dynamic tripod grasp the most functional grip for handwriting?	CAT (Levels II and III)	<ul style="list-style-type: none"> Researchers agree, for the most part, that the dynamic tripod grasp is not the only functional pencil grip utilized in handwriting activities. The lateral tripod grasp was considered in more than one study to be equal to the dynamic tripod grasp for functional writing capability. The lateral/dynamic quadrupod and four-finger pencil grasps were found to be as functional as the dynamic tripod and lateral tripod pencil grasp in one study. 	Cooley, C. (2004) Is the dynamic tripod grasp the most functional grip for handwriting? UPS Evidence-Based Practice Symposium, retrieved 4/6/2006 from www.ups.edu/~ot

Table 4. Evidence for Occupational Therapy in the Schools (cont.)

INTERVENTION (cont.)			
OT Practice Question	Type of Evidence	Evidence Summary	Reference
		<ul style="list-style-type: none"> • Grasp alone may not significantly impact overall handwriting performance. 	
Are sensory-based interventions for children with selective eating problems effective?	CAT (Levels II, III, and IV)	<ul style="list-style-type: none"> • Using sensory modalities has positive effects on infants born preterm, and/or transitioning off of tube feedings. • Feeding can have multiple etiologies and requires a team approach. • The use of sensory input as a reinforcer in behavior modifications is common practice. • Sensory analysis of food textures can improve tolerance to more varied food. 	Goldenburg, C. (2004). Are Sensory-based Intervention for Children With Selective Eating Problems Effective? UPS Evidence-Based Practice Symposium, retrieved 4/6/2006 from www.ups.edu/~ot
For school-aged children diagnosed with Attention Deficit Hyperactive Disorder, does the use of therapy balls or inflatable discs as classroom seating increase attention within the classroom?	CAT (Levels II, III, and V)		Allen, H. (2003). For school aged children, diagnosed with Attention Deficit Hyperactive Disorder, does the use of therapy balls or inflatable discs as classroom seating increase attention within the classroom? UPS Evidence-Based Practice Symposium, retrieved 4/6/2006 from www.ups.edu/~ot
Are therapy balls an effective form of alternate seating compared to typical classroom chairs in improving in-class behavior and attention of children with autistic/behavioral disorders?	CAT (Level IV)	* There is insufficient evidence to support or refute the use of therapy balls as an alternate form of seating for improved classroom behavior of children with autistic/ behavioral disorders	Holman. (2005). www.otcats.com/topics/CAT-KHolman2005.html

Table 4. Evidence for Occupational Therapy in the Schools (cont.)

INTERVENTION (cont.)			
OT Practice Question	Type of Evidence	Evidence Summary	Reference
Do weighted vests increase on-task behavior in the classroom for children and adolescents with developmental disorders?	CAT (Levels III and IV)	Overall, there was general support for wearing of weighted vests in the classroom to increase on-task behaviors of children with developmental disorders. However, there is a lack of generalizability in the findings within research literature to support or refute the effectiveness of weighted vest intervention, due to small sample sizes, age ranges studied, and lack of representation within all diagnostic developmental disorder categories.	Straw, A. (2004). Do weighted vests increase on-task behavior in the classroom for children and adolescents with developmental disorders? UPS Evidence-Based Practice Symposium, retrieved 4/6/2006 from www.ups.edu/~ot
Is Sensory Integration [SI] Therapy an appropriate intervention in the schools?	Summary of Research articles (Levels 3, 4, and 5) Meta-analysis	The results are mixed. Some studies are addressing traditional Ayres approach to SI while others are addressing a sensory processing approach. When comparing SI to a no-treatment control group, there were no significant effects. When SI has been compared to alternative treatments, e.g., such as perceptual motor therapy and academic tutoring, there has been no difference in effect.	ERIC Digest, 2003 http://ericec.org/faq/sensinte.html Vargas, S., & Camilli, G. (1999). A meta-analysis of research on sensory integration treatment. <i>American Journal of Occupational Therapy</i> , 53, 189-198.

Table 4. Evidence for Occupational Therapy in the Schools (cont.)

