Re-Mediating and Transmediating Middle-School Students' Writing Through Teacher Professional Development

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Because ever-expanding opportunities for communication have not been well-represented instructionally, this study investigated the impact of teacher professional development in new literacies on students' writing achievement. Further, the study considered professional development characteristics that support instructional shifts to include new literacies. Ten teachers and 892 students participated, with a matched control group. Participating teachers received a classroom set of laptops and up to 46 hours of training. Analyses indicate that professional learning opportunities that fostered conceptual understandings included the opportunity to observe in classrooms that were using new literacies and provided opportunities for hands-on practice and social construction of knowledge appear to have supported instructional changes. Students whose teachers were minimally trained did not have significant increases in writing achievement; however, students whose teachers received sustained training significantly increased their scores on high-stakes assessments. Increased scores were more pronounced for students who had been previously labeled as underachieving, a finding that fosters conceptualization of new literacies as transmediational and re-mediational.

The COVID pandemic has evidenced at least two realities in education: the ability for digitally delivered instruction and the persistence of an educational culture zealous about high-stakes assessment. Following more than a year of educational innovation as teachers met their students in varied remote, hybrid, and face-to-face environments, there was a swift return to testing to determine alleged learning loss (Engzell et al., 2021; Kuhfield et al., 2020; Strauss, 2021).

Although the digital means and modes enabling remote instruction have the potential for expanded opportunities for producing and consuming information, the methods and outcomes of high-stakes assessment could constrain this potential. However, if it is demonstrated that instruction incorporating these expanded characteristics also increases test scores, educators at all levels may more fully embrace the potentialities of digital learning. This study begins to provide such evidence by considering the impact of teacher professional development in new literacies practices on students' achievement on high-stakes writing assessments.

Expansive Characteristics of New Literacies

In the past, literacy was associated with reading and writing of print-based texts. However, recognition of the distinct discourses and multiple means and modes of linguistic representation, along with ever-expanding opportunities for producing and consuming linguistic expression, has led to use of the plural, *literacies,* as a common referent for communicative activities (Kalantzis et al., 2016). Because these means, modes, and opportunities are deictic and ever-changing, the term *new literacies* has been used to represent both the mechanisms and the practices used for linguistic expression, and key characteristics of these new literacies have been identified (Leu et al, 2019), including features of participation and transmediation.

Participation

New literacies represent expanded opportunities for social and collaborative composition and communication (Kalantzis et al., 2016). For example, phone and internet applications provide open access to broad audiences. Publishing through these resources is more accessible and less filtered, and distribution may be rapid and extensive, expressions of a participatory culture (Leu et al., 2019).

Today's youth frequently use digital, multimodal tools to create, communicate, and collaborate in out-of-school environments. For example, Alvermann et al. (2012) documented five teens' use of web-based resources and found they were developing relevant literacy skills, were "highly motivated and adept at using multimodal tools," (p. 191) and demonstrated critical thinking and life-skills through participation.

Transmediation

New literacies expand opportunities for using multiple modes of representation (Leu et al., 2019; Thibaut & Curwood, 2018). Meaning may be represented through text, image, video, and audio. The term transmediationhas been used to describe the act of recasting meaning from one sign system to another (Siegel, 2006; Suhor, 1984). Contrasts and commonalities encountered when moving across modes of representation have the potential to help learners connect ideas and enhance knowledge of content (Siegel, 2006; Zoss, 2011).

Researchers have considered ways multiple literacies mediate meaning and have applied the concept of transmediation to writing instruction (Batchelor, 2018; Mills, 2011; Smith et al., 2016). For example, Mills, in her study of eight-year-olds, demonstrated that producing artifacts via different sign systems supported generative and reflective thinking because new connections were created.

Curwood and Cowell (2011), in their iPoetry project, where high-school students created videos of their original poems, found that students deepened their understanding of the genre. Similarly, Batchelor (2018), found that middle-school students' understanding of the purpose and process of revision improved as they transmediated their writing into another sign system. Transmediation allowed students to see their work from a new perspective. These studies suggest that transmediation, as a tool for composing, deepens understanding of the content, purposes, and processes of writing.

In contrast, however, Howell et al. (2017) conducted a formative experiment to investigate how using multimodal tools could enhance students' argumentative writing. Although high-school students in the two classes they studied were engaged in constructing multimodal arguments, they found no evidence that this learning increased their conventional argument-writing skills. The teacher's concern regarding preparing students for high-stakes assessments seemed to inhibit multimodal instruction. The authors suggested further research to consider design features addressing such concerns.

Constraining Characteristics of Standardized Testing and Remediation

Despite the ubiquity of new literacies in students' lives, research suggests that new literacies are not yet well-represented in classrooms (Hundley & Holbrook, 2013; Lenters, 2016; Seglem & Garcia, 2018). In an era of testing and accountability, public educators may not incorporate new practices into writing instruction unless they see evidence that students' achievement on high-stakes assessments will improve.

School boundaries that limit literacies may exist because many out-of-school practices that embed literacy are invisible to teachers who frame literacy narrowly as reading and writing achievement (Roswell & Kendrick, 2013). To this point, Stewart (2014), in her study of youths' literacy experiences, found that in-school literacy represented a limited view that prevented students' success, despite participants' adroitness with new technologies. Many factors likely contribute to school boundaries that limit literacies. One of these factors is high-stakes testing.

Even when digitally delivered, standardized writing assessments typically test writing in conventional ways, using constructed-response items and scoring systems devoid of aspects of presentation and communication often embedded in out-of-school literacies (Beach et al., 2016; Towndrow et al., 2013). Because school curricula are sometimes constrained to focus on tested skills (Dutro et al., 2013), aspects of composition that are not tested may not be taught (Hutchison & Reinking, 2011; Pella, 2011).

Consequences of high-stakes testing are especially impactful for students with low test scores. Students whose literate practices differ from academic voice may be viewed as needing intervention or remediation – "remedies" to fix their problem (Dressman et al., 2005). Approaches to remediation are often imbued with deficit views that locate failure within the individual. Instruction may be further constrained by remediation practices focusing on isolated skills and rote learning (Haberman, 2010).

New Literacies as Mediating Tools

In contrast, literacies can be viewed as mediating tools. Vygotsky (1978) noted that by providing mediating tools the nature of a task can be changed so that interactions support the unfolding of new abilities. From this perspective, *re-mediation* involves a shift in the way mediating devices are used. New literacies, then, might serve as remediating tools. In her study of repositioning home literacies in classrooms, Souto-Manning (2010) advocated for goals in intervention that are reconceptualized to encompass the expansive, additive approach of re-mediation.

