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Using Evidence To Inform School-Based Practice

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Evidence-based medicine and *evidence-based practice* have been buzzwords in health-related fields for some time now. Accreditation commissions, consumer groups, managed care organizations, and Medicare are all increasingly involved in measuring outcomes from service delivery (Robertson & Colborn, 2000). Evidence-based practice advocates the evaluation of available health care or rehabilitation evidence on the advantages and disadvantages of various treatment options and is driven by the accessibility of information available through personal computers and the World Wide Web (Christiansen & Lou, 2001). Whether in teaching, research, or practice, all occupational therapy personnel must come to "grips" with the ramifications of the evidence-based era in which we are living.

What Is Evidence-Based Practice?

Evidence-based practice is described by Sackett, Rosenberg, Gray, Haynes, and Richardson, (1996) as the "conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (p. 71). Holm (2000) used Gray's description of evidence-based practice as "doing the right things right" (p. 17). In daily practice, many of us believe that we are doing the right things on behalf of our client, and based on the individual's particular outcomes, this may indeed be true. The evidence-based movement does not claim to replace the clinical reasoning required of each practitioner working with the client in the individualized context of service delivery. Instead, evidence is purported to assist the therapist by making credible research and current knowledge more accessible, thereby augmenting clinical reasoning and decision making. The larger issue for our profession is the need to build a substantial body of evidence that substantiates occupational therapy theory and the impact of occupational therapy on specific client outcomes. With busy caseloads, demanding schedules, and documentation requirements, most practicing therapists are wondering how anyone other than researchers can find time for the demands created by the evidence-based practice pundits. This article describes the importance of evidence for school practice, identifies practical ways to access and use current evidence during routine service delivery, and provides suggestions about strengthening our profession's body of evidence regarding the impact of occupational therapy on student outcomes in school practice.

How Is Evidence Examined?

Hierarchies of evidence were designed to help practitioners "select current best evidence available to guide decisions about what to do and how to do it for a particular patient or population" (Holm, 2000, p. 577). The following descriptions of the levels of evidence are taken from Moore, McQuay, and Gray's (1995) text called *Evidence-Based Everything*. The strongest or most reliable evidence is listed as Level I: "strong evidence from at least one systematic review of multiple well-designed randomized controlled trials" (p. 1). These studies usually involve meta-analytic studies or systematic reviews. Level II is strong evidence from at least one properly designed randomized controlled trial of appropriate size. Level III is evidence from well-designed trials without randomization but with single-group pretest–posttest, cohort, time series, or matched case-controlled studies. Level IV is evidence from well-designed nonexperimental studies from more than one center or research group. Level V is opinions of respected authorities based on clinical evidence, descriptive studies, or reports of expert committees.

Holm (2000) described one important piece of Level I evidence regarding sensory integration with which school-based practitioners should be familiar. Vargas and Camilli (1999) conducted a meta-analy-

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sis of 22 sensory integration studies since 1983 and found that outcomes with sensory integration were no better than the outcomes for control groups, which received no treatments, regardless of the outcome being measured. Holm further explained that the failure of this study to identify the effectiveness of sensory integration may be due to many factors, including the measurement of inappropriate outcomes, obscuring the treatment effects by application with inappropriate populations, the use of insensitive outcome measures, or inadequate sample size or statistical power. The reason for highlighting this study is that many occupational therapy personnel use the sensory integration frame of reference to design school-based evaluations and intervention (McDougall et al., 1999). Although other levels of evidence exist in the professional literature in support of sensory integration evaluation and techniques, understanding the strength of the current evidence helps us to make more knowledgeable decisions with students and teams when selecting evaluation and intervention methods.

