Writing Instruction and Assessment for Struggling Learners

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Abstract

Writing is a critical feature of comprehensive literacy. For writing assessment results to be useful in instruction, a student's writing ability must be appropriately evaluated. This study describes a novel approach to measuring writing content for students with significant cognitive disabilities by evaluating a student assignment process using teacher-supplied information about their writing skills. It provides an optimal match to content and an accurate summary of student learning that can guide subsequent instruction. The discussed sorting techniques differed in the requisite writing skill level needed to be assigned to an assessment. Placing the demarcation at orthographic writing resulted in a more balanced distribution. The study also used collected student assignment data to compare the routing techniques, and the novel routing technique proved more effective in assigning students to an appropriate assessment. The findings have broad implications on writing instruction and assessment for struggling learners.

Keywords: writing assessment, writing instruction, students with disabilities

Writing Instruction and Assessment for Struggling Learners

Literacy is crucial to the academic success of all students, but it also crucial to future success in their occupational, postsecondary educational, and social lives (Wollack & Koppenhaver, 2011). Literacy represents the cognitive processes, knowledge, and skills needed to comprehend and produce meaningful written texts (Erickson, Hanser, & Hatch, 2009). More specifically, writing is an important element in comprehensive literacy. Students who are skilled at writing have access to an important learning and communication tool that can improve their reading comprehension and learning across the curriculum (Graham & Hebert, 2011). Its importance is further demonstrated by the emphasis that the English language arts (ELA) Common Core State Standards places on writing as being an important means for increasing students' college and career readiness (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). Therefore, high quality writing instruction and assessment are vital.

Writing instruction should help students to write effectively in multiple contexts and for multiple purposes, and writing assessment should be instructionally relevant and provide sufficient information on student learning. For writing assessment results to be useful, a student's writing skills should be evaluated at an appropriate complexity level. This point is particularly crucial for students with significant cognitive disabilities who are assessed as part of statewide accountability systems in alternate assessments based on alternate achievement standards (AA-AAS). These students demonstrate a diverse range of communication modes, and support needs (Nash, Clark, & Karvonen, 2016). For students with significant cognitive disabilities, an extensive gap often exists between what they can verbally express and what they can communicate through writing, and this gap suggests that they can express their ideas verbally but not through writing. One study found that while over two-thirds of students with significant cognitive disabilities can verbally express themselves using three or more words in a grammatically correct manner, only 40% of them could write independently beyond

copying individual letters or words (Nash et al., 2016). The current paper describes an innovative approach to evaluating an assignment process for pairing students with significant cognitive disabilities to writing assessments as part of an AA-AAS based on teacher-supplied information about their writing skills.

Writing

Writing is a complex ability that requires students to perform a coordinated set of cognitive processes in order to organize and translate their thoughts, ideas, and information about a topic into easily understandable and coherent texts (Abbott, Berninger, & Fayol, 2010; Harris, Graham, Mason, & Saddler, 2002; Koppenhaver & Williams, 2010). At its lowest level, writing involves mechanical skills (e.g., handwriting, spelling) that are used to translate this information into written text. Beyond these mechanical skills, students develop the ability to perform the three conventional writing components (Flowers & Hayes, 1981): planning, translating, and reviewing. **Planning** involves 1) identifying the purpose for writing the text; 2) formulating writing objectives and goals; 3) developing a writing plan to attain the writing goals; 4) generating facts, details, and ideas related to the topic; and 5) selecting, organizing, and sequencing this information into a specific text structure to be used in the written product. When **translating**, the content and text structure developed during planning is transformed into the letters, words, and sentences of orthographic language to communicate ideas to others in a meaningful manner (Berninger, 2009). **Reviewing** involves evaluating whether the written product contains any problematic areas that need to be altered, such as confusing language or incomplete information, and resolving them. It also involves altering the writing goals, plan, and strategies based on the current state of the written product in relation to the writing objectives.

However, not all students with significant cognitive disabilities demonstrate the knowledge, skills, and understanding crucial to performing conventional writing. Instead, many demonstrate the emergent writing skills of beginning writers (Erickson, Hatch, & Clendon, 2010; Orlando & Ruppar, 2016).

Emergent writing represents the reading and writing knowledge, skills, and understanding that precede and promote the development of conventional writing, such as phonological awareness, alphabet knowledge, and letter naming. It also involves the understanding and use of print and learning how to make marks, scribble, and randomly select letters. For students with significant cognitive disabilities to acquire the print and language knowledge and understanding needed for conventional writing, they must interact with literate individuals and take an active role in numerous writing tasks across multiple contexts and for varied reasons (Carnahan, Williamson, Hollingshead, & Israel, 2012; Erickson et al., 2010; Orlando & Ruppar, 2016).

While instructional writing strategies are included in comprehensive literacy instruction for general education students, writing skills have been inconsistently taught as a part of regular instruction for students with significant cognitive disabilities (Karvonen et al., 2011). Traditionally, writing instruction for this student population has concentrated on the production of individual letters and words (Koppenhaver, Hendrix, & Williams, 2007; Koppenhaver & Williams, 2010). Because the heart of the writing process is developing and organizing ideas about a topic (Carnahan et al., 2012), writing instruction should focus on both the mechanics of writing (e.g., handwriting, spelling) and the knowledge and skills critical to producing novel and generative communication (Erickson & Geist, 2016). When provided with interactive instruction focused on the function of letters and words in communication, students with significant cognitive disabilities can produce meaningful texts for various audiences (Sturm, 2012; Erickson, Koppenhaver, Yoder, & Nance, 1997). In addition, they can demonstrate certain writing-related skills prior to being able to produce written texts, such as recognizing and labeling letters before producing sentences (Carnahan et al., 2012).

