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Using the Instructional Level as a Criterion to Target

Reading Interventions

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Abstract

The instructional hierarchy offers a useful framework to target academic interventions. Within this framework, the accuracy with which a student reads might function as an indicator that the student should receive an intervention that focuses either on accuracy or fluency. The current study examined whether the instructional level for reading (93% to 97% of words read correctly) could be used to target interventions that first facilitated accurate responding, and subsequently facilitated faster rates of fluency growth. Each of three third-grade students had faster growth rates in the second phase of a fluency-focused reading intervention following an intervention that resulted in the students reading at least 93% of the words correctly. Implications and limitations of the current study are discussed for applying the instructional hierarchy and the instructional level to target reading interventions.
Using the Instructional Level as a Criterion to Target Reading Interventions

Recent research has led to a better understanding of effective interventions (Burns & Ysseldyke, 2009) and assessment technology that can directly test potential interventions (Daly, Martens, Dool & Hintze, 1998; Jones & Wickstrom, 2002). However, even a well-researched intervention will not be effective if it does not address the core problem. The instructional hierarchy has become a commonly-used framework for intervention design (Ardoin & Daly, 2007) in which interventions are identified by matching student skill with one of four phases of student learning (Haring & Eaton, 1978). Although the hierarchy was proposed over 30 years ago, it was not used for intervention research until Daly, Lentz, and Boyer (1996) discussed it as a conceptual model for better understanding reading interventions. Moreover, the instructional hierarchy could provide a potential tool for correctly targeting reading interventions (Burns, VanDerHeyden, & Boice, 2008).

According to Haring and Eaton (1978), acquisition of new skills is the first phase of the instructional hierarchy and is characterized by slow and inaccurate performance. A student in the acquisition phase would require high modeling and immediate feedback. After a student becomes accurate, she is operating in the proficiency phase and would likely respond to repetition and over-learning procedures to perform the skill more quickly. Once the student performs the skill with accuracy and sufficient speed, she then can generalize the newly learned information to different settings (phase three – generalization) and can apply it to different situations to solve problems (phase four – adaption). The accuracy with which the task is completed is a relevant variable in the instructional hierarchy because two students with similar speed of responding may require different interventions based on their respective levels of accuracy. A student with low accuracy would need an intervention that targets accurate
responding, but a student with high accuracy would need an intervention that targets speed of correct responding.

Although Haring and Eaton (1978) make clear that the focus of acquisition interventions should be increasing accuracy, they do not discuss what level of accuracy determines when a student has progressed to the proficiency phase. The instructional level could serve as a potential criterion to switch reading intervention focus from acquisition to proficiency. Gickling and Thompson (1985) operationally defined Bett’s (1946) concept of an instructional level for reading by proposing that students were optimally challenged when they read 93% to 97% of the words correctly. Reading interventionists use the instructional level to assess the accuracy with which a skill is completed and compare that level (as determined by the percentage of items correctly completed) to an instructional level criterion of 93% to 97% known words. Students who read fewer than 93% of the words correctly from contextual reading are operating at a frustration level and those who read more than 97% correct are at an independent level. When students read at the instructional level, they experience several positive outcomes, such as enhanced reading fluency (Burns, 2007), comprehension (Gickling & Armstrong, 1978), and time on task (Burns & Dean, 2005; Gickling & Armstrong, 1978; Treptow et al., 2007).

Previous instructional level intervention research focused on reading fluency, which is often used as a target in reading intervention studies. The terms fluency and proficiency require clear differentiation when applying the instructional hierarchy to reading as an intervention heuristic. The National Reading Panel (2000) has identified five broad subskills possessed by skilled readers. Of these, reading fluency, or the ability to read text quickly and accurately with good expression, is a key subskill that often requires intervention as reading first develops. In this sense, reading fluency refers specifically to the skill of accurately and rapidly decoding
written text. Proficiency refers to the general ability to perform a skill accurately and rapidly and to the specific stage of the instructional hierarchy.