Getting Started—Becoming an Evidence-Based Practitioner

Although there are school-based occupational therapists actively involved in research investigations, many of us are seeking to use existing evidence more effectively to inform our practice decisions for the students and educational teams we serve. To help each of us accomplish this important professional goal, Tickle-Degnen (2000) recommended the following steps:

1. Write down the clinical question that you are experiencing. Determine the nature of your question—whether it is descriptive, assessment, or intervention based (see Table 1 to view a framework for this process).
2. Gather current evidence that might answer the question.
3. Evaluate the evidence to determine what is "best" for answering the question.
4. Communicate with clients and colleagues as evaluation or intervention decisions are being made.
5. Evaluate the outcomes resulting from application of the evidence and adjust methods as needed for each individual.

Locating Evidence When You Need It

Living in the Information Age has its benefits and challenges. The benefits of easy access to vast sources of information are apparent. However, as Holm (2000) aptly conveyed, the expansion of knowledge has created too much evidence to sift through easily; the "quantity of evidence does not equal quality of evidence" (p. 576). Evidence can be found in journal resources, electronic databases, textbooks, libraries, and human experts. School-based occupational therapists with access to the World Wide Web will find it relatively easy to search a variety of databases, such as MEDLINE, CINAHL, The Cochrane Database of Systematic Reviews, OT SEARCH, ACP Journal Club, DARE, ERIC, and PsycLit. The American Occupational Therapy Association's (AOTA's) Practice group also is continuing work on a project to compile current occupational therapy evidence into easily digested briefs for future access through AOTA's Web site. Present topics correlate with AOTA's Practice Guidelines Series and, of particular relevance for school practitioners, include delayed development, cerebral palsy, and effectiveness of occupational therapy in schools

Table 1
Writing a Clinical Question in School Practice

Clinical Task	Sample Question	Type of Evidence Needed
Descriptive Identify occupation or performance issues relevant to a particular population. *Assessment* Select the best assessments and procedures for particular population in school settings. *Intervention* Plan intervention.	Do students (with certain conditions, age, gender) have the same participation, experiences, and outcomes as children without disabilities? What are the most reliable and valid methods for assessing relevant occupational performance among school children? What are the most effective treatments for increasing participation and outcomes in relevant occupational performance for particular student populations?	Ethnographic, observational, single-case, qualitative, case control, correlational, cross-sectional, longitudinal, retrospective Measurement, validity, reliability Treatment effectiveness, experimental, quasi-experimental, randomized clinical trials

Note. Adapted from Tickle-Degnen (2000).

(D. Lieberman, AOTA practice associate, personal communication, January 31, 2001).

One of my favorite "quickie" methods for catching up on evidence at the end of the year is to review the subject indexes in the final editions of journals, such as *The American Journal of Occupational Therapy*. This index review enables me to locate the new studies that have been published in a particular subject area I want to review, such as school-based occupational therapy. Occupational therapy personnel also can discuss current evidence with colleagues during formal staff meetings, local discussion groups, the AOTA School System Special Interest Section Listserv, and continuing education opportunities. If a university occupational therapy program is nearby, participation with faculty or discussion groups may be another good resource. State occupational therapy association conferences and the AOTA Annual Conference serve as important meeting places for discovering current evidence from a diverse array of presenters representing many topics. The more school-based practitioners read, discuss, and explore existing evidence, the more discriminating and critical will be our use of evidence to inform the intervention process.

Macro and Micro Evidence—Investigating Student Participation Versus Impairment

Although the International Classification of Impairments, Disabilities and Handicaps, (ICIDH-2; World Health Organization, 1999) criteria have assisted the occupational therapy profession in using the language of participation and enablement in disability, investigating evidence can still become a focus on impairment or dysfunction. It is important to discuss this issue in relation to the mandates of occupational therapy personnel in the school system. Many children and adolescents experience one or more forms of physical, intellectual, or social disability in school settings. Occupational therapy is considered a related service and, as such, assists a student in benefiting from his or her educational program (Individuals With Disabilities Education Act [IDEA], § 300.24 [a][b][5]). In other words, the express purpose of occupational therapy is not to "fix" or "cure" each impairment or dysfunction that a student may bring to the school setting. The occupational therapist's role is to assist the educational team in determining how specific performance components, such as sensorimotor, cognitive, or psychosocial issues, may be interfering with a student's learning and successful participation in school roles and responsibilities. After this determination is made, then the educational team can make informed decisions about designing instruction and services that will assist the student in accomplishing his or her educational goals and objectives.

