

Single Case Research in Schools

Practical Guidelines for School-
Based Professionals

**Kimberly J. Vannest,
John L. Davis, and
Richard I. Parker**



School-Based Practice in Action Series

SINGLE CASE RESEARCH IN SCHOOLS

Single Case Research in Schools addresses and examines the variety of cutting-edge issues in single case research (SCR) in educational settings. Featuring simple and practical techniques for aggregating data for evidence-based practices, the book delves into methods of selecting behaviors of interest and measuring them reliably.

The latter part of *Single Case Research in Schools* is devoted to a step-by-step model of using SCR to evaluate practices in schools. This includes considerations such as measurement, data collection, length of phases, design considerations, calculating effect size, and reliability of measures.

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John L. Davis, and
Richard I. Parker*

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DEDICATION

Kimberly Vannest would like to dedicate this book to Jack and Randy, Frank and Karen. Thank you for love and support these many long days and late nights. I could not have done this without you. Also my heartfelt gratitude to Rich and Yupadee Parker, mentors and friends. My life would not be nearly as rich as it is today without your many gifts of wisdom and your endless patience: “khob-kun-Ka”—Thank you.

John Davis would like to dedicate this book to his loving and supportive wife Heather.



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SERIES EDITORS' FOREWORD

We are delighted to see the continued growth of the School-Based Practice in Action series, which grew out of a discussion between us several years ago while attending a professional conference. At that time, we were each at different points in our careers, yet we both realized and faced the same challenges for education and serving children and families. Acknowledging the transformations facing the educational system, we shared a passion and vision in ensuring quality services to schools, students, and families. This vision involved increasing the strong knowledge base of practitioners together with an impact on service delivery. This would require the need to understand theory and research, albeit we viewed the most critical element as having the needed resources bridging empirical knowledge to the process of practice. Thus, our goal for the School-Based Practice in Action series has been to offer resources for readers based on sound research and principles that can be set directly “into action.”

To accomplish this, each book in the series offers information in a practice-friendly manner. The books are designed to have a direct impact on transitioning research and knowledge into the day-to-day functions of school-based practitioners. We recognize that the implementation of programs and the changing of roles come with challenges and barriers, and as such, these may take on various forms depending on the context of the situation and the voice of the practitioner. To that end, the books of the School-Based Practice in Action series may be used in their entirety and present form for a number of practitioners; however, for others, these books will help them find new ways to move toward effective action and new

possibilities. No matter which style fits your practice, we hope that these books will influence your work and professional growth.

It has been a pleasure having the opportunity to work with Drs Kimberly J. Vannest, John L. Davis, and Richard I. Parker in the development of this book, *Single Case Research in Schools: Practical Guidelines for School-Based Professionals*. Given the increased need for data-based decision-making and evidence-based practice within educational settings, we felt it was necessary to have a book in the series that could offer practice-friendly guidelines for school-based providers on using single-case design research in their practice. Vannest, Davis, and Parker exceeded our expectations in delivering this book. *Single Case Research in Schools* takes concepts that many practitioners find overwhelming and describes them in terms that are both user-friendly and directly related to evaluating services in schools. The authors make direct suggestions on how to use single-case design to evaluate services, monitor progress, and make decisions, and there is specific attention given to ensuring the reliability of the data used. Although it is not easy to make a book on research “come alive,” Vannest, Davis, and Parker were able to do so through the numerous case examples provided, which will enable readers to use the information in this book and take direct actions within their work environments. We are pleased to have *Single Case Research in Schools* as part of our book series.

Finally, we want to extend our gratitude to Ms. Anna Moore and Routledge for their ongoing support of a book series focused on enriching the practice and service delivery within school settings. Their openness to meet the needs of school-based practitioners made the *School-Based Practice in Action* series possible. In addition, we must thank Mr. Dana Bliss, whose interest and collaboration made our idea for a book series a reality. We hope that you enjoy reading and implementing the materials in this book and the rest of the series as much as we have enjoyed working with the authors on developing these resources. Best wishes in your work with schools, children, and families.

Rosemary B. Mennuti, EdD, NCSP

Ray W. Christner, PsyD, NCSP

Series Editors, School-Based Practice in Action Series

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John Davis would also like to acknowledge his co-authors and mentors Dr. Vannest and Dr. Parker for introducing him to the study of single case research and inspiring his work on this topic.

HISTORY AND SIGNIFICANCE OF SINGLE CASE RESEARCH

This chapter overviews the components that make single case research unique and provides a brief background regarding the origins of SCR and its application in schools. The aim of this chapter is to provide a basic introduction for readers with little to no background and to set up the context for what follows in subsequent chapters.

What is Single Case Research?

