Exploring Inclusive Middle-school Content Teachers' Training, Perceptions, and Classroom Practice for Writing

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Descriptive and qualitative research was used to explore teacher training, teachers' perceptions, and instructional practice for writing in inclusive middle school science (n = 22) and social studies (n = 27) classrooms. Data sources for the two parallel studies included questionnaires and interviews with 49 participating teachers as well as four observations within each teacher's class during content-area writing instruction, resulting in a total of 196 class observations. Teachers reported during interviews that special education teacher (or paraprofessional) support for students needing small group or individualized instruction and adaptations was essential for enhancing writing for students with disabilities. Teachers' responses during interviews and classroom observations corroborate findings that tools including graphic organizers and guided notes were commonly used and are beneficial for all students in their inclusive content classrooms. Findings suggest a need for increased pre- and in-service teacher training and professional development for how to strategically teach and incorporate additional writing instruction, beyond writing notes and short responses, into science and social studies classroom instruction. This article concludes with considerations for future research, professional development, and teacher preparation to support knowledge development and content-area instruction in written expression.

Keywords: **Teacher training, writing instruction, inclusive education, middle school**

INTRODUCTION

Teachers, researchers, and policy makers have articulated the importance of promoting writing instruction within inclusive content-area middle school classrooms (IES Technical Report, 2017; Troia & Maddox, 2017). To begin with, integrating writing across subject areas has been associated with improved content-area learning, comprehension, and disciplinary reasoning in key concepts within those academic domains (Graham et al., 2020; Graham & Hebert, 2011). Content-area writing activi-

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ties can include engaging activities such as researching and writing reports about historical events or scientific phenomena, or written argumentation based on evidence from text (Ferretti & Lewis, 2013). Second, writing in content-area classrooms can enhance student preparedness for the advanced writing endeavors across all subjects that become commonplace in high school, college, and in the workplace (Graham et al., 2020). Thus, students must acquire the skillset to become proficient writers for a variety of purposes. Finally, the *What Works Clearinghouse Practice Guide* on secondary-level writing suggests that all students will benefit from additional writing practice in all subject and topic areas (Graham et al., 2016). Thus, students can attain skill and performance improvements by having increased opportunities for daily writing.

Students with high-incidence disabilities in middle school face challenges with written expression that can impact their performance with writing in science and social studies. For example, many students with learning disabilities in middle school (Grades 6-8) continue to experience challenges with sentence complexity, spelling, handwriting, and organization of ideas (Mason & Graham, 2008). These developing characteristics of effective writing can influence written production, length, and overall quality (Gillespie & Graham, 2014). Next, the complexity and scope of writing tasks in middle school content-area classrooms can vary broadly, which introduces new challenges. For instance, tasks including notetaking require a specific strategy supported by teachers' modeling (Boyle, 2010), while genre-based writing in these subjects (e.g., persuasive writing) may differ from writing tasks students have become accustomed to, such as story writing. Evidence also suggests that writing performance does not always generalize across genre areas (Olinghouse & Wilson, 2013), making the role of instruction for promoting middle school writing paramount (Mason & Graham, 2008; Mason et al., 2014). The complexities of middle school writing coupled with the needs of students with disabilities (SWD) suggest that exploring teachers' perceptions and teachers' instructional practices could be useful for guiding decisions about professional development needs, teacher preparation, and new intervention development.

Previous Exploratory Research

There is a paucity of exploration research focused on writing instruction within inclusive-middle-school content classrooms. Although they did not focus on SWDS, two studies (Graham et al., 2014; Ray et al., 2016) queried science, social studies, and English Language Arts (ELA) teachers about their writing instruction and provide information on how writing is integrated into content-area classrooms. Teachers in these studies reported assigning short-answer writing tasks as well as taking notes after reading. Teachers in both studies (Graham et al., 2014; Ray et al., 2016) reported the need for increased professional development specific to teaching writing. Drew and colleagues (2017) also surveyed science teachers about their instructional routines and discipline-specific practices. Researchers found that writing adaptations and strategy instruction were infrequently used for students with writing difficulties in science. To our knowledge, only two prior studies (Troia & Graham, 2017; Troia & Maddox, 2017) focused on writing instruction in general education classes for students with learning disabilities (LD) Specifically, Troia and Graham (2017) surveyed teachers about instructional adaptations in writing. Providing additional