When out-of-school literacy practices are incorporated into writing instruction, the collaborative practices and varied modalities that are part of students' repertoires from social experiences support their learning. Learning can be re-mediated not only by the teacher but also by the tools available through technology and social interaction (Cope et al., 2018; Gutierrez et al., 2009; Lankshear & Knobel, 2011).

Shifting Pedagogies for Writing Instruction

Despite increased use of technology in instruction, the potential for new literacies as mediating tools to improve students' writing and enrich their learning experience may not be realized. In addition to pressures of high-stakes tests that do not reflect such characteristics, other inhibiting factors include teachers' incomplete knowledge about new literacies' tools and methods and their own paradigms for writing instruction. Pedagogical shifts that incorporate multimodal and digital literacies challenge the world in which literacy teachers have lived and worked. Effective professional development (PD) experiences may increase teachers' knowledge and enlarge their teaching paradigms about writing instruction.

Although research has identified general characteristics of effective PD, consensus on these characteristics has been called into question because of disappointing results in rigorous studies (Garet et al., 2016; Gersten et al, 2014; Hill et al., 2013). Following Garet et al.s' recommendation, this study sought to identify effective PD features through their effects on student achievement.

To guide this study, I drew on features identified in PD research that were consistent with my conceptual framework and seemed most cogent for this study, including a sociocultural approach to professional learning (Street & Stang, 2009; Vygotsky, 1978), provision of a theoretical foundation (Sedova et al., 2016), and learning through and with the new tools and approaches ((Darling-Hammond et al., 2017; Miller, 2015). A longitudinal

commitment to PD is also a key feature (Kennedy, 2010; Opfer & Pedder, 2011). These characteristics of PD have a research base supporting their effectiveness in changing instruction, and some studies suggest benefits of these approaches for instructional incorporation of new literacies.

Curwood (2014), in her study of how teachers' cultural models shape their approach to technology integration in secondary literacy instruction, found that some teachers were challenged to conceptualize how technology would impact instructional design and assessment. However, she found that dialogue in professional learning communities provided opportunities for teachers to express, challenge, and possibly change their cultural models. Curwood's analysis suggests teachers' skills, values, and cultural models influence implementation of reforms such as integration of new literacies.

Bruce and Chiu (2015), in their study of 240 preservice and in-service teachers' reflections on learning to compose with digital video (DV), found that teachers used what they knew about print composing to learn about DV composing. This finding suggested transmediation of teachers' knowledge across modes when provided the opportunity for hands-on practice with digital tools.

Similarly, Shaw and Valerie (2018), whose project explored how preservice and in-service teachers engaged with multimodal texts, found that teachers changed as text-makers, enlarging their own composing practices. However, their study did not consider whether these professional learning experiences expanded teachers' instructional repertoires.

Cook and Sams (2018) explored how the composition of multimodal texts of 23 English preservice teachers (PSTs) influenced their stances on literacy instruction. In their course-based learning, PSTs experienced opportunities to compose, talk, and reflect on writing pedagogy within a community of practice. They began to see parallels between multimodal composition and tradition writing. However, they struggled with making the mental transition of these practices to their future classrooms.

Although features of PD have a research base supporting their effectiveness in changing instruction, their impact for incorporation of new literacies has not been fully explored. Further, because teacher PD efforts generally share the goal of positively shifting teachers' behavior, knowledge, and attitudes, with the ultimate goal of improving student achievement (Carter Andrews & Richmond, 2019), teachers may feel the pressing question of whether there is time for new literacies in schools that are shaped by a culture of accountability (Siegel, 2012).

The current study explored ways PD might encourage teachers to push beyond narrow descriptions of writing defined by high-stakes testing to provide instruction that incorporates affordances of new literacies. I postulated that PD emphasizing this perspective could not only change teachers' practice, but also improve students' achievement as measured by scores on standardized tests, even when tests reflect a constrained view of writing. Specifically, this study investigated the following questions: What effect does PD in new literacies have on students' writing achievement?

What PD characteristics support instructional shifts to include new literacies?

Methods

This study investigated teachers' learning and effects on students' writing achievement. These goals required use of both quantitative and qualitative measures. Multilevel research and sampling designs (Teddlie & Tashakkori, 2009) were used, since research questions considered participants from different levels within the population of interest (seventh-grade students nested with the classrooms of language arts teachers). Breadth and depth of the study are enhanced by using multiple types of data to tell the story (Creswell & Plano-Clark, 2011). The study evaluated student growth data on state standardized writing assessments compared with a control group and considered PD characteristics that supported instructional shifts to include new literacies.

Context and Participants

This research was conducted in a large suburban school district in the Western United States (see Table 1). The district purchased 300 laptops for their 10 middle schools. PD was frontloaded in the spring semester and summer and continued throughout the following school year, with student data evaluating changes within the final year of PD, which was considered the intervention year.

Teacher Participants

Participants in this study were 10 middle school language arts teachers with a broad range in teaching experience. One seventh-grade English teacher participated from each of the district's 10 middle schools (see Table 2). Of the 10 teachers, seven participated in the full sequence of PD and had 46 hours of training prior to students' end-of-year writing assessments. These teachers made up the first group, identified as "fully trained."

The remaining three teachers took the place of teachers who retired or changed positions between school years. These three teachers had laptops in their classroom but only received six hours of training prior to end-of-year assessment. They made up a second subset, the "technology + minimal training" group. Vast differences in PD opportunities allowed for comparisons of training effects.

