



Programming generality into a performance feedback writing intervention: A randomized controlled trial

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ABSTRACT

Substantial numbers of students in the United States are performing below grade-level expectations in core academic areas, and these deficits are most pronounced in the area of writing. Although performance feedback procedures have been shown to produce promising short-term improvements in elementary-aged students' writing skills, evidence of maintenance and generalization of these intervention effects is limited. The purpose of this study was to examine the immediate, generalized, and sustained effects of incorporating multiple exemplar training into the performance feedback procedures of a writing intervention using a randomized controlled trial (RCT). Results indicated that although the addition of multiple exemplar training did not improve students' writing performance on measures of stimulus and response generalization, it did result in greater maintenance of intervention effects in comparison to students who received performance feedback without generality programming and students who engaged in weekly writing practice alone.

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1. Introduction

1.1. Programming generality into a performance feedback writing intervention

Within the past decade, the American Psychological Association's Division 16 and the Society for the Study of School Psychology have put forth guidelines that strongly encourage the assessment of generality (i.e., generalization and maintenance) of treatment effects in behavioral research (Kratowill & Stoiber, 2002). This formal recommendation came after decades of advocacy for such practice by applied behavioral and educational researchers alike (e.g., Baer, Wolf, & Risley, 1968; Bandura, 1969; Ward & Gow, 1982). In fact, this issue was of such interest to applied behavioral researchers that specific, empirically-based techniques for programming and assessing generality of behavioral change were presented in the 1970s and 1980s (Stokes & Baer, 1977; Stokes & Osnes, 1989). Despite calls by prominent researchers and professional organizations to (a) incorporate generality programming techniques into intervention procedures to increase the likelihood of optimal outcomes and (b) evaluate and report the extent to which treatment effects generalize and maintain, intervention researchers have tended to neglect this advice.

1.2. The current state of students' academic skills

This lack of attention to generality of behavioral change is especially evident in the academic intervention literature (Skinner & Daly, 2010), which is particularly alarming in light of recent national data suggesting that U.S. students' levels of academic

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proficiency are, on the whole, substandard. Specifically, in recent years, large percentages of students were unable to demonstrate grade-level proficiency on measures of core academic skills (i.e., mathematics, reading, and writing; National Center for Education Statistics, 2012, 2013). At the elementary grade level, students' academic skills deficits were most pronounced in the area of writing, with 72% of fourth-grade students failing to demonstrate mastery of grade-level expectations (Persky, Daane, & Jin, 2003). Clearly, these deficits suggest that there is a current need to develop effective writing interventions that produce lasting and generalizable skill gains. Because formal writing instruction is typically not offered to students after the elementary grades (Graham & Perin, 2007), it is particularly important that students receive effective writing intervention early in their academic careers.

1.3. Writing fluency

One skill that was identified as developmentally appropriate to target for intervention during the elementary grades is writing fluency (i.e., the speed and accuracy with which students write; Abbott & Berninger, 1993; Berninger et al., 2006; Berninger, Cartwright, Yates, & Swanson, 1994). Cognitive explanations of writing fluency suggest that this skill allows children to reserve cognitive resources for higher-level writing components (e.g., composition planning, content knowledge) rather than expending cognitive resources on basic writing components (Graham, Berninger, Abbott, Abbott, & Whitaker, 1997). Alternatively, from a behavioral perspective, children who write fluently are more likely to: (a) retain their skills in the absence of practice; (b) sustain their performance over longer time intervals, even in the face of distractions; (c) transfer their writing skills to novel writing tasks; and (d) modify their writing skills to meet environmental demands (see Johnson & Layng, 1996).

Writing fluency can be measured using curriculum-based measurement probes in written expression (CBM-WE) in which students are given 3 min to write a narrative based on a short story stem (e.g., "I was on my way home from school and..."). The written product can then be scored using a variety of metrics, the most common of which are the total number of words written (TWW), regardless of spelling accuracy, the total number of words spelled correctly (WSC), and the total number of sequences in which each adjacent word is accurate in terms of spelling, punctuation, capitalization, grammar, and syntax (i.e., correct writing sequences; CWS). Although other metrics can be obtained from the writing sample (e.g., the percentage of CWS), TWW, WSC, and CWS are particularly useful in the elementary grades because they are measures of writing production that are sensitive to growth over time (Gansle et al., 2004). Although TWW is an indicator of speed alone and WSC evaluates speed and accuracy in terms of spelling, CWS is the metric that can capture both aspects of writing fluency (i.e., speed and accuracy).

1.4. Fluency-building interventions for writing

Despite the importance of fluent writing, few empirically-validated interventions exist that specifically target this skill. One procedure that was consistently shown to improve writing production, an aspect of writing fluency, among samples of elementary-aged students is performance feedback (Harris, Graham, Reid, McElroy, & Stern Hamby, 1994; McCurdy, Skinner, Watson, & Shriver, 2008; Van Houten, 1979; Van Houten, Hill, & Parsons, 1975; Van Houten, Morrison, Jarvis, & McDonald, 1974). Eckert et al. (2006) developed an intervention in which students were provided with weekly feedback in the form of the total number of words they wrote during the previous session and an upward- or downward-facing arrow to visually display improvement or decline. This intervention was particularly promising due to (a) its ability to be implemented in large group – potentially class-wide – format; (b) its brevity; and (c) its immediate improvement in students' TWW ($d = 0.65$, $CI = +0.25$ to $+1.06$). Additionally, despite the fact that the intervention procedures targeted writing production alone, these immediate intervention effects were replicated with the more comprehensive fluency variable of CWS (Hier & Eckert, 2014). Specifically, by providing elementary-aged students with simple feedback about their TWW, their CWS improved over time. This finding is not surprising given the strong correlation ($r = 0.94$, $p < 0.01$) between TWW and CWS (Hier, 2012) and may imply that students' CWS improved as a by-product of increased writing production. Hier and Eckert (2014) also reported that students' initial writing fluency levels was a significant predictor of their growth over time, with students who had weaker (i.e., frustrational) writing skills prior to intervention demonstrating greater fluency gains upon receiving performance feedback. The finding that performance feedback had the greatest effects for the weakest writers is consistent with the Instructional Hierarchy, which posits that performance feedback is an effective instructional tool that assists students' skills develop from basic, acquisition-level responding to fluent responding (Haring, Lovitt, Eaton, & Hansen, 1978; Martens, Daly, Begeny, & Van Der Heyden, 2011).

Despite the promising immediate effects of the performance feedback intervention on students' CWS, it did not result in maintenance of fluency gains over a 6-week period (Hier & Eckert, 2014). In addition, although the intervention had a moderate effect on students' generalization of writing skills to a task that differed in presentation of the writing prompt that had been provided during intervention (partial $\eta^2 = 0.06$), it is not known to what extent the intervention effects generalize to more clinically meaningful measures of students' writing skills (e.g., students' classroom writing assignments). Given the limited evidence of generality of this intervention's effects, the authors hypothesized that generality programming techniques should be explicitly incorporated into the intervention procedures to produce long-term achievement gains that transfer to meaningful writing tasks.

1.5. Programming for generality of intervention effects

Generality is a broad term that refers to behavioral changes that (a) are durable over time (i.e., maintenance); (b) appear in a wide variety of settings (i.e., stimulus generalization); or (c) extend to other, related, non-trained responses (i.e., response generalization; Baer et al., 1968; Stokes & Baer, 1977). Although the goal of any educational intervention is typically to achieve

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