Case-Smith (2002) investigated the effectiveness of school-based occupational therapy intervention on handwriting outcomes for 29 elementary students 7 to 10 years of age whose educational identification was primarily learning disabilities. Her study compared the findings with 9 students who did not receive occupational therapy intervention. The occupational therapy interventions represented a

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variety of theoretical methods, including sensorimotor, developmental, motor learning, and behavioral. The students receiving occupational therapy intervention demonstrated improved in-hand manipulation and position-in-space scores and improved more in handwriting legibility scores (14% legibility increase) than the students in the comparison group (5.8% legibility increase). Speed and numeral legibility did not demonstrate positive intervention effects. Two sections of the School Function Assessment (Coster, Deeney, Haltiwanger, & Haley, 1998)—Using Materials and Written Work—also were administered to evaluate the students' participation in school-related activities. Student performance on school activities involving written communication increased by a substantial amount but was not seen in the activities for using materials in school.

This Level III study provides much helpful evidence for school-based therapists in designing interventions. It also opens up many more questions to explore. Case-Smith (2002) recommended that future studies investigate specific handwriting interventions to determine "which approaches result in optimal outcomes" (p. 24). For instance, which specific handwriting needs are best met by which specific forms of intervention? How can these interventions be most effectively and efficiently delivered? It also will be helpful to learn more about the "macro" evidence or participation outcomes that might result from improving handwriting legibility, speed, or both. For instance, is participation in classroom learning significantly better because the student's handwriting skills are better established? Is the student more motivated to participate in learning tasks because writing is now more fluent or automatic?

The correlation between improvements in performance components (or impairment-level functioning) and performance areas (or participation-level functioning) cannot be assumed unless reliable evidence has verified this finding. Here lies one of the important challenges: helping school-based therapists identify when it is most efficacious to remediate impairment-based problems and when to focus on adaptation and compensation models of intervention and support. Occupational therapy personnel must routinely make remedial and compensatory service delivery decisions with students and educational teams. There also are many other important student and contextual factors that the occupational therapist must consider during the team's decision-making process. Student factors may include age, medical diagnoses, intellectual levels, and school-based priorities. Contextual factors include the classroom environment, the educational curricula, state or local academic standards, instructional delivery, team support, and school district policies and procedures. Building a strong body of evidence related to school practice requires investigations that reflect the important interrelationships among the school context, the student's school functioning, and the underlying performance components that richly coexist in the fabric of today's school systems.

What Is the Difference Between Evidence and Outcomes?

The IDEA Amendments of 1997 (Public Law 105–17) require educators and related service providers to monitor and report on student progress as often as children in general education receive progress reports (34 C.F.R. § 300.347[a][7]). The process of monitoring and reporting on student progress requires us to examine our "outcomes" for the students we serve. We cannot report on student progress reliably without examining the methods we are using to achieve our outcomes. If our outcomes are good, we might rightly presume that we have begun to establish evidence for resolving or improving the particular performance objectives that the educational team has identified in the student's individualized educational program. Unfortunately, unless our outcomes are gathered in ways that are reliable and valid for research, they may remain primarily as unpublished practice findings that may not add to the important body of evidence our profession needs to continue to assemble.

The process of monitoring student progress allows occupational therapy personnel to maintain an ongoing record about student change. Single-subject research designs (Campbell, 1988; Ottenbacher & York, 1984) can be a helpful framework for designing progress-monitoring methods for individual students. Once the team or therapist has a reliable baseline about a particular observable aspect of student performance (the dependent variable), the team can design intervention (the independent variable) and do routine observations to collect data and determine whether the student's performance is changing in the desired direction. When student progress is moving in positive directions, then intervention(s) is presumed to be at least partly responsible for desirable outcomes. When outcomes are not moving in the direction hoped, then the educational team needs to review the student's performance data and determine the changes needed in the intervention method(s). Two recent studies on the use of weighted vests to improve on-task behaviors in students with attention deficit hyperactivity disorder and pervasive developmental disorder nicely demonstrate how school-based therapists can use relatively uncomplicated research designs similar to single-subject methodology to determine the effectiveness of chosen interventions in school settings (Fertel-Daly, Bedell, & Hinojosa, 2001; VandenBerg, 2001).