Reading fluency appears to be an appropriate target for reading interventions because it can be measured reliably and sensitively with curriculum-based measurement of oral reading fluency (CBM-R; Deno, 1985) and is a strong indicator of total reading competence (Fuchs, Fuchs, Hosp, & Jenkins, 2001). There is a moderate to large correlation between CBM-R data and comprehension (Berninger, Abbot, Vermeulen, & Fulton, 2006; Burns et al., 2002; Jenkins, Fuchs, van den Broek, Espin, & Deno, 2003; Samuels, 1979), with unique variance being attributed to CBM-R (Spear-Swerling, 2006). Moreover, previous research has effectively used reading fluency interventions to increase reading comprehension (Alber-Morgan, Ramp, Anderson, & Martin, 2007; Burns, Dean, & Foley, 2004; Freeland, Skinner, Jackson, McDaniel, & Smith, 2000).

There are a large number of research-based interventions that directly address oral reading fluency deficits (National Reading Panel, 2000). Two commonly-used approaches to reading fluency interventions are repeated reading (RR; Moyer, 1982; Rashotte & Torgeson, 1985; Samuels, 1979) and the supported cloze procedure (SCP; Rasinski, 2003). According to Samuels (1979), repeated reading “consists of re-reading a short and meaningful passage until a satisfactory level of fluency is reached” (p. 404). Thus, students receiving a repeated reading intervention engage in high amounts of practice with a targeted goal of increasing the rate and accuracy with which they read. In a review of several studies on the effectiveness of repeated reading interventions, Therrien (2004) found it to be effective for students both with learning disabilities (effect sizes range of .41 to .79) and without learning disabilities (range of .18 to .85), with a mean effect size of .50 for generalization passages.
The supported cloze procedure (SCP; Rasinski, 2003) is an assisted intervention in which an instructor reads a passage jointly with a student. There are several variants of the SCP intervention, but a typical approach involves the student and interventionist reading every other word in a given passage, and then starting over while switching the words read such that each word is both modeled for and read by the student. Thus, SCP interventions specifically target reading accuracy by modeling correct reading of words in the passage. Interventions employing SCP are also effective for improving skills such as fluency and comprehension (Homan, Klesius, & Hite, 1993; Kuhn & Stahl, 2003).

Although SCP and repeated reading interventions are effective in terms of facilitating reading fluency and comprehension (Homan et al., 1993; Kuhn & Stahl, 2003; Therrien, 2004), the two types of interventions map onto the instructional hierarchy at different levels. Accuracy-focused interventions (i.e., SCP) target the acquisition stage of the instructional hierarchy, whereas interventions that focus on the speed of accurate responding (i.e., repeated reading) target the proficiency stage. According to the instructional hierarchy, speed-focused interventions might not be as effective when a student is still in the accuracy stage of a learning task, because they have not yet acquired the skills to accurately read words. Thus, it might be possible to target reading interventions more appropriately by considering the accuracy with which students read, which is consistent with a need to target empirically-tested interventions in a way that functionally matches the skill problem (Daly et al., 1996). Previous research for math found that accuracy-focused interventions were more effective for students whose skills fell within the acquisition phase than those whose skills fell within the proficiency phase (Burns, Codding, Boice, & Lukito, 2010), but this assumption has not been tested for reading.
The purpose of the current study was to extend instructional hierarchy research, and to examine the relationship between an evidence-based intervention and a specific reading problem. Thus, we examined whether reading fluency interventions would be more effective if they were implemented after successfully building reading accuracy to an instructional level. The following research question guided the study: What is the effect of a speed-based intervention on reading fluency after reaching an instructional level via a high modeling intervention?