Students with significant cognitive disabilities benefit from extensive, repeated, and individualized instruction and support across divergent writing activities in multiple contexts and for varied purposes (Erickson et al., 2005; Erickson & Geist, 2016). Writing instruction needs to be

shortened or simplified in order to provide them with additional time to complete writing tasks (Cole et al., 2000). It also needs to include significantly adapting, modifying, and accommodating materials and activities in order to meet the students' needs (Downing & Peckham-Hardin, 2007; Erickson & Geist, 2016; Erickson et al., 2010). This involves increasing students' access not only to the complete alphabet of 26 letters but also to assistive technology, which can increase, sustain, or enhance their functional abilities (Erickson et al., 2010; Koppenhaver & Erickson, 2003). assistive technology writing devices include augmentative and alternative communication (AAC) devices, alternative pencils, switches, touch screens, speech input, word predication software, and keyguards and alternative keyboards (Burgstahler et al., 2011; Cannella-Malone, Konrad, & Pennington, 2015; Carnahan et al., 2012; Erickson et al., 2010; Orlando & Ruppar, 2016).

Writing assessments typically focus on features of writing, with rubrics for rating samples. For instance, Isaacson (1996) summarized five ways to assess writing skills of students with learning disabilities, which included fluency, content, conventions, syntax, and vocabulary. For students with significant cognitive disabilities, the mechanisms of writing can be affected by the nature of their disability. To effectively assess students with significant cognitive disabilities and avoid the introduction of construct-irrelevant variance, assessments should be representative of an instructionally relevant, authentic writing task. They should also reflect principles of universal design for learning (UDL), provide access at different complexity levels, and minimize subjectivity in teacher ratings by focusing on text and communication features that can be assessed with minimal inferences. It is also critically important that assessment methods adequately assess writing skills so students can adequately demonstrate what they know and can do.

Dynamic Learning Maps Overview

The Dynamic Learning Maps (DLM) Alternate Assessment System measures the learning of students with significant cognitive disabilities in ELA, mathematics, and science for grades three through

eight and high school. Students are assessed via computer-based, instructionally embedded and spring assessments. The content measured by DLM assessments is represented in learning map models. Learning map models are fine-grained and highly interconnected cognitive representations that represent student learning within and across the domains covered in a subject (DLM, 2016; Bechard, Hess, Camacho, Russell, & Thomas, 2012). Maps contain two basic components: nodes and connections. Nodes represent not only the content-area knowledge, skills, and understanding associated with grade-level academic standards but also the critical foundational skills that support student learning upon school entry. Connections indicate the order of skill acquisition. Because of the highly interconnected nature of the learning map models, they contain multiple pathways toward academic targets.

To ensure all students with significant cognitive disabilities have access to rigorous, grade-level academic content, the DLM assessment makes assessments available at each of five linkage levels that measure underlying node(s) in the learning map, as seen in Figure 1. The Target linkage level reflects the grade-level academic expectation. The Initial Precursor, Distal Precursor, and Proximal Precursor linkage levels represent critical building block knowledge, skills, and understanding that students need in order to master the academic target. The Successor linkage level provides students with the opportunity to demonstrate their learning beyond the grade-level expectation. The DLM assessment is comprised of a series of testlets of 3-9 items that measure student learning on one or more academic standards. Using current student performance data, diagnostic classification modeling determines the likelihood of a student mastering the assessed linkage level(s) for each academic content standard.

Assignment to Assessments. Prior to administering DLM assessments, educators complete a First Contact survey of learner characteristics for each student (Nash et al., 2016). Educators answer items in a number of areas, including communication, academic skills, attention, and sensory and motor characteristics. A subset of the items are included in algorithms that recommend the linkage level of instructionally embedded assessments or to assign the level of the first spring assessment for each

subject (Clark, Kingston, Templin, & Pardos, 2014). The goal of this process is to present students with testlets that best matches their knowledge, skills, and understandings. Following the first assigned testlet in spring, the DLM system is adaptive between testlets. The system calculates whether the student should be routed up, down, or remain at the same linkage level based on performance on the most recently completed testlet.

In the first years of DLM administration, the system assigned students to their writing testlet (i.e., the last testlet) based on performance on the most recent reading testlet. This assignment technique was based on evidence that reading and writing are highly related (Fitzgerald & Shanahan, 2000; Juel, 1988; Raphael & Englert, 1990) and rely on the same mental processes (Fitzgerald & Shanahan, 2000). Additionally, good and poor readers typically develop into good and poor writers, respectively (Juel, 1988). Despite these assumptions, in some cases, the adaptive routing process resulted in a misalignment between what writing testlets required and what the student could do. In these instances, teachers indicated that the assigned writing testlet did not match the student's current writing instruction and provided too little or too great of a challenge for their students.

To address this potential for misalignment, we evaluate student assignment to specific writing testlets on the DLM assessment using teacher ratings of student writing on the First Contact survey. The goal of this approach is to provide students with the best match between assessment content and their instructional level and educators with an accurate summary of student learning that will inform subsequent instruction, which will be discussed in more detail in the Assignment to Assessments section. Considerations for broader application are discussed.