In 1992, I served as a field researcher for Winnie Dunn's pilot study investigating the impact of occupational therapy service delivery on students' performance outcomes (Kemmis & Dunn, 1996). During this investigation, three students were selected for whom various occupational therapy intervention strategies were applied in the school setting. Table 2 portrays one student's particular skills targeted for intervention and the type of data used to measure progress. The outcomes of these particular interventions were compiled by the principal researcher to gather initial evidence about the effectiveness of occupational therapy models of service delivery in school settings. Although to my knowledge this type of study has yet to be replicated in a school setting, it has much use. Occupational therapists routinely apply various methods and models to address student performance problems for thousands of students every day. These same therapists are organizing data collection with school teams so that progress monitoring can occur. The challenge for researchers in our profession is to obtain more funding support to investigate the outcomes of occupational therapy interventions in school systems. The challenge for therapists is to share our student populations and our methods, organize our data collection, measure student outcomes systematically, and work collaboratively with researchers to document school practice evidence using well-designed research studies.

The Challenges

Administrators need to grant permission for occupational therapy personnel to participate in research projects during their work hours. Parents, students, and teachers need to grant permission to be part of the studies. Therapists need to spend extra time documenting and organizing data so that the researcher can compile the findings collectively. Control groups need to be established as often as possible. For instance, in Case-Smith's (2002) handwriting study, a control group of students without delays was identified. There were no ethical concerns with this choice because the students did not show any need for occupational therapy services. For students who demonstrate occupational therapy service needs, ethical questions arise, and the best forms of occupational therapy service cannot be withheld. However, if two or more differing methods deal with a particular student problem (i.e., using sensory processing interventions vs. behavioral interventions to address a student's on-task behaviors), then designing two experimental groups and a control group might be manageable.

Table 2
Student Skill Measurement During Dunn's (Kemmis & Dunn, 1996) Pilot Study—Alycia

Skills Targeted	Measurement Used
Tearing out pages of workbook	Frequency count of properly torn pages
Sharpening pencil	Duration count of total elapsed time
Playing ball game with peers	Duration count of ball play
Putting papers in backpack	Frequency count of independent task completion
Manipulating a hole punch	Frequency count of complete punches
Putting papers in three-ring binder	Duration count of completed task
Keeping place on math sheet	Frequency count of physical object correctly placed beside problem
Paying lunch token	Duration count in cafeteria line
Putting on gloves for recess	Duration count start to finish
Properly using glue in art	Frequency count with glue sticks
Lacing an art project	Frequency count of correct holes
Retrieving balls in gym	Duration count retrieving ball
Completing movement tasks	Frequency count in classroom
Doing a frog leap	Frequency count in gym
Aligning math problems correctly	Frequency count on graph paper
Stabilizing paper while writing	Duration of proper stabilizing

Schools are complex systems. Most occupational therapy personnel know that success for their students depends on many interrelated variables, including team collaboration and follow-through with the intervention strategies, adequate consultation time, and adequate equipment and materials. Models of service delivery also are an important factor to consider in evidence. Are particular student outcomes more successful if an individualized intervention approach is used versus a classroom-integrated model with consultation components? How much does a service delivery model affect outcomes versus frequency of service delivery versus intensity of student contacts? How is the therapist's use of self as a change agent essential in the student outcomes? Finally, what specific goal-directed learning experiences or activities either foster or inhibit occupational performance (Robertson & Colborn, 2000).