Method

Participants and Setting

Three third-grade students with reading difficulties were the participants for the study. The first student was a White female named Julie (pseudonym), the second was a White male named Ryan (pseudonym) and the third was a White male named Eric (pseudonym). All three students attended the same elementary school in Minnesota and were participants in the school’s AmeriCorps reading program. Students who are eligible for the AmeriCorps reading program must (a) score below the 25th percentile on the Measures of Academic Progress (Northwest Evaluation Association, 2003), and (b) score below grade level expectations on the fall benchmark assessment for oral reading fluency (i.e., a median score of 76 words read correctly per minute or less on CBM-R benchmark assessment). The three current participants were selected because they were also reading below the instructional level of 93% accuracy and had been chosen to receive repeated reading as an intervention.

The school that the students attended served 850 students in grades 2 through 5 and was located in a rural community. Demographic data for the students who attended the school included 91% who were Caucasian and 28% who were eligible for the federal free or reduced price lunch program.
All interventions and assessments were conducted by a trained literacy tutor as part of the Minnesota Reading Corps AmeriCorps program. The tutor was a Caucasian female who participated in 2 days of training regarding the interventions and CBM-R before beginning the interventions. The students participated in the intervention once every school day for 20 minutes each session. The intervention sessions were delivered one-on-one in individual cubicles with the student and tutor seated across from each other at a small table.

Materials

The intervention materials consisted of third-grade passages from the Dynamic Indicators of Basic Early Literacy Skills (DIBELS; Good & Kaminski, 2002) assessment system. Each participant received intervention using the first passage in the DIBELS sequence on the first intervention day. On subsequent days, participants received intervention with the next passages in the sequence. If students received intervention long enough for each passage to be used, one passage was randomly selected for each subsequent intervention session to be used a second time. These passages were not returned to the pool to be selected again. Thus, each passage may have been used up to two times.

Measures

The effectiveness of the interventions was measured once each week with CBM-R. Each week, a new grade-level passage was selected randomly from the Aimsweb (Edformation, 2002) assessment system and was presented to the student. Aimsweb passages were untreated passages that were used a single time. Following standard administration procedures, the student was asked to orally read each passage for 1 minute while the tutor followed along and recorded errors. The number of words read correctly within that minute (WRCM) was recorded as the data to address the research questions. Additionally, the number of words read correctly was divided
by the total number of words (read correctly plus errors) and multiplied by 100 to create an accuracy score of percentage of words read correctly.

Previous research has consistently demonstrated high reliability for monitoring student progress with CBM-R (Marston, 1989; Wayman, Wallace, Wiley, Ticha, & Espin, 2007), and that slopes derived with CBM-R data can be acceptably reliable for instructional decision making after 6 to 8 weeks if administration procedures are optimal (Christ, 2006). Moreover, accuracy data derived with CBM-R procedures have been shown to be sufficiently reliable for instructional decision making (Burns, Tucker, Frame, Foley, & Hauser, 2000).

**Conditions**

The students participated in two interventions, both of which were conducted for 20 min at least 3 days per week. All three started with RR for a period of 5 to 18 weeks. Julie and Eric started receiving the interventions during the first weeks of the school year, but Ryan began later in the year because he moved into the school district after the school year had started. The RR procedure involved having the student orally read grade-level passages for 1 minute while the tutor followed along, marked errors, and provided error correction after the student completed the reading sample. This process was repeated four additional times (total of five), and each time the tutor marked how far the student read during the minute so that the student would attempt to read further during the next read.

The phase change between interventions was staggered and occurred after 5 weeks beginning in week 9. At that time, all three students received the SCP in which the student read a grade-level passage orally while the tutor followed along and provided immediate correction for any errors. After reading the passage, the student and tutor read the passage two more times by reading every other word. The student read the first word during the first read through (tutor-
second word, student-third word, tutor-fourth word, etc.), and the tutor read the first word during the third reading (student-second word, tutor-third word, student-fourth word, etc.).