Objective/Purpose

This study evaluates survey and assessment data for students with significant cognitive disabilities for the following purposes:

- Describe teacher ratings of students' writing knowledge, skills, and understanding

- Compare the effectiveness of three versions of an algorithm for assigning writing testlets based on teacher ratings of student writing skills
- Evaluate assignment of writing testlets using the writing algorithm when compared to adaptive routing from the previous reading testlet

Method

Subjects

Approximately 12,000 students with significant cognitive disabilities participate in DLM integrated model writing assessment each year in five states. These students demonstrate diverse learning and communication skills and require a range of support needs. In addition, they may also have one or more disabilities that significantly affect their intellectual functioning and adaptive behavior (e.g., vision, hearing, mobility, and communication). The most frequently observed disability categories demonstrated by students with significant cognitive disabilities are intellectual disability (25.6%) and autism (25.2%).

According to the results of the First Contact survey (Nash, Clark, & Karvonen, 2015), students with significant cognitive disabilities demonstrate a number of receptive and expressive communication characteristics that can create challenges for writing instruction and assessment. Regarding receptive communication, a small number of these students are deaf or hard of hearing (5%), blind or with low vision (7%), and require enlarged print or tactile graphics (6%). In addition, the majority of students with significant cognitive disabilities are able to read primer and grade-level books (62%), while the remaining students are capable of reading only a few words or up at a pre-primer level (18%) or cannot read any words in print or braille (20%). However, only 15% of students in this population can read and comprehend texts without symbol support, and only 12% of them can explain or elaborate on a text that is read.

The expressive characteristics of students with significant cognitive disabilities will have a large impact on their writing abilities. Some students in this population cannot use speech expressively (24%), while others use either sign language (8%) or AAC devices (19%) in order to communicate. For students who do not use speech, sign language, or AAC devices, roughly half of them can use conventional gestures or vocalizations to communicate intentionally (48.1%). The remaining students use only unconventional gestures, vocalizations, and body movements to communicate intentionality (14%) or exhibit reflexive or unintentionally communicative behaviors that can be interpreted by others as communication (37.8%). For students capable of expressing themselves through speech, 71% of them could combine three or more words to produce grammatically correct sentences. Students with significant cognitive devices using AAC devices for expressive communication typically use voice output devices (37.6%), groups of one or two symbols (27%), low-tech communication boards or books (20.9%), and eye gaze boards (4.6%). In addition, a majority of students in this population are capable of accessing a computer with a standard keyboard (86%) and a standard mouse (59%), while the remaining students use alternative keyboards or keyboards with large keys (8%), touch screens (35%), and switches (8%). However, some students required either specialized seating or positioning equipment to remain upright (8.4%), while others can only use one hand (13%), require physical assistance (7.9%), or cannot use hands (2.5%) to complete tasks.

Materials

Data sources include First Contact survey responses and DLM ELA assessment data.

First Contact Survey. Educator responses to the First Contact survey item about the student's writing skills were collected. The seven-option multiple-choice item asked teachers to indicate the answer that most closely depicted the student's highest level of writing skill, ranging from "Scribbles or randomly writes/selects letters or symbols" to "Writes paragraph length text without copying using spelling (with or without word prediction)."

DLM Writing Testlets. At each grade level, the five linkage levels for all writing content standards are measured by two types of writing testlets: *emergent* and *conventional*. Emergent writing testlets measure the Initial and Distal Precursor linkage levels by assessing students on the early writing and communication skills that represent emergent literacy. Conventional writing testlets measure the Proximal Precursor, Target, and Successor linkage levels and focus on the production of letters and words associated with conventional literacy through the use of traditional or assistive technology writing tools. They also assess the student's understanding that groups of letters combine to form individual words, words have specific meanings, and written words can be specifically arranged to communicate with others.

In each writing testlet, the test administrator uses a scripted activity delivered through the online testing platform to guide students in engaging with writing processes in order to create writing samples. The testlets include an engagement activity in which students are encouraged to choose an object or topic to write about and to recall relevant information about it prior to writing. Following the completion of the writing activity, the test administrator responds to items that require the evaluation of the student's writing process and sometimes the written product itself. These items ask the test administrator to select one or more responses that best describes what the student did or produced as part of the writing activity. Each item in the writing testlets was designed to require minimal inferencing on the part of test administrators by providing general descriptions of the types of processes or products likely to be evidenced by the student. Each answer option is scored as a dichotomous item to determine the linkage level(s) mastered by the student for each writing content standard.

Assignment to Alternate Assessments. Spring 2016, 2017, and 2018 assessment routing data was collected for students taking ELA assessments. This included the percent correct and level of the last reading testlet taken prior to the writing testlet being administered.

Procedure

We first provide descriptive information for teacher ratings of students' writing knowledge, skills, and understanding from the First Contact writing survey item. We then compare descriptive statistics for three methods of using the First Contact writing data to assign students to emergent and conventional writing testlets. Table 1 depicts the three techniques for using First Contact writing data to assign students to emergent and conventional writing testlets. Technique 1 assigns students who can produce simple phrases, sentences, and paragraph-length texts to conventional writing testlets. With Technique 2, students who could use letters to accurately reflect the individual sounds in words were also assigned to the conventional writing testlet. In Technique 3, students who could independently produce letters, words, phrases, sentences, and paragraph-length texts received the conventional writing testlet, while the remaining students received the emergent writing testlet.

