CHAPTER 1

INTRODUCTION

1.1 Background of the Study

A quantitative research synthesis can benefit our learning by combining and comparing studies (Hall, Tickle-Degnen, Rosenthal, & Mosteller, 1994). This objective, empirical, and systematic method can contribute to large-scale literature review and provide a way to integrate and deposit many scientific findings into the knowledge system. While an individual single-subject investigation is limited in generalization of causation, a meta-analytic technique can demonstrate an empirical assessment of external validity for single-subject researches (Scruggs, Mastropieri, & Casto, 1987).

In contrast with the growth of between-group meta-analytic reviews, the development of single-subject research syntheses has been restricted by lack of a widespread accepted methodology (Center, Skiba, & Casey, 1985-86; Scruggs, Mastropieri, Forness, & Kavale, 1988). This can be attributed to the particular properties of single-subject experimental designs. First, the single-subject research focus is on behavior change at individual level rather than general level whereby the target behavior of individual is measured continuously and repeatedly (Morgan &

Morgan, 2001). Therefore, the data generated from single-subject designs are serial dependent and thus contravene the assumption of independency for parametric statistics. Second, single-subject investigators often introduce the intervention after observed data points on a baseline show a stable behavior curve. In other words, within-subject variability is always small (Idleman, 1993). Third, the total number of observations is small. Huitema indicated that the typical number of data points in baseline phases was four by investigating studies published in Journal of Applied Behavior Analysis from 1968 to 1977 (Methot, 1995).

Owing to a necessary prerequisite for a research synthesis, efforts in searching for a unifying metric for summarizing single-subject outcomes have been made in several studies (Busk & Serlin, 1992; Busse, Kratochwill, & Elliott, 1995; Center, Skiba, & Casey, 1985-86; Crosbie, 1993; Edgington, 1995; Kromrey & Foster-Johnson, 1996; Ma, 2002; Scrugg, Mastropieri, & Casto, 1987; Wampold & Worsham, 1986; White, Rusch, Kazdin, & Hartmann, 1989). Various methods have been proposed to assess effects of interventions, such as a piecewise regression technique; standardized mean difference approaches; an interrupted time-series analysis; randomization tests; the investigation of the PND (Percentage of Nonoverlapping Data); and the investigation of the PEM (Percentage of Data Points Exceeding the Median of Preceding Baseline Phase). However, not with standing the method, all are still imperfect in considering

all dimensions of analyzed single-subject data, i.e., trend and variability, without violating the basic assumptions of the statistics (see Ch.2.2 for details).

As the PND approach and the PEM approach are nonparametric methods that avoid some of the requirements of parametric statistics such as independency and are less affected by particular properties of single-subject data mentioned above, these two methods were chosen for calculation of effect sizes of the studies in this analysis.

In addition, the PEM technique as an alternative for the PND can alleviate the influence of outliers and orthogonal slope changes confronted by the PND approach (Ma, 2002). To test the validity of the PEM scores, the current investigation adopts outcome ratings from judgments of primary authors as a validity criterion and compares the result with those of the PND scores. This approach is undertaken for several reasons. First, it is necessary to take the expert judgments in the original studies into account. Additionally, Mastropieri and Scruggs, the developers of the PND approach, used a three-point scale to divide outcome ratings into 1 (effective), 2 (partially effective), or 3 (ineffective) based on judgments of primary authors and assessed the correlation between overall outcome rating and the PND score. The result shows that the Spearman correlation coefficient is .68 (Mastropieri & Scruggs, 1985-86).

With the accumulation of numerous single-subject studies on academic behavior

modification, there is yet to have a comprehensive synthesis of these literatures. Hence, this study intended to provide an overview of educational interventions for academic behavior changes within applied behavior analysis.

1.2 Purposes of the Study

The purposes of this study are as follows:

1. In order to verify the applicability of the PEM approach, the validity of the PEM scores and that of the PND scores is compared.
2. In order to describe which types of treatments are effective, a quantitative synthesis is conducted to survey the effectiveness of behavioral modification on academic behaviors.

1.3 Research Questions

There are several questions underlying the current study:

1. Are the PEM scores more reflective of the original judgments in the studies than the PND scores?
2. What interventions have been applied to promote academic behaviors? What kinds of interventions have been demonstrated to promote academic behaviors?

1.4 Delimitation

Target behaviors are classified as academic achievement and academic engagement. Academic achievement is related to formally-noted ability of the participants (i.e., the percentage of accurate scores, number of problems completed correctly, grades, and rate of errors) and academic engagement is related to involvement of the participants in tasks or school works (i.e., task completion, orientation toward the appropriate object such as assigned course materials or person such as lecturing teacher; verbalizing a question relating to the material presented or assigned; being in one's seat unless addressing the class or otherwise appropriately out of seat; working on the assigned task; following the teacher's directions or instructions; participating in class discussion; asking for teacher assistance if needed; accepting teacher’s feedback appropriately).