Table 1
Demographic Information for the Participant and Matched Control Participants

Matched Classroom Groupings		Prior Year State Writing			% Male	% Free and Reduced Lunch	% Gifted & Talented in Language Arts	% of non-English Proficiency
		Mean Scaled Score (SD)	Median Scale Score	Mean Growth Percentile (SD)				
1	Participant	581.04 (45.96)	580.00	56.36 (27.36)	50.6%	9.1%	11.1%	6.9%
Control	588.40 (56.31)	584.00	56.15 (29.64)	45.9%	4.9%	14.0%	7.8%	
2	Participant	562.42 (57.89)	562.00	56.85 (28.61)	39.7%	19.3%	2.9%	4.4%
Control	558.96 (58.59)	565.00	55.00 (28.09)	46.7%	21.7%	15.1%	9.6%	
3	Participant	568.85 (53.18)	561.00	51.62 (28.41)	42.7%	7.8%	18.1%	3.4%

Matched Classroom Groupings		Prior Year State Writing			% Male	% Free and Reduced Lunch	% Gifted & Talented in Language Arts	% of non-English Proficiency
	Control	568.59 (65.11)	554.00	53.29 (30.24)	36.2%	8.6%	7.3%	0%
4	Participant	553.24 (63.82)	552.00	44.70 (30.29)	37.6%	25.5%	13.0%	11.6%
	Control	543.30 (53.88)	546.50	48.81 (29.47)	41.8%	17.4%	8.9%	6.7%
5	Participant	551.44 (53.45)	552.00	49.19 (30.78)	61.5%	12.8%	4.1%	5.4%
	Control	543.25 (46.09)	545.00	43.16 (27.26)	43.1%	13.8%	4.0%	4.0%
6	Participant	540.52 (57.26)	546.00	44.41 (40.00)	52.6%	17.5%	4.5%	5.6%
	Control	546.78 (41.87)	541.00	54.18 (29.25)	37.8%	28.9%	0%	14.6%
7	Participant	529.19 (45.661)	533.00	50.00 (31.20)	40.6%	33.3%	0%	8.5%

Matched Classroom Groupings		Prior Year State Writing			% Male	% Free and Reduced Lunch	% Gifted & Talented in Language Arts	% of non-English Proficiency
Control	534.27 (60.68)	541.00	63.20 (30.80)	50.0%	16.7%	0%	0%	
8	Participant	536.15 (45.43)	533.00	44.72 (27.33)	48.5%	46.5%	8.0%	23.9%
Control	528.80 (43.80)	532.00	47.59 (28.14)	51.4%	35.2%	4.6%	7.7%	
9	Participant	535.45 (45.66)	530.00	37.42 (25.01)	46.9%	24.7%	3.9%	2.9%
Control	525.11 (37.89)	522.00	44.36 (28.79)	50.5%	27.0%	2.0%	6.8%	
10	Participant	531.28 (49.94)	530.00	45.47 (27.66)	28.6%	33.4%	15.8%	10.5%
Control	517.67 (52.69)	513.00	42.91 (27.37)	43.9%	66.7%	10.5%	66.6%	

Table 2
Teacher Participants

Teacher	Experience	Age	Full PD
1	0–5 years	20–30	Yes
2	20+ years	50+	Yes
3	20+ years	50+	Yes
4	15–20 years	40–50	Yes
5	5–10 years	30–40	No
6	5–10 years	30–40	Yes
7	20+ years	50+	Yes
8	0–5 years	20–30	No
9	20+ years	50+	Yes
10	0–5 years	20–30	No

Notes. Three teachers participated in only six of the 46 hr of training that occurred prior to student testing. Three schools had only one seventh-grade language arts teacher; that teacher is the participant.

Student Participants

There were 892 students in the classes of the 10 teachers. Ten classroom-level control groups were statistically matched to these classrooms. Control groups were initially matched based on median test scores. There were 645 students in the resulting matched classrooms. Control classrooms were similar in prior proficiency levels, prior growth rates, and demographic characteristics. Matching procedures resulted in no initial significant differences in scaled scores of participants compared to the matched control group, $t(1,463) = .118$, $p = .90$.

In addition, no significant differences were indicated between participants and control group on growth prior to program implementation. Control group students did not have regular access to technology and their teachers did not receive district training in new literacies or other writing PD.

Teachers in both participant and control groups had flexibility in instructional design. The same literature anthologies, novel sets, and instructional resources were available to all teachers and students, with the notable exception that laptops were provided in the classes of all participating teachers (both the "fully trained" and "minimal training" groups).

Researcher's Role

As the PD provider in this study, I was a participant observer. My position allowed for sustained engagement and the opportunity to investigate the backstage of the experiences as well as its more public aspects (as described by Goffman, 1963). Through these interactions, I established rapport with teachers that allowed for open conversations during interviews and a comfortable atmosphere during observations (Seidman, 2013). To guard against my own biases and inappropriate influence on participants, many types of data, including additional interviews by an outside evaluator and anonymous surveys, were included.

Data Sources and Analyses

Data were collected from multiple sources to analyze students' writing achievement and PD practices that supported changes in teachers' perceptions of literacy instruction.

Data on Students' Writing Achievement

Data from the state writing assessment were collected to consider students' writing achievement. The state writing test included 40 multiple choice items, accounting for 58% of the total score, and six constructed-response items, accounting for the remaining 42%. Constructed-response items were four one-paragraph responses and, additionally, a writing plan and extended-response based on a prompt. Assessments were externally constructed and evaluated; constructed-response items were scored by readers trained in using the state writing rubric. Analysis of these scores followed a repeated measures design and included nonparametric tests of student growth percentile distributions.

Student Growth Percentiles

Student growth percentiles from participant classrooms were compared with growth of classroom-level control groups using non-parametric tests. The Mann-Whitney test was used for growth-percentile comparisons between experimental and control groups. Distribution of growth scores was also considered based on proficiency levels.

Data on PD Practices

In addition to considering changes in student achievement, this study sought to understand what PD characteristics supported instructional shifts, to include new literacies. Data regarding this inquiry were collected through the Teacher Evaluation Tool (TET), field notes during PD

activities, and interviews with teachers. Qualitative constant-comparative analysis was used within each data set to highlight themes and provide additional insight regarding supportive PD practices. Categorical aggregation (Creswell & Plano-Clark, 2011) was used across data sets to identify similar categories. Triangulation across these sources was used to draw meaning from multiple data sets and increase validity through convergence of information from different sources (Creswell & Creswell, 2017).

Categories were identified and collapsed into themes. For example, the categories of Sharing, Talking, and Comfort had a common, underlying theme of Collaboration. Overlapping themes were merged; for example, themes of Change and Shift were combined.

Teacher Evaluation Tool. The TET is an anonymous, 10-question, researcher-created survey completed by teachers after the first 6 months of training and again at the end of the study. The survey included Likert-scale items with response choices from 1 – 4, with 1 being *strongly disagree* and 4 being *strongly agree*. Descriptive statistics were used with TET Likert-scale items. Responses to open-ended questions from the survey were considered along with other qualitative data.

Teacher Interviews. Two forms of teacher interviews were conducted. Levels of Use (LoU; Hall & Hord 2006) is a standardized protocol for evaluating implementation of innovations. LoU describes seven discrete stages (Orientation, Preparation, Mechanical Use, Routine, Refinement, Integration, and Renewal), including behaviors a user exhibits during each stage. An outside evaluator trained in this tool interviewed teachers and reviewed responses to written questions to determine each teacher's level of use.