OUTCOMES			
OT Practice Question	Type of Evidence	Evidence Summary	Reference
What impact can OT services have on quality of life, health, and well-being	Research summaries and reports	OT can support outcomes such as participation, self-esteem, transition to adulthood, and other childhood occupations	www.canchild.ca
What is the role of OT in increasing the participation of children with disabilities?	Research summaries and reports	This main area of CanChild research explores the participation of children and youth with disabilities and their families, with a focus on community and family activities, and on environments that support or limit participation. This link will take you to studies, reports and resources on this topic. Related terms include: accessibility, barriers, and environmental factors.	www.canchild.ca
What is the importance of community-based experience for high school kids? Importance of employment during high school as predictor of post school employment, etc.	Multiple methods, longitudinal, retrospective, randomly selected national sample	<p>NLTS2 is:</p> <ul style="list-style-type: none"> • Focusing on a wide range of important topics, such as high school coursework, extracurricular activities, academic performance, postsecondary education and training, employment, independent living, and community participation. • Producing information of interest to many audiences, including state and local education agencies, the U.S. Congress, USDOE, parents, teachers, researchers, advocates, and policy makers. <p>http://www.nlts2.org/gindex.html</p>	<p>http://www.nlts2.org/gindex.html</p> <p>What Works</p> <p>http://www.ncset.org/publications/viewdesc.asp?id=714</p>

Summary of effective practices. The preceding evidence review revealed a lack of high-level research-based evidence due to the few Level I and II studies available to guide school-based OT services. Despite this finding, a growing body of Level III, IV, and V literature does exist along with qualitative studies. Thus, currently, occupational therapists must rely more on effective or promising practices, clinical expertise, and client values as well as systematically collected data when delivering effective practices.

Additionally, the literature in general reveals that the OT profession strongly supports EBP. This is reflected in AOTA documents (American Occupational Therapy Foundation [AOTF], 2004), the premier U.S. journals in the OT field (*American Journal of Occupational Therapy*, *OTJR: Occupation, Participation, and Health*), available research funding for efficacy research (AOTF, 2006; Institute for Educational Sciences [IES], 2006); the national standards for OT education programs (Accreditation Council for Occupational Therapy Education, 2006); and repeated calls by OT scholars for the expansion of high-level research activities (Holm, 2001; Law, Baum & Dunn, 2005; Tickle-Degnen & Bedell, 2003).

Third, it is clear that school-based OT practices are, at times, based more on policy than on research. For example, education policy reflects the nation's widely held beliefs regarding equal opportunity and the rights of students with disabilities and their parents (the IEP process, due process, and student access to the general curriculum). Policy in these cases is most often tested in the courts and not through research. IDEA promotes specific practices that are believed to be beneficial but may lack empirical support, such as calls for inter-professional collaboration on behalf of students with disabilities (§614(d)(1)(B); §636(a)(1); §652(b)(1); §653(b); §654(a)(1)(C)); the use of whole-school interventions (§636(a)(1)); and education within the regular classroom based on the concept of least restrictive environment (20 U.S.C. 1412(a)(5)(B); §601(c)(1); §614(d)(1)(A)). Even without high-level research evidence, these policy-driven practices have become a part of the mainstream public education culture, in part, because of our nation's inclusive values (Lipsky & Gartner, 1997). However, data are emerging that indicate some of these policies, such as collaborative practices, may be effective (Friend & Cook, 2003; Snell & Janney, 2005; Thousand & Villa, 2000; Villa, Thousand, Nevin, & Malgeri, 1996; Walther-Thomas, Korinek, McLaughlin, & Williams, 2002).

Given the state of the literature, providing effective (versus evidence-based) OT services may be the only realistic option when Level I and II studies are not available to guide intervention decisions. Interventions based on a careful reading of Level III, IV, or V studies combined with the systematic collection of individual student performance and outcome data can allow students to achieve targeted outcomes. In fact, the Institute for Educational Sciences [IES] with USDOE calls this student-focused accountability process an "individual student growth model" and is supporting research in this area. Of interest to IES is the model's potential to offer special education professionals with a valid and reliable way to account for student progress based on IDEA and NCLB requirements (retrieved 7/19/2006, [www.http://ies.ed.gov/ncser/funding/accountability.asp](http://ies.ed.gov/ncser/funding/accountability.asp)).