Next, we evaluate assignment of writing testlets using the writing algorithm compared to adaptive routing from the most recent ELA testlet. The adaptive routing method uses student performance on the most recent DLM reading testlet to assign students to either the emergent or conventional writing testlet, using the procedure shown in Figure 2. In this method, students are routed to a higher complexity band if they correctly answer more than 75% of the reading items and to a lower complexity band if they correctly answer less than 30% of the reading items. Students remain in the same complexity band if they fall between these ranges. For example, a student correctly answering 50% of the items on a Distal Precursor reading testlet would remain at that level and receive an emergent writing testlet, whereas correctly answering 100% of the items would result in the student moving up to a higher complexity level and receiving a conventional writing testlet. Using student performance data collected during the spring 2017 administration year, we examine how well students assigned to emergent and conventional writing testlets using the historic routing method performed.

Finally, we compare student assignment to emergent and conventional writing testlets between the spring 2017 administration year, which routed students based on most recent reading-testlet

performance, and the spring 2018 administration year, which used the writing algorithm to assign the writing testlet. We next examine what student assignment would have been in the spring 2018 administration year using the historical routing method. We then evaluate student assignment data from the spring 2018 administration year using the writing algorithm to determine the extent to which students were assigned to lower, the same, or higher complexity band compared to student assignment during the spring 2017 administration year using the historic routing method.

Results

Writing Knowledge, Skills, and Understandings

Educators most frequently indicated that the student scribbles or randomly writes/selects letters or symbols (29.2%) followed by writes by copying words or letters (23.3%) and writes words or simple phrases without copying using spelling (16.7%). Fewer than 5% of students with significant cognitive disabilities who take DLM assessments use spelling to write paragraph-length texts. Figure 3 summarizes the full results of student writing characteristics collected in the spring 2017 and spring 2018 administration years.

Writing Algorithm Evaluation

Table 2 demonstrates the count and percentage of students across all grades who would be assigned to writing testlets using each version of the writing algorithm using spring 2016 data. Using Technique 1, whereby students who produce phrases, sentences, and paragraph-length texts receive the conventional testlet, the majority of students (82%) would be assigned to emergent writing testlets. Technique 2, which additionally included students who use letters to represent sounds to those who receive a conventional testlet in Technique 1, produced a slightly more balanced distribution, with over a third of the students being assigned to the conventional writing testlet. Technique 3, which included students who represent orthographic writing in the conventional testlet, resulted in the most balanced

student assignment. Nearly half of the students would be assigned to the emergent and conventional writing testlets.

For each writing algorithm technique, we then evaluated the classification consistency of the algorithm with the historical routing process using the results from most recent reading testlet, as shown in Table 3. Technique 1 had the smallest number of students who would receive the same level writing testlet using either assignment method. This was due in part, because the student distribution was heavily skewed towards the emergent writing testlet. In contrast, Technique 3 was the most consistent with the historical routing method, because it achieved a more balanced distribution of students across writing testlets. Technique 2 fell in between in terms of overall consistency.

To further evaluate the appropriateness of using Technique 2 for assigning writing testlets, we examined the assessment performance of students whose teachers indicated the student *uses letters when spelling words.* During spring 2016, students were assigned a writing testlet based on most recent reading testlet performance, which resulted in students who use letters when spelling being distributed across both the emergent and conventional testlets. Figure 4 summarizes their median number of linkage levels mastered across the writing content standards. Findings indicate that students who received the conventional writing testlet (measuring the top three levels) generally demonstrated mastery of those levels, while students who received the emergent writing testlet (measuring bottom two levels) often demonstrated mastery of the higher of those two levels. Therefore, it is likely students who use letters to spell words would have been better able to show the complete breadth of their knowledge, skills, and understanding on the higher conventional writing testlet. Based on these findings, and an analysis of the content of the writing assessments relative to the First Contact survey item, Technique 2 was selected for a tryout of writing testlet assignment as it represented the best match between the skills assessed across all grade levels in the emergent and conventional writing testlets.

Assignment Using Writing Algorithm

Table 4 demonstrates the number and percent of students assigned to each type of DLM writing testlet by grade using most recent reading testlet in 2017 and the writing algorithm in 2018. Using the historic routing method, 37.2% of the students were assigned to emergent writing testlets and 62.8% were assigned to conventional writing testlets. In contrast, using the writing algorithm, 71.6% of students were assigned to emergent writing testlets and 28.4% of students were assigned to a conventional writing testlets. These findings suggest that students with significant cognitive disabilities were more likely to be assigned to the conventional writing testlet using the historic routing method from the most recent reading testlet in ELA and the emergent writing testlet using teacher responses to the First Contact survey to produce the writing-testlet assignment algorithm.

We then examined what student assignment would have been in the spring 2018 administration year using the historical routing method from most recent reading testlet to provide a basis for comparison between the two routing methods using the same data set. Table 5 demonstrates the number and percentage of students who would have taken each type of writing testlet based on the historic routing method. Similar to the spring 2017 and spring 2018 administrative year comparison, nearly 60% of students would have received conventional-level writing testlets during spring 2018 using the historic routing method, compared to just 28% receiving the same type of writing testlet based on the writing algorithm.