In addition the LoU tool, I interviewed all teachers regarding their experience with the study after the first 6 months of training and again at the end of the 18-month study. Interviews were coded and excerpts identified and included with other qualitative data sources during constant comparative analysis and categorical analysis.

Field Notes. During professional development experiences I took field notes about teachers' participation, noting people, activities, and the physical aspects of the situation (as recommended by Spradley, 1980). My written reflections after training sessions provided additional data for qualitative analysis. Field notes were coded and excerpts identified and included with other qualitative data sources.

Procedures

Over the course of 18 months, 46 hours of PD were provided to teachers who received laptop carts for their classrooms (see Table 3). I planned and provided the training, in collaboration with school district educational technology staff. PD included opportunities for collaboration and social construction of knowledge, integration of theory, and time to learn through and with the new tools that teachers were encouraged to use in their classrooms.

Social Construction of Knowledge

Throughout each session, teachers had frequent opportunities to talk with one another about what they were thinking. They also read articles in small groups and shared their take-aways with all participants. Every session included time for teachers to work together as they wrote lesson plans that integrated tools and practices we discussed. Book studies of *The Digital Writing Workshop* (Hicks, 2009) and *iWrite: Using Blogs, Wikis, and Digital Stories in the English Classroom* (Wilber, 2010) included opportunities for teachers to work in small groups to prepare activities that highlighted insights from each chapter. As trainings progressed, teachers shared examples of student work and new practices they were using.

Integration of Theory

Throughout the PD, characteristics of new literacies were emphasized. Readings drew attention to these attributes, and teachers used the following questions to guide their planning: How will the activity make literacy learning more social/collaborative/participatory or more multimodal? How will it expand methods for producing, distributing, exchanging, and receiving texts? How will technology skills be incorporated? In what ways will the activity enable students to direct their own learning? These questions encouraged teachers to incorporate new literacies as they designed learning opportunities for students.

Learning Through and With New Tools

During trainings, teachers learned new tools and accessed, created, and shared information using these tools. Articles and blogs were read online and responded to through discussion boards and apps. Teachers learned about tools such as RSS feeds, online organizers, and collaborative online platforms, and they used them in planning for instruction that included these tools. For example, as part of lesson planning, teachers used Bubbl.us, an online concept map, to envision lesson activities and connections between these activities. Concurrently, they planned practices for introducing this tool to students.

Extended Duration

Training began 8 months before student participants entered teachers' classroom. At the initial full-day training, guest teachers showed online spaces they had created for their classes and examples of student work such as blogs and online discussion boards. Participants read and discussed articles that provided a theoretical foundation for their work. The initial training also included examination of writing processes. The flexible, iterative nature of these processes was discussed. Digital tools for use within writing processes were shared; teachers used and discussed these tools and planned for how they might be incorporated into upcoming writing projects.

Table 3
Teacher Professional Development Experiences

Format	Content
Initial full-day training	Overview of new literacies characteristics and digital tools
Field trip	Visit and discuss classrooms using new literacies practices
Just-in-time training 1	Iterative writing process; student choice; audience and purpose; pre-writing tools
Just-in-time training 2	Share successes and challenges; drafting tools; teacher presentations on book study chapters.
Just-in-time training 3	Teachers share student examples; successes and challenges; choice and inquiry; writers craft; conferring; revision tools; teacher presentations on book study chapters.
Just-in-time training 4	Teachers share student examples; successes and challenges; presentation and publishing tools; teacher presentations on book study chapters.
Just-in-time training 5	Teachers share student examples; successes and challenges; choice and inquiry; using fewer tools with more consistency; teacher presentations on book study chapters.
2-day summer institute	Additional content and tools; workshop with book study author Troy Hicks; plan instructional units
Just-in-time training 6	Share and create digital writing lessons; new book study teacher presentations.
Just-in-time training 7	Teachers share student examples; share and create digital writing lessons; new book study teacher presentations.
Just-in-time training 8	Teachers share student examples; share and create digital writing lessons; new book study teacher presentations.

Subsequently, teachers took a full-day field trip to see classrooms using practices similar to those described in the initial training. Time was provided for teachers to reflect together. After these initial experiences, which were intended to provide a vision for the work, teachers participated in five 2-hour after-school sessions, held approximately every 2 weeks during spring semester. After-school sessions were termed

just-in-time trainings because the intent was to introduce new tools and practices as teachers were ready to use them in the classrooms.

For example, teachers initially learned about prewriting tools such as RSS feeds, concept map apps, and digital recording. At a subsequent training, teachers explored Google Docs as well as word-processing tools. Blogs and online discussion boards were later considered as means for gathering feedback during revision and editing, and multimodal tools (Storybird, Glogster, etc.) were discussed when sessions focused on publishing. PD included opportunities to use and create podcasts, communicate via blogs and discussion boards, and utilize digital video and other media to present to peers. Time was provided during each training for teachers to problem-solve together, plan for classroom use, and share instructional experiences.

At the conclusion of the school year, teachers in the study participated in a 2-day summer institute that again included opportunities to read and think about new literacies, try new tools, and plan units for instruction. During the intervention school year, teachers attended three additional 2-hour after school trainings with similar structures. Three teachers who participated in the previous training retired or left the district, and the three teachers who took their places attended only these final three trainings. Thus, the study represents three levels of support: fully trained teachers with laptops, minimally trained teachers with laptops, and teachers without training or laptops.

Findings

Assessment of Student Writing

State Writing Test

To evaluate students' growth on the state standardized writing assessment, student growth percentile distributions were analyzed. Analysis indicates significant gains in median student growth percentiles for students whose teachers were fully trained (i.e., attended 46 hours of training). Growth rates showed a 5-unit change (48-53), as opposed to a 0-unit change (48-48) for the control group, a statistically significant difference (Mann-Whitney 1-tailed *p*-value = .015). These participants exceeded their own prior year's growth, the matched control group's growth, and growth of academic peers statewide. When students from all classrooms with laptops were included (fully trained and minimal training) overall gains were evident but not statistically significant.