Regardless of the research "holes" that currently exist for school-based occupational therapists, the expectation remains for them to use effectively the best available research combined with their professional expertise and an understanding of client values. To accomplish this, the school-based OT can benefit from thinking like a researcher who strives to answer the following questions about OT intervention and then by using systematically collected data throughout intervention and at its conclusion:

-
- What was the impact of the OT intervention on the student's *performance* of educational activities?
 - To what extent was the student's *participation* within the education context affected by the OT intervention?

To move toward addressing these questions as an effective practitioner, the occupational therapist must be able to draw on the available research related to the student's focus problem and alternative intervention approaches. Using the Occupational Therapy Framework as a guide (AOTA, 2002), the occupational therapist must also collaborate with the student and the education team to identify a specific behavior or outcome that the student is expected to perform with OT support (e.g., complete written English assignments; appropriate social interactions during recess). By starting with a student outcome in mind, student evaluation and subsequent intervention planning will be focused and efficient. Following a contextual evaluation of student performance in the classroom, the occupational therapist must select an intervention approach, such as using occupation-based activity (e.g., engaging the student in using computer technology to complete English assignments); collaborative consultation (e.g., working with the teacher to identify technology accommodation strategies that could be implemented by the teacher within the classroom); or education of members on the student's IEP team (e.g., teaching paraprofessionals how to support student performance without "over-helping"). Data collection can begin after specification of an intervention protocol (what the occupational therapist will do, when, and where) and when outcome measures are selected (e.g., teacher evaluations of writing quality and quantity, number of written paragraphs, number of words typed per minute, etc). The occupational therapist must develop a systematic way to document the OT intervention plan, its implementation, and student performance data. With this evidence in hand, the occupational therapist is equipped to work with the team to make well-informed decisions about continuation, discontinuation, or modification of OT services.

At the risk of oversimplification, the previous example demonstrates how occupational therapists can think like researchers in a systematic manner to provide effective school-based OT services. The preceding example may assist occupational therapists, school administrators, and other members of the education team to understand how occupational therapists can support students with disabilities to gain educational access, perform according to curriculum and IEP expectations, and ultimately participate in the school community as a student. Additionally, when OT services are designed to be outcome-oriented, it is possible for occupational therapists to account for changes in student performance and participation, thus meeting accountability expectations outlined by IDEA and NCLB.

Finally, when reading any research article or CAT summarizing the research, school-based occupational therapists need to review the data carefully based on the skills and expertise of an occupational therapist. Some data may indicate that a particular intervention results in a specific outcome but that the skills and expertise of an occupational therapist are not required in order to implement the intervention.

CONCLUSIONS

The purpose of this paper was to summarize the research regarding effective OT practice in the schools. The public school is identified by more than one-third of the members of the AOTA as their primary work setting (AOTA, 2005a). This percentage underscores the need for school-based practice to be an integral part of initial OT preparation programs and ongoing professional development offerings (Swinth, 2002).

The Occupational Therapy Code of Ethics states, “Occupational therapy personnel shall critically examine available evidence so they may perform their duties on the basis of current information” (AOTA, 2005b, p. 4). Thus, it is crucial that school-based occupational therapists keep abreast of current evidence regarding the intervention strategies they choose. However, due to the fact that Level I and II research is limited, school-based occupational therapists need to use systematic data-based decision making to help inform their interventions. “Research findings do not replace or supersede clinical experience, but rather they support and shape services so that the most effective and efficient strategies are considered” (Kellegrew, 2005, p. 12).

OT may be termed a “research emergent” profession (Ilott, 2004). For that reason, at times the profession lacks sufficient research-based evidence to declare which specific practices and interventions are most effective. As a result, the competent school-based occupational therapist must think about “effective practice” and engage in systematic data collection related to desired student outcomes. At all times, the therapist must utilize student/client evaluation and intervention activities to collect and document student performance (outcomes) that justify ongoing decisions about OT service continuation, modification, or discontinuation.

Accountability for special education and related services is directly tied to the educational performance outcomes achieved by students. When occupational therapists understand the outcomes targeted by our education system, OT intervention effectiveness questions can begin to be answered. In other words, occupational therapists must first know where they are going in order to evaluate whether or not they actually got there.