Designing and implementing research that marries these diverse, but interdependent aspects of service delivery is one of the unique challenges of conducting research in the school environment. A number of authors have emphasized the importance of "multimethod" research that mixes qualitative (word-based data) and quantitative (number-based data) to obtain methodological pluralism (Davies & Gavin, 1999; Nick & Hardin, 1999; Robertson & Colborn, 2000). Particularly, Nick and Hardin (1999) noted that allied health literature often pays little attention to the interpretation and presentation of the simultaneous effects of many variables on an outcome, usually preferring to describe relationships that are simple and linear. Any experienced school-based occupational therapist will validate that multiple variables are constantly at work influencing student outcomes, so research designs will need to reflect this multiplicity as well.

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References

Campbell, P. (1988). Using a single-subject research design to evaluate the effectiveness of treatment. *American Journal of Occupational Therapy, 42,* 732–738.

Case-Smith, J. (2002). Effectiveness of school-based occupational therapy intervention on handwriting. *American Journal of Occupational Therapy, 56,* 17–25.

Christiansen, C., & Lou, J. Q. (2001). Ethical considerations related to evidence-based practice. *American Journal of Occupational Therapy, 55,* 345–349.

Coster, W., Deeney, T., Haltiwanger, J., & Haley, S. (1998). *School function assessment: User's manual.* San Antonio, TX: Psychological Corporation.

Davies, P. L., & Gavin, W. J. (1999). Measurement issues in treatment effectiveness studies. *American Journal of Occupational Therapy, 53,* 363–372.

Fertel-Daly, D., Bedell, G., & Hinojosa, J. (2001). Effects of a weighted vest on attention to task and self-stimulatory behaviors in preschoolers with pervasive developmental disorders. *American Journal of Occupational Therapy, 55,* 629–640.

Holm, M. (2000). Our mandate for the new millennium: Evidence-based practice, 2000 Eleanor Clarke Slagle lecture. *American Journal of Occupational Therapy, 54,* 575–585.

Individuals With Disabilities Education Act Final Regulations. (1999). Pub. L. 1205–17, 34 C.F.R. Part 300.

Kemmis, B. L., & Dunn, W. (1996). Collaborative consultation: The efficacy of remedial and compensatory interventions in school contexts. *American Journal of Occupational Therapy, 50,* 709–717.

McDougall, J., King, G., Malloy-Miller, T., Gritzan, J., Tucker, M., & Evans, J. (1999). A checklist to determine the methods of intervention used in school-based therapy: Development and pilot testing. *Physical and Occupational Therapy in Pediatrics, 19*(2), 53–77.

Moore, A., McQuay, H., & Gray, J. A. M. (Eds.). (1995). Evidence-based everything. *Bandolier, 1*(12), 1.

Nick, T. G., & Hardin, J. M. (1999). Regression modeling strategies: An illustrative case study from medical rehabilitation outcomes research. *American Journal of Occupational Therapy, 53,* 459–470.

Ottenbacher, K., & York, J. (1984). Strategies for evaluating clinical change: Implications for practice and research. *American Journal of Occupational Therapy, 38,* 647–659.

Robertson, S. C., & Colborn, A. P. (2000). Can we improve outcomes research by expanding research methods? *American Journal of Occupational Therapy, 54,* 541–543.

Sackett, D. L., Rosenberg, W. M. C., Gray, J. A. M., Haynes, R. B., & Richardson, W. S. (1996). Evidence-based medicine: What it is and what it isn't. *British Medical Journal, 312,* 71–72.

Tickle-Degnen, L. (2000). Evidence-Based Practice Forum—Gathering current research evidence to enhance clinical reasoning. *American Journal of Occupational Therapy, 54,* 102–105.

VandenBerg, N. (2001). The use of a weighted vest to increase on-task behavior in children with attention difficulties. *American Journal of Occupational Therapy, 55,* 621–628.

Vargas, S., & Camilli, G. (1999). A meta-analysis of research on sensory integration treatment. *American Journal of Occupational Therapy, 53,* 189–198.

World Health Organization. (1999, January 2). *ICIDH-2: International classification of impairments, activities, and participation: A manual of dimensions of disablement and health*. Geneva, Switzerland: Author.

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