**Procedure**

As stated above, two of the students began the intervention early within the school year and the third started later because he moved into the district at that time. All three students received RR as the first intervention. Julie received RR for 9 weeks, and then changed to SCP; Ryan started the intervention when Julie changed phases, and received RR for 5 weeks. Eric continued in RR for an additional 5 weeks after both Julie and Ryan changed to SCP, then he changed phases as well. All three students continued to receive SCP until they accurately read at least 93% of the words for five consecutive data points. At that time all three changed back to RR. Julie required 10 weeks to reach that criterion, Ryan 9 weeks, and Eric 5 weeks. The criterion of 93% was selected based on the lowest end of the instructional level of 93% to 97% (Armstrong & Gickling, 1978; Gravois & Gickling, 2008). Five consecutive data points was selected to assure that enough data were collected within the phase. All three students then received RR until the school year ended in May.

**Treatment Integrity and Interobserver Agreement**

The tutor was observed twice each month by the first author with an implementation checklist. Thus, a total of 10% of the intervention sessions were observed. The building principal also observed the tutor twice each month to provide feedback on implementation integrity, but those data were not collected as part of this study. The integrity checklists contained between 16 (SCP) and 20 (RR) items that asked whether standardized procedural steps for each intervention were completed accurately. The total number of items correctly completed was divided by the
total number of items and resulted in mean integrity of 98.21% (range 93.75% to 100%) for SCP and 99.2% (range 95% to 100%) for RR.

Interobserver agreement (IOA) was also assessed for 10% of the sessions by observing the assessment procedures and recording words as read correctly or incorrectly. The total number of agreements (consistently rated as correct or incorrect) was divided by the total number of words and multiplied by 100, which resulted in 100% IOA.

**Experimental Design**

The research question was addressed with a nonconcurrent multiple baseline design using the CBM-R data as the dependent variable. The design was considered nonconcurrent because of the different start dates for the three participants, but all of the data were collected in a concurrent manner in that all three students participated simultaneously.

**Results**

As shown in Figure 1, the trend of the CBM-R data did not indicate an effective intervention in the first RR phase. The numeric slope of the CBM-R data was computed with ordinary least squares, which are reported for each participant in Table 1. The slopes for the first phase of RR were all less than 1.0 WRCM increase per week and one was negative. The trend of the accuracy data was also flat for two students, but increased somewhat for Ryan. The change to SCP resulted in a slight increase in level of the accuracy data for the students, but the trend was mostly stable with an increase for Ryan. The CBM-R data were mostly stable within the SCP and consistent with the first RR phase, with a slight increase for one student (Ryan).

After consistently reading at least 93% of the words correctly within the SCP phase (i.e., five consecutive accuracy scores above 93%), the students again received RR. The percent of the words read correctly continued to be high for the students, with mean scores at or above 93%
(92.98 for Ryan). A visual analysis of the CBM-R data for the second RR phase as compared to the SCP phase revealed a relatively rapid change in level and an increase in trend. The slopes for the second RR phase for all three students were higher than the first RR phase and two were above 4.00 words correct per minute increase per week.

**Discussion**

The current study examined the use of the instructional level as a criterion to target acquisition and proficiency interventions for struggling readers. Results indicated that reading fluency improved faster after accuracy levels were facilitated to within the instructional level. This provides evidence supporting the application of the instructional hierarchy (Haring & Eaton, 1978) to targeting reading interventions that are either accuracy- or speed-focused. The first RR condition for each student resulted in low to negative growth in reading fluency, but the mean accuracy was below the instructional level criteria of 93% for each student, which suggested that the reading material was too challenging. After the SCP phase, in which high-modeling facilitated accuracy levels to consistently within the instructional level range, the second RR phase resulted in much stronger growth slopes. Thus the hierarchy of skill development (Haring & Eaton), in which accuracy precedes proficiency, was supported by the current findings. Once students could read grade-level passages with sufficient accuracy, they made strong gains in a high-practice (i.e., RR) intervention; however, high practice without accuracy led to minimal improvements.

