



In Support of Single Subject Research for Evidence Based Practice and AAC Research*

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Practitioners who endeavor to engage in Evidence Based Practice (EBP) will recognize that this process consists of a sequence of elements. Schlosser & Raghavendra (2004) have identified these steps: (1) articulating meaningful research questions, (2) consulting the research literature, including identifying appropriate components: (3) analyzing and integrating the data, (4) applying the conclusions to therapy, (5) assessing the results and (6) sharing the findings of the therapy intervention.

In the field of Alternative and Augmentative Communication (AAC) and Assistive Technology (AT), there is a pressing need for additional research which is of sufficient rigor and clarity that professionals can draw upon the literature with greater confidence (Edyburn & Gersten, 2007). One hopeful by-product of EBP is that, one day, groups of studies will become the foundation for meta-analysis and ultimately lead to a larger body of research on which to base professional decision-making.

Scholars have expounded upon these steps in an effort to bring greater clarity and offer ways to improve quality at each point. Schlosser, Koul, & Costello (2007) and Rothschild (2007) have addressed the process of developing well-structured steps including research questions. Schlosser & Raghavendra (2004) have provided a discussion of the process for collecting indications from the literature. Reichle (2007) has described the aspects of single subject design research that, when carefully observed, can produce reliable results which can demonstrate the efficacy of the intervention. Schlosser (2007) has provided checklist for assuring sound application of the intervention (“treatment integrity”). These articles provide excellent direction and insight for conducting EBP. These articles are among the bibliography available on the PRC Research web site (<http://www.prentrom.com/research>). Some articles are linked from the PRC site.

However, the integration of these articles into a coherent process for EBP can be a challenge for practitioners. This paper is an effort to provide a series of templates, or rubrics, by which professionals may incorporate the structure and direction provided by these scholars, into their practice. We present a set of checklists and rubrics which can aid a professional to collect appropriate and complete data, organize the search for useful evidence, shape the research question carefully, conduct the intervention with treatment integrity, and follow sound procedures for analysis of the data.

SUBJECT PROFILE

As professionals we collect a wealth of information about our clients. When the key elements of the consumer’s profile accompany EBP Research in which that consumer is a participant, there exists the potential that the study can be incorporated with other similar studies later to examine the broader implications. This template suggests a list of characteristics which describe various aspects of the consumer’s profile that could factor into future studies. Taking a few moments to complete this profile and to include this profile with EBP research data, could prove helpful later.

SUBJECT PROFILE

Use this checklist to assist in the collection of personal and demographic data that may be useful in future meta-analysis.

| Characteristic | Types of Detail | Consumer/Client Information |
|--|---|-----------------------------|
| Name | Consumer name | |
| Age | Consumer chronological age | |
| Gender | Male/female | |
| Disability | Medical diagnosis | |
| Genl. Description | Date of onset Physical status Hearing status Language skills Vision status Cognitive skills | |
| Impairment | Dysarthria Apraxia Aphasia Aphonia | |
| Severity | Describe level of involvement | |
| Stage of Speech Intelligibility | <ul style="list-style-type: none"> • No detectable speech disorder • Obvious speech disorder, intelligible • Reduction in speech intelligibility • Natural speech supplemented with SGDs • No useful speech (SGD only) • Etc. | |
| Functional Communication Goals | General Description | |
| AAC History | General Description Experiences Systems/Devices used Results Preferences | |
| AAC system/device | Brand and model of system | |
| Language system | Number of key locations Language representation method (single meaning pictures, semantic compaction, or text) Word/phrase/letter based | |
| Input method/ selection technique | Direct Selection w/ or w/o keyguard Headpointing Scanning Eye Gaze Aud. Scanning Joystick | |
| Display Characteristics | Type of symbols Visual Scenes Use of color | |
| Output features | Voice(s) Text | |
| Treatment setting | Individual /group therapy Environment | |
| Patient/family support level | Team members, roles: <ul style="list-style-type: none"> • Family, friends • Teachers, school staff • Private therapists, others | |

SEARCHING FOR EVIDENCE

One important aspect of applying quality research to therapy or instruction involves the gathering of existing research literature having implications for the consumers at hand and the question you seek to study. Schlosser, R. W., & Raghavendra, P. (2004) have proposed a framework for Evidence Based Practice (EBP) in AAC. One of the key elements of this framework is the selection, analysis and application of evidence from the literature to your study. This rubric seeks to identify key elements of effective literature search. Three aspects are addressed: (1) the quality of sources of evidence, (2) the identification of search filters, (3) and characteristics by which to evaluate evidence.