Distribution of growth scores was also considered, based on the proficiency levels designated by the state assessment; results are displayed in Figure 1. In each chart, the box plots represent the growth distribution for students' performance levels: Unsatisfactory (far left); Below (center left); Proficient (center right); and Advanced (far right). Growth for the year prior to the intervention (top row of charts) and the intervention year (bottom row) are displayed for the fully trained teachers (left) and the control group (right). Each graph shows the students' growth from prior-year performance, broken out by performance levels. (By definition, the

median growth percentile is the 50th percentile for students who took the test statewide.)

Figure 1. *State Assessment Growth by Prior Performance*
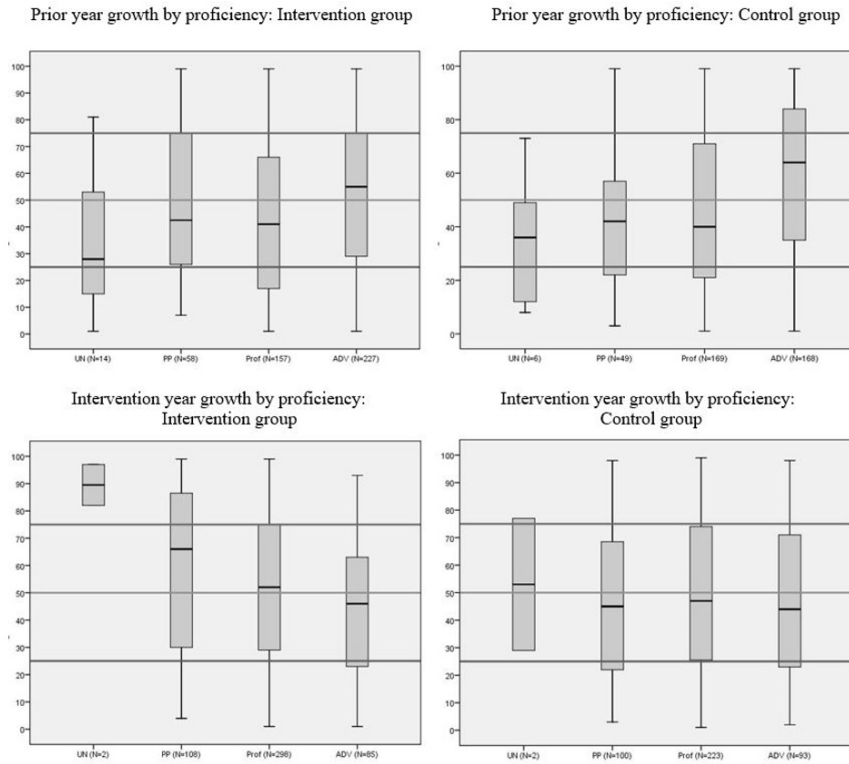
This figure illustrates the growth of intervention and control group students on the state writing test by prior proficiency level in the year prior to the intervention and the intervention year.

Comparing growth on previous test scores with growth on the intervention-year assessment, these charts demonstrate how distributions shifted up for intervention participants compared to the control group. For example, intervention students in the Unsatisfactory group were in the 89th percentile statewide for growth during the intervention year, compared with the 52nd percentile for the same category in the control group. Intervention students in the Partially Proficient group were in the 63rd percentile, compared with the 44th percentile in the control group. Students who began the year in Unsatisfactory and Partially Proficient categories had the greatest growth gains compared to themselves on the previous assessment and compared to the control group on the intervention-year assessment.

Teachers' Professional Learning

The second question around which data were collected was, "What professional development characteristics support instructional shifts to include new literacies in writing instruction?" Findings regarding

instruction are discussed in greater detail elsewhere (Collet, 2017). In sum, teachers moved toward greater levels of use of new literacies practices based on evaluation using the *LoU* protocol (Hall & Hord 2006). Teachers indicated "new doors were opened" and reported using laptops daily in their classrooms. Expansion and Shiftwere themes related to teachers' instruction. Teachers described an expansion of tools at their disposal and felt their use was positively impacting student learning.

They reported that differentiation was easier: They could find leveled texts more easily, offer support tools, include activities that were open-ended and offered multiple approaches, and easily modify formats and tasks. "I was able to have students working on different levels and different projects at the same time," reported one teacher. Another said, "I've been able to use different tech applications for students with specific needs and to address multiple intelligences."

Teachers reported that students used music, visual media, and linguistic and interpersonal skills as part of their learning and they shared projects that included these features. During PD experiences, teachers shared samples of student work that incorporated these features. Several teachers described how the openness of technology and new literacies enabled students to differentiate for themselves: "How the students themselves interact with technology is differentiated in nature," a teacher explained. Another described experiences with students who had been identified as Moderate Needs as "incredible!" She stated that everything the rest of the class used "could be differentiated with netbook resources." Teachers reported they differentiated more often because of this ease.

Instruction was not only expanded but changed: These shifts incorporated characteristics of new literacies. Instruction shifted in terms of process, product, and distribution. For example, students wrote on blogs about what they were reading and commented on each other's posts. A teacher described how digital affordances are "totally shifting how you're teaching. Rather than just making posters, they're using Glogster and Photo Story." Further, a teacher explained, "I'm finding my own thinking really changing in terms of who my audience is, what the product is I want students to put out." These comments suggest that instruction shifted. Further, as teachers recognized students' skill with using these tools and considered affordances of technology, they began to see themselves as designers and facilitators of learning.

To consider PD characteristics that supported these expansions and shifts in instruction, data were collected through the TET, field notes during PD activities, and interviews with teachers.

Teacher Evaluation Tool

The TET is a researcher-created survey completed teachers that included both Likert-scale and open-ended questions. Questions 6, 9, and 10 of the TET are relevant for investigation of PD practices. Question 6 stated, "The trainings were useful." Likert-scale choices were from 1 (*strongly disagree*) to 4 (*strongly agree*). After the initial semester of training, the

average rating for this question was 3.88. The following year, the average rating was 4.0, indicating all teachers *strongly agreed* that the trainings were useful. The question, "Visiting schools to observe a teacher using digital tools was beneficial," referred to a field trip teachers took together to observe technology in use during writing instruction. All teachers *strongly agreed* this experience was beneficial. On the question regarding training sessions held during the summer, the average rating was 3.53, with 4 being the most frequently occurring rating and no scores below 3. Ratings between 3.53 and 4.0 on all PD-related items on the TET indicate teachers were satisfied with the PD. In addition to this analysis of Likert-scale items, analysis was conducted on TET comments on open-ended questions and other qualitative data.

Additional Findings on PD

Qualitative data from TET, field notes and interviews provided information related to PD practices that supported teachers' inclusion of new literacies. Comments from these data sources related to PD were excerpted and analyzed. Broad themes related to sociocultural learning and expansion of concepts and tools were identified.