Concurrently, school-based OT needs a strong research agenda to help shape future practice. This research agenda should not only study current practice strategies (e.g., use of sensory principles in the classroom, best use of the skills and expertise of an occupational therapist to address handwriting) but should also address the current assumptions of school-based OT service delivery (e.g., therapy in a therapy room versus in the classroom, collaborative service delivery). High-level experimental and quasi-experimental studies addressing the effectiveness of specific OT practices on students’ educational access, participation, and performance (outcome measures) are also needed. Additional research should include:

- Further development of valid and reliable outcome measures that can be used in OT efficacy studies—which ones have promise?
- Rigorous and trustworthy qualitative studies focused on intervention impacts that identify promising practices worthy of further study
- Research that matches the OT interventions to subgroups of students (age, diagnosis, current performance levels)
- Research that helps to inform OT service delivery decisions in the schools, for example, variables influencing collaborative practices versus 1:1 “hands-on” services

-
- Systematic data collection on school- based OT practice based on clear, measurable goals
 - Identification of preservice and ongoing professional development strategies for personnel preparation that improve evidence-based, practice-related behaviors among school-based occupational therapists.

REFERENCES

- Accreditation Council for Occupational Therapy Education. (2006). Guide to compliance with the 2006 master's-level standards. Retrieved July 15, 2007, from: www.aota.org/Educate/Accredit/StandardsReview/39133.aspx
- Allen, H. (2003). For school aged children, diagnosed with Attention Deficit Hyperactive Disorder, does the use of therapy balls or inflatable discs as classroom seating increase attention within the classroom? Paper presented at the UPS Evidence-Based Practice Symposium. Retrieved April 6, 2006, from <http://www.ups.edu/ot.xml>
- American Academy of Cerebral Palsy and Developmental Medicine [AACPD]. (2002). *AACPD Methodology for developing evidence tables and reviewing treatment outcomes*. Rosemont, IL: Author.
- American Journal of Occupational Therapy (n.d.). Author guidelines. Retrieved June 15, 2006, from <http://www.aota.org/ajot/guidelines.asp>
- American Occupational Therapy Association [AOTA]. (1999). *OT services for children and youth under the Individuals with Disabilities Education Act* (2nd ed.). Bethesda, MD: Author.
- AOTA. (2002). Occupational therapy practice framework: Domain and process. *American Journal of Occupational Therapy*, 56, 609-639.
- AOTA. (2005a). Creating a centennial vision: Four possible scenarios. Powerpoint presentation.
- AOTA. (2005b). *Occupational therapy code of ethics*. Bethesda, MD: Author.
- American Occupational Therapy Foundation [AOTF]. (n.d.). OTJR: Occupation, participation and health. Retrieved June 15, 2006, from <http://www.aotf.org>
- AOTF. (2004). Final report: International conference on evidence-based occupational therapy. Retrieved June 15, 2006, from <http://www.aota.org/members/area15/docs/ebfinal.pdf>
- AOTF. (2006). Dissertation research grants. Retrieved July 19, 2006, from <http://www.aotf.org/html/student.shtml>
- Case-Smith, J. (2000). Effects of occupational therapy services on fine motor and functional performance in preschool children. *American Journal of Occupational Therapy*, 54(4), 372-380.
- Case-Smith, J. (2002). Effectiveness of school-based OT intervention on handwriting. *American Journal of Occupational Therapy*, 56(1), 17-25.
- Case-Smith, J. (1997). Variables related to successful school-based practice. *Occupational Therapy Journal of Research*, 17(2), 133-153.