Single case research (SCR) is the study of the individual. This could be one individual or many individuals, but at its heart, the unit of analysis is “one” person. This individual serves as a “control” against him- or herself. SCR is an extremely important tool in schools and clinical settings because the problems faced by children and individuals with disabilities are often unique. Sara, for example, is a second grade girl with selective mutism at school, a high IQ, and problem behaviors in the cafeteria and school library that include hiding under tables and desks and pinching children who walk by. Sara’s behavior has not responded to teacher reprimands, parents being called to take her home or timeouts in library and cafeteria spaces. Michael meanwhile is a ninth grade boy with Prader-Willi syndrome and an unassessed IQ who eats the laminate off the edge of the school desks but performs reasonably well in classes. Michael’s odd behaviors evoke classroom disruptions when other students make comments or tease. Michael’s preferred responses to comments of his peers or teacher include pulling his pants down or leaving the classroom, neither of which are workable in the setting.

SCR’s usefulness comes in part from its multi-purpose nature. SCR can involve a comparison between a treatment condition and a

non-treatment condition, for example Condition 1 or phase A—length of time getting dressed independently—and Condition 2 or phase B—length of time getting dressed independently with music playing. SCR can also involve more than one treatment condition, for example accuracy of homework completion with a peer tutor, accuracy of homework completion with a peer tutor and reinforcement for scores above 90 percent, and accuracy of homework completion with no peer tutor and scores above 90 percent.

The designs of SCR are purposeful in order to control for threats to validity in a study (more on this topic in Chapter 2). The data in SCR is described as time series data, meaning that measurements are repeated across time. The stock market and the weather are common examples of time series data.

In addition to an individual subject of interest, a purposeful design, and time series data, SCR requires a well-defined target or targets (for example, getting dressed or homework completion and accuracy), consistent measurement (for example, length of time), and equivalence of measures and environmental conditions (see Figure 1.1).

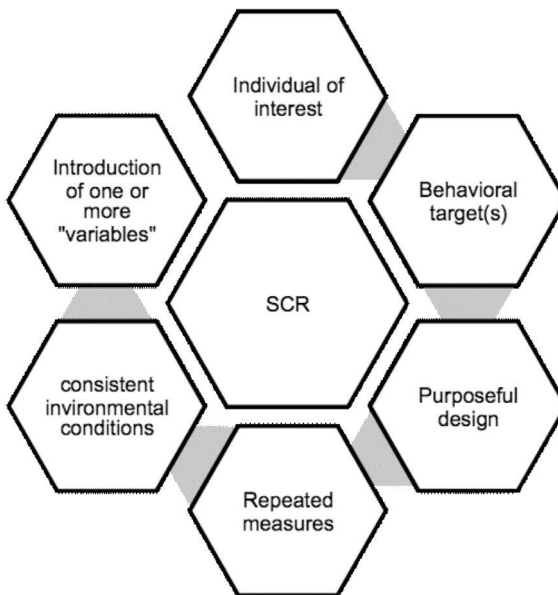


Figure 1.1 Single case research (SCR) has specific requirements.

Within an SCR design one condition serves as a control for the other condition. For example, Sara's behavior under typical conditions could be represented by operationally defining and counting the frequency of these problem episodes, and her word use could also be counted. This is considered a baseline condition. Michael's baseline would also be an empirical representation of his behaviors and might include inappropriate responses to comments from peers, or his pica behavior (eating inedible items) (see Figure 1.2).

SCR designs compare performances in conditions that are adjacent. A to B or B to C. Baseline phase sets the condition of "current