Student data from the spring 2018 administrative year was also evaluated to determine the extent to which students are assigned to writing testlets of the same or different complexity level. Table 6 summarizes the percentage of students who were assigned to writing testlets of a lower, higher, or the same complexity level during the spring 2018 administrative year compared to the testlet they would have received using the historic routing method. Using the writing algorithm, most students (93%) received writing testlets of the same or of a lower complexity level than they would have received using the historic routing method.

We next examined actual student performance during spring 2018 for students who received their writing testlet using the writing algorithm[1]. Results are summarized in Figure 5. While students who received the conventional writing testlet (highest three levels) typically demonstrated mastery across a broader range of linkage levels, students who received the emergent writing testlet (lower two levels) had a more bimodal distribution, whereby they typically mastered either the highest level possible or no levels at all. The large number of students mastering both levels may indicate a need for additional adjustments to writing testlets and their assignment.

Discussion

The goal of student assignment to testlets in the DLM assessment is to support all students with significant cognitive disabilities in demonstrating their knowledge, skills, and understandings. Assigned testlets should provide students with an appropriate level of challenge without being too easy or too difficult. Placing the "cut" between emergent and conventional testlets between "uses word bank to select or copy words" and "writes simple phrases and sentences" resulted in the most balanced distribution regarding student assignment. Further, this cut makes conceptual sense for differentiating writing complexity levels by assigning students who cannot produce letters and words to the emergent writing testlets, which cover skills that precede letter and word formation (Erickson et al., 2010). The remaining students who can produce letters and words are assigned to the conventional writing testlets, which involve the use of letters and words to produce text.

Overall, the findings presented here suggest an improved match between students' writing skills and testlet content when assigning testlets based on the writing algorithm. Because less than 20% of students who take DLM assessments are able to compose text using words or simple phrases, sentences or complete ideas, or paragraph-length text according to teacher ratings on the First Contact survey, the use of the writing algorithm to assign writing testlet appears to provide a more appropriate match to

[1] Four states used this method in spring 2018.

writing testlet content. Routing these students to the emergent writing testlet instead, as demonstrated using the writing algorithm, provides them with a more appropriate platform on which to demonstrate their writing knowledge, skills, and understanding on appropriately complex writing tasks. These findings have important implications for student opportunity to learn writing and demonstrate the full extent of what they know and can do on a testlet of appropriate complexity for their needs. The findings have broader implication to the instruction and assessment of writing for all struggling learners, particularly in light of the shortcomings of using reading performance to assign writing testlet.

The current findings also have implications for other assessments of students with disabilities. Students with significant cognitive disabilities demonstrate diverse writing abilities as evidenced by the results of the First Contact survey (Nash, Clark, & Karvonen, 2016) and the student writing characteristics collected in the spring 2017 and 2018 administration years. The inclusion of only two versions of the DLM writing assessment might not provide every student with an appropriate platform on which to demonstrate their learning. Students whose ability level fall in between the emergent and conventional writing testlets might be better served with one or more additional levels of writing testlets that have an improve alignment with what they know and can do, which would improve the accessibility of the writing testlets to all students. The findings highlight the importance of providing students with disabilities with an appropriate number of assessment levels to represent accurately their diverse ability levels. Without this adjustment, the resulting assessment might be inaccessible to students who do not clearly align to the current levels, and the findings will not provide educators with the crucial information needed to plan individualized instruction.

A reason why student assignment to the appropriate type of writing testlet is so critical for instruction is because educators must have an in-depth understanding of not only their students but also the content in order to deliver effective writing instruction to students with significant cognitive disabilities. They need to understand the complexity of the writing process in addition to the critical

steps or building blocks associated with both emergent and conventional writing, which could then become the academic targets in individualized instruction. Lastly, they need to evaluate student performance and progress by continually collecting and using student data. This data can then be used to plan individualized writing instruction focused on potential next steps derived from what students currently know and can do (McLeskey, Rosenberg, & Westing, 2017). Tracking student progress over time leads to improved learning outcomes for students with disabilities (Quenemoen, et al., 2003). However, educators are sometimes more adept at assessing what students know and can do than they are in using student data to understand students' strengths and needs and then identifying potential next steps in instruction (Heritage, Kim, Vendlinski, & Herman, 2009; Troia & Graham, 2016). They demonstrate improvement in data collection and use in their instruction when provided with content and pedagogical content knowledge (Mandinach & Jimerson, 2016). Student performance data from misaligned writing testlets fails to provide educators with the critical information they would need in order to plan personalized instruction through the identification of potential next steps and pathways leading towards the acquisition of academic targets.

Effective writing instruction also requires that educators improve student motivation and engagement by providing them individualized instruction in conjunction with collaborative writing and positive feedback (Zumbrunn & Krause, 2012). Joseph and Konrad (2008) found that strategy instruction (e.g., phases of instruction, modeling, guided practice, and independent practice) is an effective approach for teaching writing for students with significant disabilities (Cook & Bennett, 2014; Joseph & Konrad, 2008; Taft & Mason, 2011). More specifically, self-regulated strategy development (SRSD; Graham & Harris, 1993) employs scaffolds, explicit instruction, and self-regulation to improve students' knowledge of the writing process and performance of the critical steps involved in composing writing texts (Asaro-Saddler, 2014; Asaro-Saddler & Bak, 2014). Self-regulating the writing process by setting goals, using writing strategies, monitoring performance, and tracking progress improves not only the

quantity and quality of written text but also enhances the likelihood in which it will be used in novel situations (Konrad & Test, 2007). Without an accurate understanding of what students currently know and can do, educators would encounter difficulties in using writing strategy instruction to aid students in their progress towards the acquisition of academic writing standards.