-
- Case-Smith, J., & Cable, J. (1996). Perceptions of occupational therapists regarding service models in school-based practice. *Occupational Therapy Journal of Research*, 16, 23-44.
- Center on Personnel Studies in Special Education [COPSSE]. (2005). *Update on the Related Services Design Panel work-2005*. Retrieved June 15, 2006, from http://www.coe.ufl.edu/copsse/docs/update_on_rs_design_panel_work/1/update_on_rs_design_panel_work.pdf
- Centre for Evidence-Based Medicine [CEBM]. (2006). Levels of evidence and grades of recommendation. Retrieved July 23, 2006, from http://www.cebm.net/levels_of_evidence.asp
- Cooley, C. (2004). Is the dynamic tripod grasp the most functional grip for handwriting? Paper presented to the UPS Evidence-Based Practice Symposium. Retrieved April 6, 2006, from <http://www.ups.edu/ot.xml>
- Cooley, C. (2005). What are the current supports and/or barriers that impact effective evidence-based practice methods (EBP) among occupational therapy practitioners? Symposium on Evidence-Based Practice. Retrieved April 6, 2006, from <http://www.ups.edu/ot.xml>
- Cooley, C. (2006). Evidence-based practice: Acquisition and application by occupational therapists in the public schools. Unpublished master's thesis, University of Puget Sound.
- Dankert, H. L., Davies, P. L., & Gavin, W. J. (2003). OT effects on visual-motor skills in preschool children. *American Journal of Occupational Therapy*, 57(5), 542-549.
- Denton, P. L., Cope, S., & Moser, C. (2006). The effects of sensorimotor-based intervention versus therapeutic practice on improving handwriting performance in 6- to 11-year-old children. *American Journal of Occupational Therapy*, 60(1), 16-27.
- Dietz, J. (2003). Classroom seating for attention deficit hyperactivity disorder: Therapy balls versus charis. *American Journal of Occupational Therapy*, 57(4), 534-541.
- Dunn, W. (1991). A comparison of service provision models in school-based occupational therapy services: A pilot study. *Occupational Therapy Journal of Research*, 10, 300-320.
- Education Resources Information Center. (2003). Retrieved June 15, 2007, from <http://www.ericdigests.org/2004-1/sensory.htm>
- Feller, A. (2005). What is the best treatment for the management of upper extremity spasticity in children with cerebral palsy? Paper presented at the UPS Evidence-Based Practice Symposium. Retrieved April 6, 2006, from <http://www.ups.edu/ot.xml>
- Friend, M., & Cook, L. (2003). *Interactions: Collaboration skills for school professionals*. Boston: Allyn & Bacon.
- Giangreco, M. (1995). Related services decision-making: A foundational component of effective education for students with disabilities. *Physical and Occupational Therapy in Pediatrics*, 15, 47-67.

-
- Goldenburg, C (2004). Are Sensory-based interventions for children with selective eating problems effective? Paper presented to the UPS Evidence-Based Practice Symposium. Retrieved April 6, 2006, from <http://www.ups.edu/ot.xml>
- Hammel, K. W. (2001). Using qualitative research to inform the client-centred evidence-based practice of occupational therapy. *British Journal of Occupational Therapy*, 64, 228-234.
- Hanft, B. E., & Place, P. A. (1996). *The consulting therapist: A guide for OTs and PTs in schools*. San Antonio, TX: Therapy Skill Builders.
- Hess, D. (2003). *Preferred methods in competence development and influences on practice within school-based occupational therapy*. Unpublished master's thesis, University of Puget Sound, Tacoma.
- Holm, M. B. (2001). Our mandate for the new millennium: Evidence-based practice. *American Journal of Occupational Therapy*, 54, 575-585.
- Holman, K. (2005). There is insufficient evidence (Level 4) to support or refute the use of therapy balls as an alternative form of seating for improving classroom behavior of children with autistic/behavioral disorders. Retrieved April 6, 2006, from <http://www.otcats.com/topics/CAT-KHolman2005.html>
- Hoss, S. (2004). Do children with disabilities, who are included in the general education classroom, have better academic achievement than children in special education classrooms? Paper presented to the UPS Evidence-Based Practice Symposium. Retrieved April 6, 2006, from <http://www.ups.edu/ot.xml>
- Hyde, P. (2001). Fools gold? Questioning the use of gold standards in the production of research evidence. Paper presented at the Qualitative Evidence-Based Practice Conference, Taking a Critical Stance. Coventry University, May 14-16, 2001.
- Individuals with Disabilities Education Improvement Act of 2004 [IDEIA]. Pub. L. No. 108-446.
- Individuals with Disabilities Education Act Amendments of 1997 [IDEA], Pub. L. 105-17, 20 U.S.C.-1400 et seq.
- Jackson, L., & Arbesman, M. (2005). *Children with behavioral and psychosocial needs: Occupational therapy practice guidelines*. Bethesda, MD: American Occupational Therapy Association.
- Kellegrew, D. H. (2005). The evolution of evidence-based practice: Strategies and resources for busy practitioners. *OT Practice*, 10, 11-15.
- Law, M., Baum, C., & Dunn, W. (2005). *Measuring occupational performance: Supporting best practice in occupational therapy*. Thorofare, NJ: Slack, Inc.
- Law, M., Pollock, N., & Stewart, D. (2004). Evidence-based occupational therapy: Concepts and strategies. *New Zealand Journal of Occupational Therapy*, 51, 14-22.