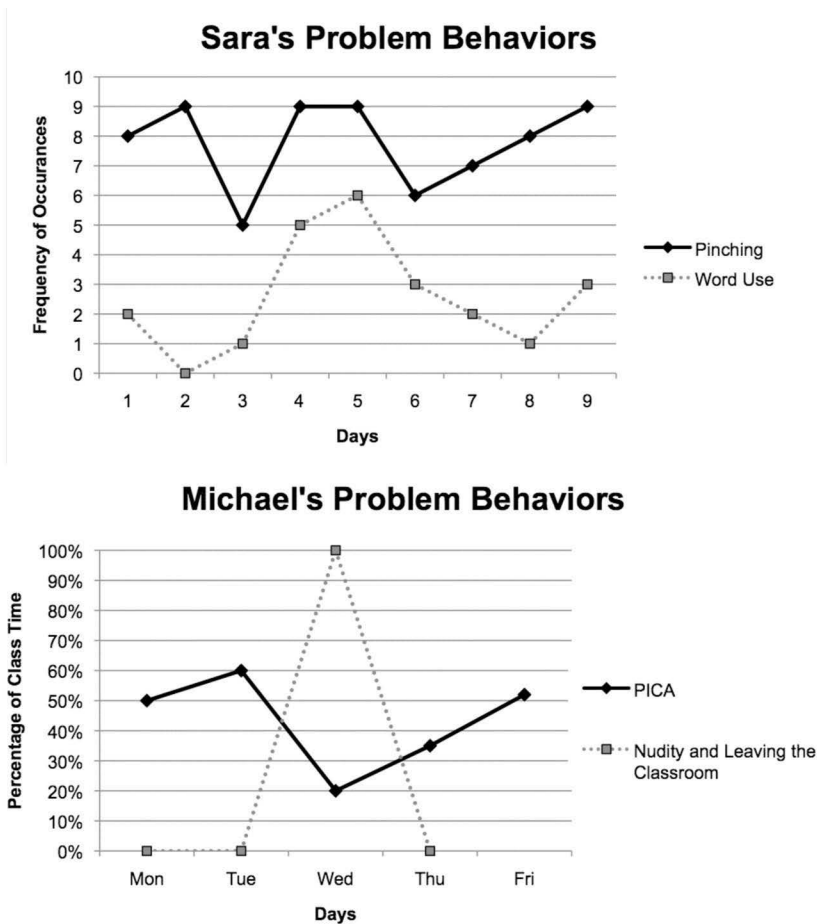


Figure 1.2 Baseline data for Sara and Michael.

performance” or the control condition of what behavior looks like prior to treatment or intervention. Baseline or phase A is also represented by nomenclature such as A1 or A₁ and these terms are interchangeable, although some professionals will have preferences and justifications for one over another.

The data represented in Figures 1.1 and 1.2 is only as good as the measures used to collect it. The measures used in SCR can include direct observation, self-report in the form of questionnaires or surveys, or inferential sources such as rating forms or retrospective remembrances. The data can be anything from a frequency count to a topographical description including scales of any number, rates or percentage. For example, Sara’s frequency of pinching could also be represented by a scale score 1–10 about the amount of social interaction with peers. Michael’s data could be a self-assessment about his time on task (as a replacement for pica) or an A–F category scale for the nudity and elopement: “A” would be no departure or nudity and “F” would be pants off and walking out the door; “C” might be starting to leave the room with pants up but returning when asked, etc. The data (in any form) must be reliable. More on the topic of reliability will be discussed later in Chapter 5.

Single case research is a broadly used research methodology commonly seen in psychology, education, and increasingly in medicine. It is particularly well suited for closely examining the effect of X on Y. In fact, you may notice many published titles of studies will be variants of this, for example, “What is the effect of X on Y.” SCR is frequently seen in psychology and education because the problems of concern tend to be very specific, sometimes unique, and may be related to a naturalistic setting. For example, Michael’s Prader-Willi syndrome and associated behaviors such as eating the laminate off the corner of his desk in Language Arts class is a problem not easily solved or examined in “large n” studies (those with, say, 200 participants in a control group and 200 in a treatment group). In fact, it is this “applied” characteristic that makes SCR so appealing.

Single case research has been the bedrock of the educational sciences related to disability since the early 1960s, meaning that individual treatments have been applied with the goal of solving practical, socially important problems.

In the 1960s and 1970s researchers in applied sciences began to call for an alignment in methodology to evaluate the effects of intervention. As new theories and procedures started to emerge, researchers began to champion certain methods for measuring intervention effects (Paul, 1969). One of the primary methods in use during this time was the “case study” method of investigation (Bolger, 1965). This was a move away from group research (Bergin & Strupp, 1970; Estes, 1956) and many began to advocate the use of single case studies as a better way to describe certain phenomena and control for threats to validity (Bergin & Strupp, 1970; Dukes 1965; Shapiro, 1961).

SCR can tell us about causal relationships, for example, “Does the use of a daily behavior report card (DBRC) reduce office discipline referrals (ODRs)?” SCR can also tell us about the differences between treatment options, for example, “Does a DBRC or self-monitoring work better to reduce ODRs?”, or even about multiple treatment options as in component analysis—“does a DBRC without reinforcement and a DBRC with reinforcement and a DBRC with reinforcement and check-in and check-out result in the most improved behavior?”

Thus SCR is useful for examining individuals and their problems, but SCR is also useful in defending evidence-based practices. SCR can provide a “rigorous experimental evaluation of intervention effects (Horner & Spaulding, in press; Kazdin, 1982; Kratochwill, 1978; Kratochwill & Levin, 1992; Shadish, Cook, & Campbell, 2002)” (Kratochwill et al., 2010, p. 2).

Multiple studies of SCR data can also be aggregated to provide measures of effects, confidence intervals, and insight into the moderators associated with efficacious use. This is particularly important for evidence-based practice determination and in making recommendations to the field about the adoption, sustainability, and fidelity of implementation of treatments.

A Very Brief History

Operant psychology set the foundation for what is now Applied Behavior Analysis (ABA), a branch of inquiry most responsible for promoting the use of SCR. Skinner, Lindsley, and others operated labs at Harvard University from 1956 to 1961, originating the term