Sociocultural Aspects of Teacher Learning. Teachers' comments about PD revealed a theme relating to its social aspects. They described sharing with colleagues, learning from teammates, and dialoging with other teachers as among the most useful parts of the PD. The word "we" occurred frequently, indicating the collaborative nature of teachers' learning. They described "a lot more sharing" and more talking about the tools that were introduced. One teacher commented, "The training and sharing were excellent catalysts for supporting and increasing my understanding of tools and how to apply their use in the classroom." Another said, "I feel the district has done an excellent job in providing a place where people could learn from each other. A safe environment to explore." This comment reflects the importance of the social nature of teachers' PD experience and links to a subtheme: their comfort in learning. A teacher described that during the training,

> We talked about the need to have stronger vocab. We talked about what's available online. Rather than being afraid, I went and looked. The whole approachability of technology – you start thinking, could technology do it better than the old-fashioned way?

This comment illustrates not only the collaborative nature of the work but also the willingness to take risks and try something that had been unfamiliar. Teachers described the training as confidence-building and indicated they were more comfortable venturing into new territory. A teacher explained that she was "a lot more comfortable taking a risk." Another said, "It's made a huge difference in my comfort level and the way I think about teaching."

Professional Learning That Expands Concepts and Tools. As the previous comment illustrates, teachers reported their concepts about instruction changed. One teacher described her shift to thinking more

about multimodality, saying, "I'm starting to see things differently. I'm finding my own thinking really changing." "The training has opened new doors for me," said another. A teacher said, "I understand web tools now so much better. Not only do I 'get it' conceptually, but I have a much better toolkit for technology teaching." These comments suggest the shift included both change in conceptual understanding and expansion of available tools.

Describing this expanded toolkit, a teacher talked about how her knowledge of technology had "exploded." Another teacher said, "I got a lot more excited about the possibilities and different ideas I could try out in my classroom. It just opened me up to different things that were out there that we can access." Another commented, "There are so many tools I didn't know about, and the trainings helped to discover those new tools and use them in the classroom." Teachers described trainings as "profound," "an eye-opener," and as "excellent catalysts for supporting and increasing my understanding of tools and how to apply their use in the classroom."

Having hands-on opportunities with technology during training was important; teachers said "playing with various programs," "hands-on work," "trying different sites," and "practicing with the tools" were among the most useful parts of the training. "I left each and every training with new ideas for authentic use of web tools," a teacher commented. The word "tool" occurred frequently in teachers' comments, implying they saw technology as a useful means of accomplishing the writing task. As indicated by these comments, teachers described classroom observation, the social aspects of their training, and the hands-on approach as important factors in expanding their concepts and tools for new literacies instruction.

Summary of Findings

Findings indicate that students' writing achievement was positively impacted when new literacies were included in their learning experience. Important factors of teachers' PD that seemed to contribute to these shifts included ongoing opportunities for social construction of knowledge, hands-on learning, and observation of the tools and practices in classrooms. Creating a climate during PD that was comfortable and supportive of risk-taking was also conducive to changes in teachers' practice.

Discussion

In this study, I examined changes in students' scores on standardized writing assessments when technology and PD were provided to integrate new literacies. Analyses indicate students whose teachers received sustained training significantly increased their scores on high-stakes assessments, but students whose teachers were minimally trained did not. Results suggest skills appropriated when writing instruction included new literacies perspectives also had salience for writing in more constrained contexts, such as those tested through standardized assessment. In addition, increased scores on standardized writing

assessments were more pronounced for students who had been previously labeled as underachieving. Use of new literacies appears to hold promise as an embedded intervention. These assertions foster conceptualization of new literacies as transmediationaland re-mediational.

New Literacies as Transmediational

Findings suggest that a focus on new literacies positively impacted students' writing achievement. Understandings that students developed about communication when opportunities were expanded through new literacies seemed to support learning the more constrained writing practices assessed on current standardized tests. Theories of transmediation substantiate this hypothesis.

Transmediation of Processes and Skills

Findings suggest that moving across sign systems not only enhanced learners' knowledge of *content*, as suggested by previous research (Curwood & Cowell, 2011; Suhor, 1984; Whiten, 2005), but also expanded understanding of the communicative *process*. Similar to Batchelor's (2018) finding that moving across modes supported students' understanding of the process and product of revision, it appears that students in our study transmediated processes from digital experiences to the conventional writing processes tested. Repertoires of practice that were developed through new literacies were useful in developing writing skill as measured through standardized assessments.

Transmediation Through Shared Features

Two notions may provide some explanation of how new literacies transmediate traditional writing processes. The first is the shared nature of many literate practices across conventional and new literacies. Although some aspects of new literacies are absent in high-stakes testing, methods and modes for contemporary communication do not exclude characteristics valued in high-stakes writing assessments: new literacies include tested characteristics.

For example, both new and conventional literacies call for clear communication of ideas, consideration of audience, and awareness of voice and perspective. Thus, understanding of these characteristics developed through use of new literacies could support students' writing in conventional modes. Theories of transmediation suggest that as learners transform these understandings by mapping them onto another sign system (traditional, print-based forms) their understanding is enhanced. Subtle tensions resulting from differing applications of common characteristics provide the opportunity for new perspectives (Batchelor, 2018).

Transmediation Through Cultural Modeling

A second plausible explanation is the concept of cultural modeling. Theories of cultural modeling postulate that utilizing learners' cultural

resources can support academic learning (Gutierrez et al., 2009; Souto-Manning 2010). Perhaps instruction that includes new literacies capitalizes on communicative resources students have developed through social media and other cultural practices. Practices tried on in social contexts may be incorporated into conventional writing when instruction incorporates new literacies. Students' repertoires of writing practices are, thus, developed across school and nonschool contexts. Findings of this study suggest these affordances of new literacies were particularly valuable for students who had been identified as struggling writers.

New Literacies as Re-Mediational

The finding that instruction including new literacies helped to narrow the achievement gap for students who had previously underperformed on high-stakes assessments is particularly compelling. High-stakes tests cause preoccupation in schools with identifying students in terms of categories because of "consequential agendas for which the labels are made relevant" (McDermott et al, 2006, p. 12). These probabilistic notions view variability as a marker for intervention, which has often meant isolating students from mainstream classroom interactions and delimiting their literacy experiences to focus on isolated skills and rote learning.