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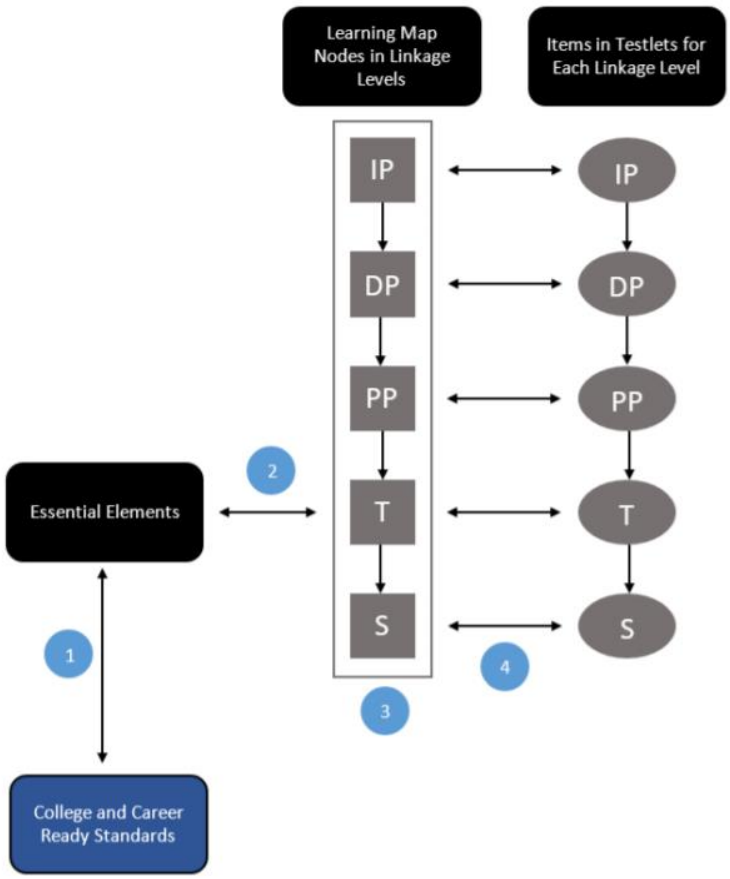

Figure 1. Relationships in the DLM Alternate Assessment System. Linkage levels are Initial Precursor (IP), Distal Precursor (DP), Proximal Precursor (PP), Target (T), and Successor (S).

Level of Reading Last Testlet	Routing Based on Percent Correct	Writing	
		Level	Testlet
Successor	% >75 = Up level 75 ≥ % ≥ 30 = Same level % <30 = Down level	Successor	Conventional
Target		Target	
Proximal Precursor		Proximal Precursor	
Distal Precursor		Distal Precursor	Emergent
Initial Precursor		Initial Precursor	

Figure 2. Routing assignment process based on percent correct rule.

