

# In Support of Single Subject Research Design for Evidence-Based Practice & AAC Research

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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.

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.

## 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.

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

Scholars have expounded upon these steps in an effort to bring greater clarity and offer ways to improve quality at each point. These articles provide excellent direction and insight for conducting EBP. However, the integration of these articles into a coherent process for EBP can be a challenge for practitioners. This poster 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.

## 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 clients at hand and the question you seek to study.

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 CNHAL PsychNFO ERIC LLBA ISI Web of Science	
Peer Reviewed Journals	Journal of Special Education Technology ( <a href="http://www.tamcec.org">www.tamcec.org</a> ) What Works Clearinghouse ( <a href="http://ies.ed.gov/ncee/wwc/">http://ies.ed.gov/ncee/wwc/</a> ) Augmentative & Alternative Communication ( <a href="http://www.aac-online.org/en/publications/aac.html">www.aac-online.org/en/publications/aac.html</a> ) Assistive Technology ( <a href="http://www.resna.org">www.resna.org</a> ) Journal of Research on Technology in Education	
Hand Searches	ISAAC ASHA Eur. Conf of Adv Rehab Techn.	
Search Filters	Keyword strategies, combination DB Thesaurus of Keyword terms	
Target Types Evidence	Systematic reviews	
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?	

## Disclosure

Ben Satterfield, AT Specialist/Research Coordinator, works at GA Tools for Life within the Georgia Institute of Technology. Annalee Anderson, Clinical Projects Manager, is employed by the Prentke Romich Company.

## 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						

In Support of Single Subject Research Design for Evidence-Based Practice & AAC Research is available as a free download at <http://www.prentrom.com/research/applications>. References are included in the download.

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

## 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.	Specifies 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 reported, and all phases are included.
6	Reactivity (treatment agent performs differently in presence of observer) is minimized. Unnecessary if self-reported researcher is treatment agent.	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 is made.	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