time to complete writing assignments was the most common adaptation, but many adaptations (e.g., technology, dictation support) were infrequently used. In a second study, researchers surveyed and convened focus groups with middle school teachers to gather information about how they integrate writing into class lessons (Troia & Maddox, 2017). Consistent with the aforementioned studies, teachers requested more support with integrating writing in their classes. Teachers also cited challenges with addressing individual student writing difficulties (i.e., emerging sentence-writing skills) and having minimal time for integrating writing into content-area lessons (Troia & Maddox, 2017).

To date, no prior studies have explored writing instruction and supports in content-areas for SWDs Therefore, the present investigation extends the aforementioned studies in two ways. First, we provide updated information about content-area writing specific to students receiving special education services. Thus, we collected descriptive and qualitative data to expand the limited research base on content-area writing instruction and supports specifically for SWDs. Second, this study includes data gleaned from classroom observations in science and social studies classrooms, allowing researchers to further contextualize themes from teacher questionnaires and interviews. Thus, the present study may produce considerations for professional development to assist content-area teachers with writing instruction in inclusive settings.

Conceptual Framework

Teacher training for teaching writing and for teaching SWD significantly impacts teacher's perceptions and instructional decisions (Brindle, et al., 2016; Troia & Graham, 2016). Contextualization of instruction across multiple factors – teachers' training, perceptions, and instruction – is critical for understanding how instruction for SWD is supported and implemented in typical practice settings (Klingner et al., 2016). Exploring teacher preparedness through interviews is also important because teacher perceptions can influence student performance and engagement across academic subjects (Aloe et al., 2014; Ross et al., 1996). Thus, data collected from the exploratory descriptive and qualitative data sources in our conceptual framework (see Figure 1) can influence future professional development, teacher preparation coursework, as well as innovative intervention development. In the current exploratory descriptive and qualitative study, we address gaps in knowledge about teachers' writing instruction for SWD in inclusive middle-school science and social studies classrooms by examining data collected through teacher self-reported training information, semi-structured interviews, and classroom observations.

Research questions. The following research questions were used to further explore content-area writing instruction in inclusive classrooms for SWD:

(1) What is the influence of pre-service and in-service training for teaching writing and for teaching SWD on middle school science and social studies teachers' self-reported perceptions?

(2) What is the influence of middle school science and social studies teachers' self-reported preferences for adapting writing instruction and on instructional practices for SWD?

(3) What opportunities and challenges do middle school science and social teachers report related to integrating writing in content areas and adapting instruction for SWD?
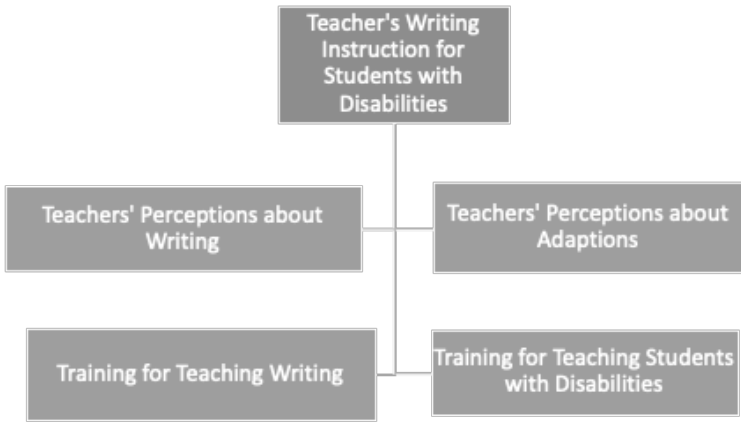

Figure 1. **Conceptual Framework**

METHOD

Measures and analyses focused on the exploration of how science teachers in one state and social studies teachers in another state integrate writing into inclusive content-area instruction. To strengthen credibility, triangulation occurred across three data sources: (a) a written questionnaire, (b) classroom observations, and (c) a one-to-one interview.