-
- Lieberman, D., & Scheer, J. (2002). AOTA's evidence-based literature review project: An overview. *American Journal of Occupational Therapy*, 56(3), 344-349.
- Lipsky, D. K., & Gartner, A. (1997). *Inclusion and school reform: Transforming America's classrooms*. Baltimore, MD: Brookes.
- Lopez, M. (2004). Is there evidence that the School Function Assessment and the Vineland Adaptive Behavior Scales are valid measures of social skills for children and adolescents? Paper presented at the UPS Evidence-Based Practice Symposium. Retrieved April 6, 2006, from <http://www.ups.edu/ot.xml>
- McMaster University, CanChild Centre for Childhood Disability Research. Retrieved June 15, 2007, from <http://www.canchild.ca>
- Miller, E., & Miller-Kuhaneck, H. (Sept. 2006). The relationship among sensory preferences, play preferences, motivation, and mastery in guiding children's play: A review of the literature, Part 2. *Sensory Integration Special Interest Section Quarterly*. Bethesda: MD: American Occupational Therapy Association.
- Missiuna, C. (2003). Children with developmental coordination disorder: At home and in the classroom. (5th ed.) [Brochure]. McMaster University, Hamilton, ON: CanChild Centre for Childhood Disability Research. Also available at <http://www.fhs.mcmaster.ca/canchild>
- Muhlenhaupt, M. (2003). Evidence-based practice in the schools: How can we begin? *The Israel Journal of Occupational Therapy*, 12, 19-35.
- National Center on Secondary Education and Transition [NCSET]. (2002). 'What Works' data brief. Retrieved August 22, 2006, from <http://www.ncset.org/publications/viewdesc.asp?id=714>
- No Child Left Behind Act of 2001, Pub. L. No. 107-110, 20 U.S.C.-1425 et seq.
- Palisano, R. J. (1989). Comparison of two methods of service delivery for students with learning disabilities. *Physical and Occupational Therapy in Pediatrics*, 9, 79-100.
- Peters, K. (2004). Does auditory training result in improved attention, expressive language and a reduction of behavior problems for children with autism? Paper presented at the UPS Evidence-Based Practice Symposium. Retrieved April 6, 2006, from <http://www.ups.edu/~ot>
- Rapport, M. J (2004). *Related services research agenda*. Retrieved June 15, 2006, from <http://www.coe.ufl.edu/copsse/docs/SUMMIT-CP-PUB5/1/SUMMIT-CP-PUB5.pdf>
- Rosenblum, S., Goldstand, S., & Parush, S. (2006). Relationships among biomechanical ergonomic factors, handwriting product quality, handwriting efficiency, and computerized handwriting process measures in children with and without handwriting difficulties. *American Journal of Occupational Therapy*, 60(1), 28-39.