Use this rubric when searching the research literature for evidence on which to base your research question, assumptions, and hypotheses.

| Evidence Sources | Description | Application to Your Study |
|--------------------------|--|---------------------------|
| Textbooks | Subject index: topical overviews Are readings up-to-date? | |
| DB Searches | Evidence-based databases: Evidence Based Medical Reviews (EMBR) DARE Cochrane General Purpose Databases: MEDLINE CINHAL PsychINFO ERIC LLBA ISI Web of Science | |
| Peer Reviewed Journals | Journal of Special Education Tecnology (www.tamcec.org) What Works Clearinghouse (http://ies.ed.gov/ncee/wwc) Augmentative & Alternative Communication (www.isaac-online.org/en/publications/aac.html) Assistive Technology (www.resna.org) Journal of Research on Technology in Education | |
| Hand Searches | ISAAC ASHA Eur. Conf of Adv Rehab Techn. | |
| Search Filters | | |
| ID Keywords | Keyword strategies, combination DB Thesaurus of Keyword terms | |
| Target Types Evidence | Systematic reviews | |
| Evaluate Evidence | | |
| Treatment Integrity | Was independent variable employed as devised? | |
| External Validity | Can discoveries from this study be applied beyond this sample/situation? | |
| Social Validity | Are the aims, results, and approach of value to those directly/indirectly involved in the study? | |
| Research design | Is the design of the study sound? | |

Source: Schlosser, R. W., & Raghavendra, P. (2004). Evidence-based practice in augmentative and alternative communication. *Augmentative and Alternative Communication*, 20, 1-21.

Other resources

Reed, P. (October, 2008). We have to do WHAT? Alook at the IDEA Requirement that Interventions be based on Peer Reviewed Research and how it applies to AT. A presentation at the Closing The Gap Conference, Minneapolis, Mn. 2008.

RESEARCH QUESTION

One key step in effective research is the development of quality research questions. Skillfully crafted questions can be especially helpful in producing a methodical examination of available resources. This is no less significant for Evidence Based Practice. Schlosser, Koul, & Costello (2007) have provided a structure for shaping excellent research questions. Use this rubric to help formulate quality research questions in your EBP.

| Template Component | Person & Problem | Environments | Stakeholders | Interventions | Comparison | Outcomes |
|--------------------|--|--|--|--|--|--|
| Description | Describe the individual involved & Issue to be addressed | Describe the settings/context in which individual will communicate | Describe the other individuals who have input/ influence on decision making & their perspectives | Describe the proposed steps to be taken to effect change | Describe the baseline or alternative intervention to be compared | Describe the anticipated outcomes. |
| Example | 7 yr old boy with autism. Rarely vocalizes. Needs a means to communicate | Public school self-contained ASD classroom. | Teachers and SLP welcome any communication. Parents are still hopeful that he will vocalize. | Child will use an SGD | Communication without SGD compared to communication with SGD present | Child will increase # attempts to communicate. |
| Your Study | | | | | | |

From:

Rothschild, N. (2007). Evidence-Based Practice in AAC: Involving Stakeholders in EBP Problem Formulation, Paper presented at Eighth Annual Conference of ASHA's Division on AAC, Atlanta, Ga., February 9, 2007.

Based upon:

Schlosser, R. W., Koul, R., Costello, J. (2007). Asking well-built questions for Evidence-based Practice in augmentative and alternative communication. *Journal of Communication Disorders*, 40, 225-238.

www.slpa.neu.edu/people/schlosser/23_Schlosser2006.pdf

RESEARCH DESIGN

Evidence Based Practice in AAC often involves only a single subject. There are research designs that are recognized as being effective methods when applied properly. The elements of effective Single Subject Research Design (SSRD) involve “repeated measurements of one or more dependent variables and systematically applying & sometimes withdrawing or varying the independent variable.” (Miller, 2008)

Employ this rubric to help structure effective design for your intervention and analysis.

| Aspect | Definition | Rubric | Your Study |
|----------------------------------|---|---|------------|
| Literature Search | Collection of evidence on which to base study | See SEARCHING FOR EVIDENCE rubric. | |
| Baseline Condition | <ul style="list-style-type: none"> • Prior to contemplated treatment • Describes current levels of behavior | <ul style="list-style-type: none"> • Baseline involves at least 5 data points • Note dependent variable until consistent behavior established • Record one baseline (minimum) | |
| Baseline Timeframe “A” Phase | <ul style="list-style-type: none"> • Time of repeated observations of target behavior • No intervention • Provide frame of reference against which future behavior is compared | <ul style="list-style-type: none"> • Sufficient to assess current levels of target behavior | |
| Treatment Design | <ul style="list-style-type: none"> • Type of design (plan for intervention & measurement) • Common types: <ol style="list-style-type: none"> 1.A-B-A Withdrawal design 2.Multiple –baseline design 3.Alternating treatment design | | |
| Treatment Timeframe “B” Phase | <ul style="list-style-type: none"> • Intervention begins • Impact upon target behavior measured • Period of time during which experimental manipulation is introduced and target behavior is observed & recorded | <ul style="list-style-type: none"> • Usually single variable is affected • If two variables are changed together interaction should be noted • Similar length of time as Baseline • Long enough to achieve stability in target behavior Baseline | |
| Dependent Variable | <ul style="list-style-type: none"> • The behavior to be observed • To determine influence of independent variable | <ul style="list-style-type: none"> • Is dependent variable quantifiable? | |
| Independent Variable | <ul style="list-style-type: none"> • The treatment: condition that the researcher utilizes • To influence the observed behavior (dependent variable) | <ul style="list-style-type: none"> • Ideally, the only variable to be changed from baseline to treatment | |
| Data Collection | <ul style="list-style-type: none"> • Measurement of target behavior during treatment phase | <ul style="list-style-type: none"> • Repeated measures of dependent variable • Standardization of conditions • Consistent measurement process | |
| Data Analysis | <ul style="list-style-type: none"> • Plot data graphically • Visual inspection of data | <ul style="list-style-type: none"> • Examine data pattern • Compare patterns from different times • Evaluate intervention effects by visual examination of: <ul style="list-style-type: none"> • Magnitude • Rate of change | |