This study suggests an alternative: use of new literacies as part of inclusive classroom instruction benefits students who have been identified as underskilled. This finding importunes the question: What are the transmediational affordances of new literacies that have special benefit for students identified as struggling writers? Views of re-mediation have relevance to this inquiry.

Expanded Opportunities

Outcomes of high-stakes assessments suggest that those with low scores need intervention or remediation. In contrast, re-mediation involves a shift in the way mediating devices are used. The activity system is reorganized to expand tools and repertoires of practice (Gutierrez et al., 2009; Souto-Manning, 2010). Instruments and sign systems can be re-mediated, making available the potential for new forms of higher psychological processes (Cole & Griffin, 1983). New literacies offer tools and practices for re-mediation.

Instead of interventions that middle school students might find "irrelevant, dull, and isolating" (Dressman et al., 2005, p. 54) because of their focus on basic skills, students in this study received instruction that emphasized the activity of writing as embedded in communicative purposes. New literacies provided intervention that was a re-mediation – a new kind of activity. The actions of writing were reinterpreted, and learning through the new tools and practices appeared to influence students' skill with forms of writing valued on standardized tests. Importantly, these expanded learning opportunities did not take the stance of locating learning differences in the individual; rather, new ways of learning were provided.

Social Interaction as Re-Mediation

A significant aspect of these activities was their utilization of social affordances of new literacies. Writing was viewed as collaborative, capitalizing on knowledge and repertoires of practice students brought from social experiences. Teachers were encouraged to organize learning so students participated in the social practices of writing in joint activity with others. In these socially mediated interactions, students learned with and from each other.

Perhaps, as in other contextualized approaches to intervention (Englert et al., 1994; Palinscar & Brown, 1984), new literacies support development of writing ability by organizing instruction around apprenticeship in applied settings and employing what students already know. The curriculum is reengineered, so learning is re-mediated not only by the teacher but also by the available tools and social interaction, as called for by Gutierrez et al. (2009). Findings suggest writing instruction that includes new literacies may serve as an intervention provided in situ, with inclusive instruction creating spaces that allow for social construction of knowledge. Such an approach offers an alternative to deficit approaches to remediation, which often exclude students from the academic community through pull-out programs.

Multimodality as Expansive Re-Mediation

As noted by Siegel (2006), affordances of multimodality can support transformations of literate identities. Siegel found that expanding literacy practices to include varied modalities allowed learners, particularly those who had acquired labels of failure, to use the "well-stocked semiotic toolkits" they came to school with, positioning them as meaning-makers (p. 69). Making connections among diverse texts and textual forms supports development for students who struggle with writing as traditionally measured (Segev-Miller, 2007).

In this study, multimodal features of new literacies amplified students' literate repertoires, in contrast to remedial approaches that defaulted to a script of risk and deficiency (Gutierrez et. al, 2009). Re-mediation through tools of new literacies appeared to provide intervention that is expansive rather than restrictive.

Professional Learning That Changes Writing Instruction

In this study, students whose teachers received sustained training significantly increased their scores on high-stakes assessments, but students whose teachers were minimally trained did not. Because teacher PD, and not simply access to technology, seemed to support changes in student achievement, it is valuable to consider characteristics of professional learning that may have supported those changes.

Transmediational and re-mediational benefits of new literacies described here were significant only for students whose teachers were fully trained. In this study, being fully trained meant attending 46 hours of PD that spanned 18 months. Teachers attended full-day trainings, visited

others' classrooms, and participated in short just-in-time trainings, where new tools were introduced as teachers were ready to use them in class.

Students whose teachers had received 6 hours of training did not show significant gains, even though they had the same technology available in their classrooms. This finding highlights the importance of sustained professional learning opportunities to support changes in writing instruction. As noted by Curwood (2014), "Above all, professional learning is a process. It takes time and space. It involves commitment and patience" (p. 33).

Social Context for Professional Learning

In addition to the need for professional learning opportunities that are extensive and sustained over time, this study highlights other PD attributes that may have contributed to expansion and shift in teachers' writing instruction. One characteristic highlighted by the findings is the social context for learning. Dialogue, collaboration, and collegiality were fostered and seemed to create comfortable contexts that encouraged risk-taking, important as teachers ventured into new realms and even tried on new teaching identities. Incorporating new literacies represented a shift from both how they had themselves been taught and how they had taught in the past. Breaking from past practices requires that teachers analyze their teaching practices in light of their prior and current experiences and the needs of their students (Mewborn & Tyminski, 2006).

Conceptual Understanding

For teachers in this study, expansion and shift in writing instruction seemed to be supported by conceptual understanding of new literacies. To stimulate this conceptual understanding, teachers initially read from professional articles that articulated theoretical ideas in teacher-friendly language. Subsequently, characteristics of new literacies were reinforced through frequent reference as these concepts were applied in their own learning experiences. This study reinforces previous findings that conceptual understandings are enhanced when teachers see a clear and coherent relationship between theory and practice (Sedova et al., 2016), and it extends these ideas to the development of understandings regarding new literacies.

Active Professional Learning

Another characteristic of PD provided to teachers was hands-on practice and the opportunity to be learners through a new literacies approach. Teachers experienced a learning environment that was facilitated rather than authoritatively delivered and had opportunities for "active multimodal knowledge making" (Cope et al., 2018, p. 6). Experiencing practices from a learner's perspective provided teachers opportunities for social construction of knowledge, and teachers were asked to reflect on not only *what* they learned during training sessions but also on *how* they learned. PD that is active and requires teachers to learn in ways they will later teach their students acknowledges the contextualized nature of knowledge and supports changes in practice (Darling-Hammond et al.,

2017; Opfer & Pedder, 2011). This study applied these findings to new literacies and implied their benefit for PD focused on these practices.

Concrete Examples

Past research also suggests instructional changes are more likely to occur if alternatives are vivid and concrete (Nesbitt & Ross, 1980). Seeing realistic examples of new practices facilitates conceptual change and supports teachers in taking risks associated with changing their practice (Putman et al, 2009). In this study, teachers visited classrooms that used new literacies early in the PD experience. Seeing these practices in action appears to have opened their minds to new possibilities and made these possibilities seem tenable.

To realize the transmediational and re-mediational potential of new literacies, students need not only technology access, but also teachers equipped with tools and practices to exploit these affordances. Teachers who had experienced sustained, active professional learning in social contexts that developed conceptual understanding and provided concrete examples reported they had expanded tools and pedagogical choices, increased opportunities for differentiation, new expectations for writing processes and products, and a facilitative teaching stance.