-
- Sackett, D., Rosenburg, W., Gray, J., Haynes, R., & Richardson, W. (1996). Evidence-based medicine: What it is and what it isn't. *British Medical Journal*, *312*(1), 71-72.
- Savage, A. (2005). What techniques or programs other than 1:1 therapy have proven effective for helping children with Asperger syndrome achieve age-appropriate social and emotional skills? Paper presented to the UPS Evidence-Based Practice Symposium. Retrieved April 6, 2006, from <http://www.ups.edu/ot.xml>
- Schilling, D. L., Washington, K., Billingsley, F. F., Deitz, J. (2003). Classroom seating for children with attention deficit hyperactivity disorder: Therapy balls versus chairs. *American Journal of Occupational Therapy*, *57*(5), 534-541.
- Snell, M., & Janney, R. (2005). *Collaborative teaming* (2nd ed.). Baltimore, MD: Paul H. Brookes Publishing Co.
- Spencer, K. C., Turkett, A., Vaughan, R., & Koenig, S. (2006). School-based practice patterns: A survey of occupational therapists in Colorado. *American Journal of Occupational Therapy*, *60*, 81-91.
- Straw, A. (2004). Do weighted vests increase on-task behavior in the classroom for children and adolescents with developmental disorders? Paper presented at the UPS Evidence-Based Practice Symposium. Retrieved April 6, 2006, from <http://www.ups.edu/ot.xml>
- Swinth, Y. L. (2002). [Current issues and trends in school-based occupational therapy]. Unpublished raw data.
- Swinth, Y., Chandler, B., Hanft, B., Jackson, L., & Shepherd, J. (2003). Personnel issues in school-based occupational therapy: Supply and demand, preparation, certification and licensure (COPSSE Document No. IB-1). Gainesville, FL: University of Florida, Center on Personnel Studies in Special Education. Retrieved June 15, 2006, from <http://www.coe.ufl.edu/copsse/docs/IB-1/1/IB-1.pdf>
- Tanta, K. J., Deitz, J. C., White, O., & Billingsley, F. (2005). The effects of peer-play level on initiations and responses of preschool children with delayed play skills. *American Journal of Occupational Therapy*, *59*(4), 437-445.
- Thousand, J., & Villa, R. (2000). Collaborative teaming: A powerful tool in school restructuring. In R. Villa and J. Thousand (Eds.), *Restructuring for caring and effective education* (pp. 254-291). Baltimore, MD: Paul H. Brookes Publishing.
- Tickle-Degnen, L. (1999). Evidence-based practice forum—Organizing, evaluating, and using evidence in occupational therapy practice. *American Journal of Occupational Therapy*, *53*, 537-539.
- Tickle-Degnen, L. (2000). Evidence-based forum—Gathering current research evidence to enhance clinical reasoning. *American Journal of Occupational Therapy*, *54*, 102-105.

-
- Tickle-Degnen, L., & Bedell, G. (2003). Evidence-based practice forum—heterarchy and hierarchy: A critical appraisal of the “levels of evidence” as a tool for clinical decision-making. *American Journal of Occupational Therapy*, 57, 234-237.
- Tomlin, G. S. (in press). Scientific reasoning. In B. A. B. Schell & J. W. Schell (Eds.). *Clinical and professional reasoning in occupational therapy*. Baltimore: Lippincott, Williams & Wilkins.
- U. S. Department of Education [USDOE], Institute for Educational Sciences. (n.d.) *Funding opportunities*. Retrieved July 1, 2006, from <http://ies.ed.gov/ncser/funding>
- USDOE, National Longitudinal Study 2. Retrieved June 15, 2006, from <http://www.nlts2.org/index.html>
- USDOE, Office of Special Education and Rehabilitative Services. (2004). *IDEA 2004 Resources*. Retrieved January 3, 2006, from <http://www.ed.gov/policy/spced/guid/idea/idea2004.html>
- Vargas, S., & Camilli, G. (1999). A meta-analysis of research on sensory integration treatment. *American Journal of Occupational Therapy*, 53(2), 189-198.
- Villa, R., Thousand, J., Nevin, A., & Malgeri, C. (1996). Instilling collaboration for inclusive schooling as a way of doing business in public education. *Remedial and Special Education*, 17(93), 169-181.
- Walther-Thomas, C., Korinek, L. McLaughlin, V., & Williams, B. (2002). *Collaboration for inclusive education: Developing successful programs*. Boston: Allyn & Bacon.
- Whitehurst, G. J. (2002, October). Evidence-based education (EBE): Powerpoint presentation at the Student Achievement and School Accountability Conference. Retrieved May 6, 2006, from <http://www.ed.gov/nclb/methods/whatworks/eb/edlite-index.html>
- World Health Organization. (2001). *International classification of functioning, disability and health*. Geneva: Author.