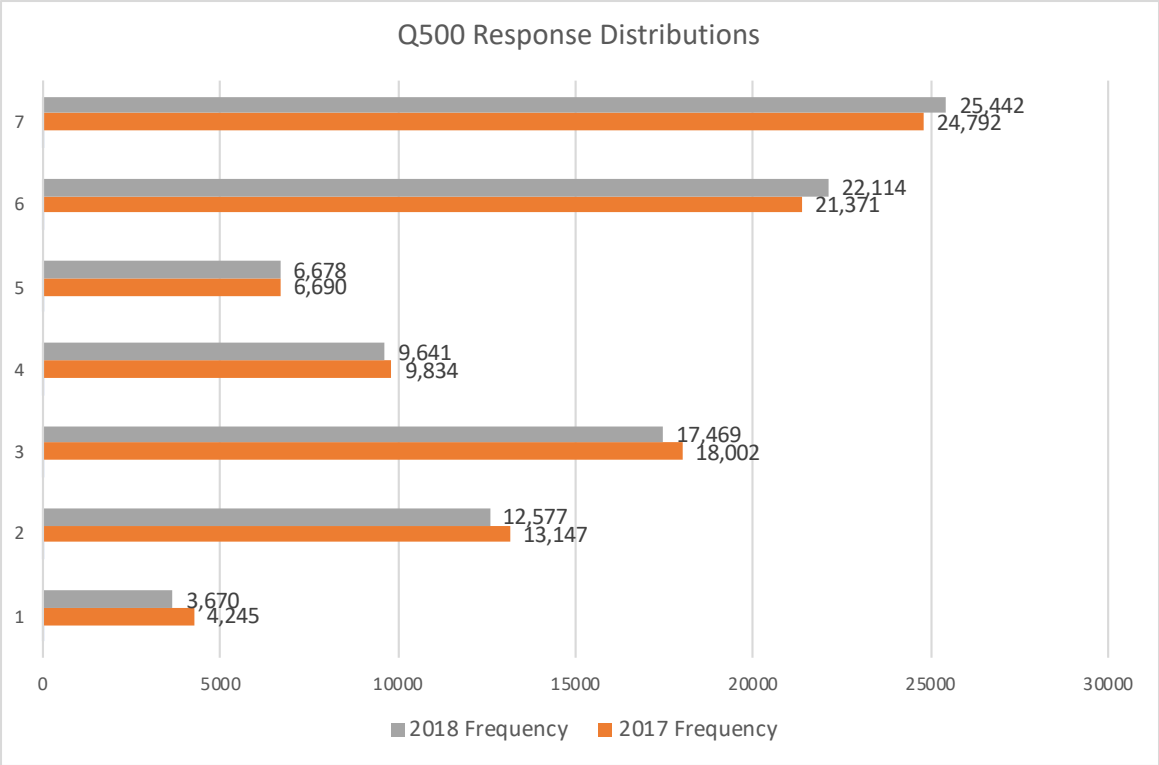

Figure 3. Distribution of writing First Contact item responses for the spring 2017 (orange) and spring 2018 (gray) assessment years (2017 *N* = 98,081; 2018 *N* = 97,591; 1: paragraph text, 2: sentences or complete ideas, 3: words or simple phrases, 4: letters for some sounds, 5: Word banks or symbols, 6: Copying words or letters, 7: scribbles).

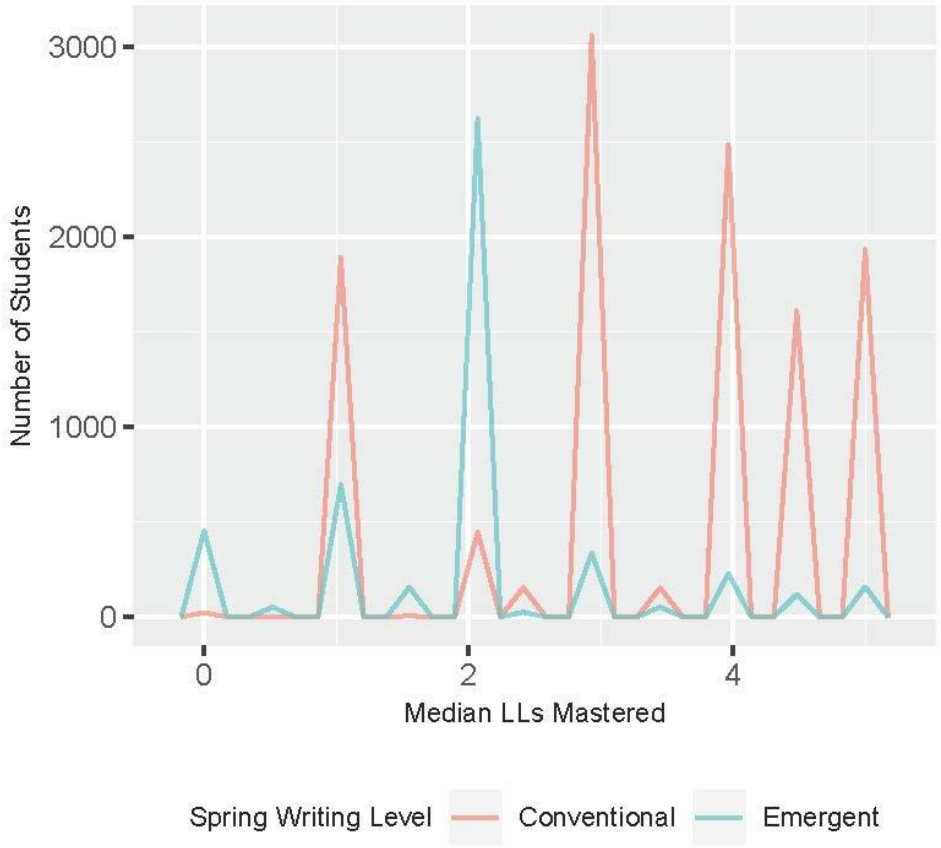

Figure 4. Median linkage levels mastered across all writing content standards for students who *use letters to reflect sounds in words* and took the writing assessment during spring 2016.