Although the change in level during the final phase was not immediate for two of the students, it was for Julie and the data in the final phase did not overlap with the data in the SCP phase by the 2nd data point for Ryan and 4th for Eric. Some latency could be expected given that
meta-analytic research found a large mean effect for academic interventions that lasted 11 to 30 intervention sessions (Swanson, 1999).

These data also support the instructional level theory initially proposed by Betts (1946) and operationally defined by Gickling and Armstrong (1978). Student skill increased at a faster rate once they participated in an intervention that increased accuracy to at least 93% known words. Although previous instructional level research also focused on time on task (Burns & Dean, 2005; Treptow et al., 2007) and reading comprehension (Gickling & Armstrong, 1978; Treptow et al., 2007), neither of which were examined in the current study, the current data were consistent with studies that found increased reading fluency when students were taught at an instructional level (Burns, 2002; 2007). However, the accuracy data were not the primary dependent variable and were included in Figure 1 simply to graphically display the criterion for a phase change. Thus, we make no experimental claims regarding the effectiveness of SCP in increasing the accuracy with which passages are read.

The current results suggest that educators who seek to develop interventions that lead to faster reading growth rates might be able to use the instructional level criterion of 93% to identify interventions that either (a) target interventions at accuracy development if student reading skills are below 93% accurate; or (b) target interventions at speed development if student reading skills are above 93% accurate. This is consistent with previous research that found reading accuracy data can be appropriate for instructional decision making (Burns, 2007; Burns et al., 2000). However, previous research also found that preteaching activities can facilitate an instructional level and result in positive outcomes (Beck, Burns, & Lau, 2010; Burns, 2007). The SCP was not used as a preteaching activity in this study, and future researchers could examine if multiple interventions for facilitating an instructional level also result in similar rates of learning.
when interventions change focus to proficiency. Moreover, instructional level researchers caution against having students read material that represents a frustration level task (Gravois & Gickling, 2008). Using the SCP might reduce potential frustration, but additional research is needed to determine if more long-term reading growth occurs from high modeling and support within grade-level material that represents a frustration level without assistance, or from repeated reading with material that represents an instructional level.

The results of the current study suggest several directions for future research. First, the current accuracy intervention (i.e., SCP) is one of several accuracy-focused (i.e., high modeling) interventions. An entire class of assisted reading strategies focuses on modeling fluent reading rather than giving repeated practice (Dowhower, 1989). For instance, the neurological impress method (Heckelman, 1969) has led to successful high-modeling interventions in which the student follows along as a tutor reads an entire passage (Hollingsworth, 1970; Mefferd & Pettegrew, 1997). Future research might examine and compare results found for other types of accuracy interventions that could facilitate an instructional level.

A second direction of future research might investigate the criteria for which accuracy is deemed sufficiently high that fluency interventions can be implemented. The criterion of five passages at an instructional level before switching to RR was chosen relatively arbitrarily. It seems logical that tutors or teachers should have high confidence that the passages students are reading fall consistently within the instructional level, but it may be that fewer points are sufficient or that more points are necessary. Similarly, additional criteria for sufficient accuracy could be investigated and compared. Although the empirically-validated instructional level (Gickling & Armstrong, 1978; Treptow et al., 2007) appears appropriate because of the associated positive fluency outcomes, other criteria for accuracy might be found. For instance,
less conservative criteria (i.e., accuracy ≥ 90%) might indicate a student is ready for a speed-targeted intervention sooner. Future research should investigate the number of passages at the instructional level as well as the accuracy criteria to ensure that interventionists make effective, efficient decisions.