Implications

The current study suggests use of new literacies practices as mediators for writing achievement. As called for by the National Council of Teachers of English (2018), English language arts (ELA) teachers can be inclusive of society's ever-changing means of creating and communicating, "without abandoning the kinds of practices and principles that we as English educators have come to value" (para. 2). The study not only documented changes in students' achievement on standardized tests of writing, it also described the PD on which those changes may be predicated, with important implications.

Implications for ELA Classroom Instruction

Because of pressure for students to score well on high-stakes assessments that measure traditional writing practices (Mehta, 2013), teachers may be reticent to incorporate new literacies. To this end, Siegel (2012) called for consideration of how new literacies might be positioned so that teachers and students can tap into their possibilities within a culture of accountability.

This study's findings regarding transmediational and re-mediational qualities of new literacies have important implications for practice. In this study, a focus on new literacies correlated with increased achievement on writing assessments, especially for students who previously scored below proficient, and gains were statistically significant only for teachers who participated in sustained PD with certain characteristics. These findings suggest new literacies might help students acquire the authoritative voice privileged by standardized tests and shrink the achievement gap between proficient and nonproficient students.

Importantly, these practices not only prepare students for standardized tests, they enhance college and career readiness (Pittman, 2010). As such, including new literacies as part of initial teacher training and ongoing PD for literacy educators may have positive outcomes for school systems, teachers, and students.

Implications for ELA Teacher PD

This study also pointed to the futility of spending public dollars to purchase high-cost technology for schools without providing adequate PD for teachers who will support its use. In this study, purchasing technology and then providing training that was limited in duration produced minimal results; extended training produced significant results. Although comprehensive training may be costly and difficult to arrange, purchasing technology and *not* providing such training is a waste of resources. In addition to the need for training to be extensive and sustained, this study suggested other characteristics of effective professional learning about new literacies: providing concrete examples and a social context, including dialogue and collaboration; developing conceptual (not just procedural) understandings; and providing active, hands-on practice.

Implications for Research

Data demonstrate that a minimal level of professional support regarding new literacies did not result in changes in student achievement. Six hours of training did not make a difference; 46 hours did. How much that amount could be reduced while still producing significant results is an area for future research.

Findings suggest that expansive practices of new literacies might escalate engagement and achievement of all students while having *increased impact* on previously low performers. Teachers' comments suggested why this might be the case (increased opportunities for differentiation and engaging students more meaningfully). Future research could help to clarify causes of this variance. It would be negligent, however, to ignore the possibility this study suggests for minimizing the achievement gap while raising the achievement of all students.

Conclusion

This mixed-methods study suggests that teacher PD that encourages instructional use of new literacies has the potential to improve writing achievement for all students while narrowing achievement gaps within inclusive classroom environments. Instruction that prepares students for a broad range of writing experiences in today's world appears to prepare them for writing within the narrowed discourse of proficiency embedded in writing achievement tests. This evidence is important, given the ongoing weight of standardized testing within school accountability systems.

In addition to documenting improvement in students' writing achievement, this study also identifies characteristics of PD on which those changes may be predicated. Teacher educators and PD providers can capitalize on these findings to help teachers design instruction that reflects

literacies prevalent in authentic out-of-school writing. Professional learning opportunities that foster conceptual understandings, include the opportunity to observe in classrooms that are using new literacies, and provide opportunities for hands-on practice and social construction of knowledge appear to support such changes.

Previous research suggests that even once teachers have begun incorporating new literacies instructionally, such practices are abandoned when what teachers see as "the 'real work' of test prep comes around" (McVee et al., 2008, p. 138). Findings of this study suggest such dichotomization is unnecessary and may shore up teachers' resolve to continue with instruction that includes new literacies. Transmediational and re-mediational characteristics of new literacies suggest possibilities for breaking patterns of past practice and opening opportunities for improved instruction.

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Appendix
Sample Training Agendas

Initial Training Agenda

8:00 – 8:15   Welcome & Overview
- Today is not like yesterday, and tomorrow will not be like today. Writing is different – more collaborative, more multi-modal. Describe: New literacies are more participatory, more collaborative, and more distributed, as well as less published, less individuated, and less author-centric. Another important characteristic of new literacies is the absence of gatekeepers: those who prohibit expression until standards of correctness have been mastered.

- YouTube: http://www.youtube.com/watch?v=_A-ZVCjfWf8

- Partner talk, then whole group discussion of who literature practices are changing

8:15 – 8:40   **Guest Teacher 1** shares her use of web-based writing tools
8:40 – 8:53   Debrief
8:53 – 9:00   Break
9:00 – 9:20   **Guest Teacher 2** shares his use of web-based writing tools
9:20 – 9:30   Debrief
9:30 – 10:30   In small groups, read and comment on **articles** about digital writing; break; prepare presentation with your group about your article using digital tools you are comfortable with. Consider the 4 A's protocol: Assumptions, Agree, Argue, Aspire!

10:30 –11:20   Group **presentations** and discussion
11:20 –11:45   **What are *new literacies*? What is *digital writing*?**

Vote 1-4 about examples: 1) post comments on movie   2) create PPT   3) Comment on a text using textual evidence; comment on each other's comments. 5) Draft your writing using a digital audio recording. 6) Find out what others are saying about the novel you are reading. Comment on their comments. 7) Post your writing on a blog.

Digital writing is an emerging genre of literature that incorporates technology to create a richer reading experience.

11:45 –12:45   Lunch
12:45 –2:15   Overview of digital writing tools & short break at appropriate time
2:15 – 2:45   Small group discussions about upcoming writing projects
2:45 – 3:50   Set up class sites in BlackBoard
3:50 – 4:00   Closing and announcements:

Just-In-Time Sample Training Agenda

Opener: It's a Book Video

Discussion Board Posting:
    Quote from Medina
    Posting: Are you in agreement?

Video Clip:
    Can a variety of types of reading happily co-exist?
    Discussion

Read hard-copy:
    Information Technologies Continuum Quote

On SmartBoard:
    Create the continuum
    Any changes needed show that it shows an expanded definition of writing?
    Define the ends of the continuum
    Consider writing as : Fixed and permanent vs. changing and temporary

Whole Group Discussion:
    How do we take advantage of the changing and temporary characteristics of digital text to support our students' writing?

PowerPoint
    Review Pre-writing tools
    Introduce & use tools for drafting

Teacher Presentation on Book Chapter

Playtime/Planning