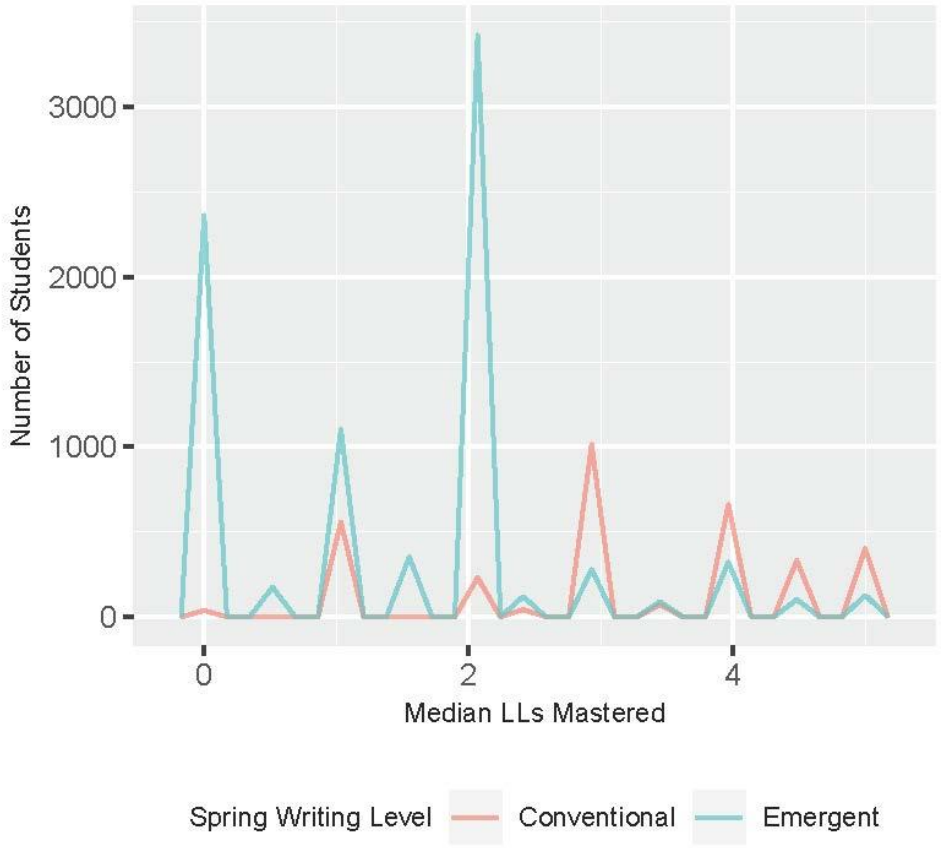

Figure 5. Median linkage levels mastered across all writing content standards for students who were assigned a writing testlet using the writing algorithm during spring 2018.

Table 1.

Allocation of the First Contact writing-related skill categories for each technique

Technique	Emergent Wring	Conventional Writing
Technique 1	• Makes random marks or scribbles • Copies letters and words • Selects symbols to express meaning • Uses word bank to select or copy words • Uses letters when spelling words • Uses letters to accurately reflect sounds in words	• Writes simple phrases and sentences • Writes paragraph-length texts
Technique 2	• Makes random marks or scribbles • Copies letters and words • Selects symbols to express meaning • Uses word bank to select or copy words • Uses letters when spelling words	• Uses letters to accurately reflect sounds in words • Writes simple phrases and sentences • Writes paragraph-length texts
Technique 3	• Makes random marks or scribbles • Copies letters and words • Selects symbols to express meaning • Uses word bank to select or copy words	• Uses letters when spelling words • Uses letters to accurately reflect sounds in words • Writes simple phrases and sentences • Writes paragraph-length texts

Table 2.

Assignment to Writing Testlet by Technique for Students Taking Spring 2017 Assessment *(*N *= 93,600)*

Technique	Cut	Emergent Writing [Count (%)]	Conventional Writing [Count (%)]
1	Writes simple phrases	80,689 (82.3)	17,392 (17.7)
2	Uses letters to reflect sounds	62,687 (63.9)	35,394 (36.1)
3	Uses words when spelling	52,853 (53.9)	45,228 (46.1)

Table 3.

Classification Consistency with Historic Routing from Reading Testlet

Technique	EW [Count (%)]	CW [Count (%)]	Overall [Count (%)]
1	44,841 (94.2)	15,428 (28.7)	60,269 (59.4)
2	39,391 (82.7)	28,818 (53.6)	68,209 (67.3)
3	35,423 (74.4)	35,984 (66.9)	71,407 (70.4)

Table 4.

Student Assignment to Writing Testlet

	2017				2018			
	Emergent		Conventional		Emergent		Conventional	
Grade	*n*	%	*n*	%	*n*	%	*n*	%
3	482	30.2	1,113	69.8	1,243	89.4	148	10.6
4	472	29.1	1,150	70.9	1,236	81.7	276	18.3
5	533	31.9	1,140	68.1	1,171	76.5	360	23.5
6	569	34.5	1,079	65.5	1,100	70.3	465	29.7
7	640	38.4	1,028	61.6	1,003	66.6	504	33.4
8	679	43.0	900	57.0	1,005	65.1	539	34.9
9	250	47.3	279	52.7	341	66.3	173	33.7
10	434	44.4	543	55.6	538	55.3	434	44.7
11	501	41.2	715	58.8	621	58.2	446	41.8
12	186	78.2	52	21.8	210	90.9	21	9.1
Total	4,746	37.2	7,999	62.8	8,468	71.6	3,366	28.4

Note. 2017 assignment based on most recent reading testlet. 2018 assignment based on writing algorithm.

Table 5.

Hypothetical Spring 2018 Assignment Based on ELA Adaptation

	Emergent		Conventional	
Grade	*n*	%	*n*	%
3	519	37.3	872	62.7
4	532	35.2	978	64.8
5	558	36.5	971	63.5
6	631	40.4	932	59.6
7	655	43.5	850	56.5
8	661	42.9	880	57.1
9	287	55.9	226	44.1
10	435	44.8	537	55.2
11	502	47.2	561	52.8
12	194	84.0	37	16.0
Total	4974	42.1	6844	57.9

Table 6.

Writing Level Assignment via First Contact Relative to ELA Adaptation

	Lower		Same		Higher	
Grade	*n*	%	*n*	%	*n*	%
3	2,069	19.9	7,577	72.9	744	7.2
4	1,800	16.6	8,545	78.7	519	4.8
5	2,037	18.8	7,749	71.5	1,047	9.7
6	2,170	19.7	7,736	70.3	1,102	10.0
7	1,252	11.4	9,176	83.7	531	4.8
8	2,020	17.9	8,742	77.6	505	4.5
9	574	10.3	4,508	80.5	516	9.2
10	472	17.4	2,105	77.6	136	5.0
11	1,186	16.4	5,762	79.9	267	3.7
12	25	10.8	197	85.3	9	3.9
Total	13,605	16.8	62,097	76.6	5,376	6.6