Interpretations of the current results should not be made without consideration of the relevant limitations. Although the slope data in the final condition are consistently much higher for each participant, suggesting the appropriateness of following an effectively targeted high-modeling procedure with a high-practice procedure (which is consistent with the instructional hierarchy; Haring & Eaton, 1978), each participant appeared to make consistently positive gains, both in terms of level and slope across conditions. In other words, each participant had higher levels and slopes in each successive condition. Thus, there remains a possibility of maturation effects (Cook & Campbell, 1979) instead of the effects from the conditions in any given phase and that these data simply suggest that reading fluency interventions increase reading fluency. However, the consistent findings across participants are encouraging and should be replicated to include design features that control for maturation effects on reading development. One possibility is to apply a group design that compares whether maturation alone (i.e., repeated reading intervention for duration of the study) or the SCP intervention alone (i.e., adding the SCP intervention without a return to repeated reading) would result in similar rates of growth at the same time points in which the high growth rates were observed in the current study.

Another limitation is that the mean accuracy for two of the participants was not markedly below the instructional level in the first intervention phase. Julie and Eric both had relatively high accuracy levels during the initial phase (i.e., mean accuracy of 92.72% and 92.21%, respectively), thus subsequent intervention effects might have been attributable to generally
higher reading accuracy skills. The accuracy for each student was not high enough to reach the low end of the empirically tested instructional level for reading of 93% (Gickling & Armstrong, 1985; Treptow et al., 2007), but additional participants with clearly low accuracy (i.e., Ryan) would provide more convincing replication of the current findings.

Additional limitations are related to the first phase of the study, which did not include baseline conditions and did not achieve consistent control in the length of the first intervention phase. A true baseline condition for a similar length of time as the intervention duration would permit comparisons between growth without intervention and growth in the context of each intervention phase. Moreover, Ryan started intervention when Julia changed to SCP, which was 9 weeks after Julia had begun. Eric started at week 3, after Julia had two CBM-R data points. Traditional multiple baseline designs have the same start points for each participant making it easier to discern trends in growth or level during the first phase. While Eric appeared to have a sufficient number of data points to identify trends in growth or level, Ryan is missing a considerable number of data points. Thus, less confidence can be attributed to Ryan’s data in the first intervention phase, although they appear mostly stable.

Although the criterion for switching to RR at 93% accuracy over five consecutive sessions was purposefully consistent with the low end of the instructional level criteria (Gickling & Armstrong, 1978; Treptow et al., 2007), the current study was not designed to identify differential effects of students reading at the independent level (i.e., ≥ 97% accuracy). This was only consistently observed for one student (Ryan), who had three of five data points in the independent range, but the effects of achieving an independent level of accuracy in the high-modeling (i.e., SCP) phase remain unknown. It is plausible that accuracy performance at the independent level might affect outcomes of interventions targeted to fluency.
The implications of the study are also limited by the small and relatively homogeneous sample. Each student was a third grader from a single elementary school who struggled at reading connected text. Thus, extensions of the study might target a more diverse range of students. Moreover, the general idea of targeting interventions at building accuracy before speed, as per the instructional hierarchy (Haring & Eaton, 1978), was only examined on a narrow range of reading skills. The current participants all struggled with reading connected text; however, the development of other reading skills might also be facilitated by following the instructional hierarchy. For example, the development of phonetic skills might follow a similar course, in which case interventions for accuracy might facilitate later effectiveness of fluency interventions. Moreover, we did not collect true baseline data in that the students received an intervention within each phase.

Inclusive of the limitations, this study adds support for the instructional hierarchy as an intervention heuristic because students made much stronger gains in response to a fluency-focused intervention after obtaining a high level of accuracy. Future research is recommended to both strengthen the current conclusions and expand the student population and reading skills for which the current methods may be applicable.
References


Table 1

*Mean Oral Reading Fluency (ORF) Score, Mean Accuracy Score, and Slope for Each Phase*

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<td>(1.15%)</td>
<td>(13.59)</td>
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<td>1.73</td>
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<td>(1.77%)</td>
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*Note. ORF = Oral reading fluency score from the curriculum-based measurement for reading.*
Figure Caption

*Figure 1.* Accuracy and fluency data across repeated reading and supported cloze procedure phases for each participant