| | | | |
|--|--|-----------|--|
| | | • Latency | |
|--|--|-----------|--|

McMillan, J. H. (2004). Educational Research: Fundamentals for the Consumer, 4th Edition. Allyn and Bacon: Boston, p.227-228.

Miller, B. Single Subject Research Design. Vancouver Coastal Health Research Institute. Retrieved Sept 20, 2008 from: www.vchri.ca/i/pdf/SingleSubjectResearch.pdf

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http://www.eshow2000.com/asha/2006/handouts/855_1667Reichle_Joe_073707_110906025109.pdf

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<http://www.practicalpress.net/updatenov05/SingleSubject.html>

MAINTAINING TREATMENT INTEGRITY

The term “Treatment Integrity” relates to how closely the intervention (independent variable) matches the intent of the research design. In other words, are we conducting the treatment phase of the research the way we think we are? Our research is strengthened when we can site measures (or steps we have taken) that demonstrate that the treatment was conducted as planned. This contributes to confidence in the results of our study.

Schlosser (2002) has discovered that those engaged in Evidence Based Practice (EBP) struggle to achieve Treatment Integrity. He has devised a checklist that can be helpful to researchers as they plan and evaluate their interventions.

Use this checklist in your planning and as you assess the integrity of your intervention. Apply these criteria when examining studies for possible adoption of treatment strategies.

| | Evaluation/Planning Items | P | G | E |
|----|--|--|--|--|
| 1 | Independent variable is operationally defined. (Observable conditions are described, including parameters. Show researcher how to measure, assess that condition). | Independent variable is not defined operationally. | Describes use of independent variable. | Describes how use of independent variable can be measured. |
| 2 | All observable procedural steps are decided and described. | Steps are not clearly described. | Steps are described. | Steps are described so they can be measured. |
| 3 | Method for assessing treatment integrity is specified. Direct approaches are chosen at least as one assessment method. | There is no provision for assessing treatment integrity. | Indirect measures (self-monitoring) are used. | Direct measures are used in at least one set of measures. |
| 4 | Data collection sheets are consistent with selected approaches to measurement of treatment procedures. | No method for collecting data on treatment integrity is planned. | Checklist facilitates self-monitoring. | Independent observer can collect data on treatment integrity. |
| 5 | The number of observations indicates representativeness (timing across course of intervention and across phases: baseline, intervention, maintenance, etc.). | No schedule for observation is planned. | Observations are scheduled. | Timing of observations is stipulated, and all phases are included. |
| 6 | Reactivity (treatment agent performs differently in presence of observer) is minimized. <i>Unnecessary if self-reported researcher is treatment agent.</i> | Reactivity is not addressed. | Reactivity is addressed in treatment plan. | Controls for reactivity are specified in treatment plan. |
| 7 | Experimenter (Practitioner) bias is minimized; Objective assessment of treatment integrity. | No provision for controls on experimenter bias are planned. | Plan for self-monitoring of experimenter bias is made. | Plan goes beyond self-monitoring to control for experimenter bias. |
| 8 | Provides % accuracy, and % agreement on occurrence/nonoccurrence. (Accuracy is the correspondence between observed treatment behavior and that described in treatment plan.) | Treatment integrity data is not reported. | % treatment integrity is reported as self observed and measured. | % treatment integrity accuracy is reported along with % agreement with independent observer. |
| 9 | Results are reported in terms of (a) component (treatment of component across all sessions), (b) session (treatment of all components within one session), and (c) overall (all treatment components across all sessions). | Treatment integrity data is not reported. | Treatment integrity data is reported overall only. | Treatment integrity data is reported by component, session and overall. |
| 10 | Integrity results support the treatment efficacy results. | Treatment integrity is ignored | Issues with treatment integrity are reported. | High level of treatment integrity is reported. |
| | Overall Rating | P | G | E |

Key to rating: P = Poor; G = Good; and E = Excellent.

From: Schlosser, R.W. (2002). On the importance of being earnest about treatment integrity. *Augmentative and Alternative Communication*, 16:,36-44. <http://www.slpa.neu.edu/people/schlosser.html>

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