Participants

Following university procedures for the protection of human subjects, schools and teachers were recruited and consent obtained. Participants included 22 science teachers from four middle schools in the northeastern region and 27 social studies teachers from seven middle schools in the south-central region of the United States (see Table 1). School demographics indicated a range of 15.8% to 80.4% of students received free and reduced meals (see Table 2). English language learners represented as little as 4.1% of the school population to as much as 44.2% of middle school students. Within the participating middle schools across the two sites, approximately 7.4% to 18.0% of students received special education services. Middle school content-area teachers in the present study provided instruction to SWD within a minimum of one course section. SWD included any student who had an Individual Education Programs (IEPs). Of the participating science ($n = 22$) and social studies ($n = 28$) teachers, the majority were Caucasian (86%) and female (63%). In addition, most teachers had a bachelor's degree as the highest earned degree (61%) with the greatest percentage (33%) having zero to five years teaching experience. One social studies teacher was excluded from the current analysis due to missing data, resulting in $n = 27$ social studies teachers.

Measures and Procedures

Data sources were collected in the following sequence – questionnaire, classroom observations, then interview. First, all teachers completed a Teacher Information Questionnaire. The questionnaire requested demographic information and then asked four open-ended questions for information regarding pre- and in-service training for teaching writing ("Describe any pre-service training you received in writing instruction." "Describe any in-service training you received in writing instruction.") and for teaching SWD ("Describe any pre-service training you received in teaching SWD." "Describe any in-service training you received in teaching SWD."). Two research team members coded the questionnaire for general themes and topics about training that were consistently brought forth by multiple teachers. Interrater agreement estimated as agreements / [agreements + disagreements] was 100% across all questionnaires.

Table 1. *Teacher Demographics.*

Teacher Demographics						
	Social Studies		*Science*		*Total*	
	n	*%*	*n*	*%*	*n*	*%*
Self-identified Ethnicity/ Race						
Caucasian	21	78	21	95.5	42	86
Hispanic	6	22	0	0	6	12
African American	0	0	1	4.5	1	2
Gender						
Female	13	48	18	81.8	31	63
Male	14	52	4	18.2	18	37
Highest degree earned						
Bachelors	23	85	7	31.8	30	61
Masters	4	15	15	68.2	19	39
Years Teaching						
0-5	8	30	8	36.4	16	33
6-10	11	41	1	4.5	12	24
11-15	3	11	3	13.6	6	12
16-20	3	11	3	13.6	6	12
21-25	2	7	5	22.7	7	14
26+	0	0	2	9.1	2	4
Years Teaching Content Area						
0-5	17	63	11	50.0	28	57
6-10	3	11	1	4.5	4	8
11-15	4	15	4	18.2	8	16
16-20	1	4	2	9.1	3	6
21-25	2	7	4	18.2	6	12
Grade						
6	9	33.3	10	45.5	19	39
7	9	33.3	8	36.4	17	35
8	9	33.3	4	18.2	13	27

Teachers' instruction and support for students' science and social studies writing was explored by observing each teacher's classroom using the CT-Scan (Kennedy et al., 2017). This tool was designed to document teacher instructional practices, with the capacity to capture time spent on specific evidence-based responsive practices, the frequency of use of those practices, and descriptive field notes during real-time, live observations. The CT-Scan was customized for the current study to categorize classroom activities into general content instruction, writing-notetaking, writing-written expression, and classroom management. Information regarding evidence-based responsive practices identified in prior research (e.g., Ferretti & Lewis, 2013) as important for supporting content-area writing for students with disabilities as well as adaptations for instruction was collected only when in the two writing categories. The CT-Scan used for the current study can be found at http://www.classroomteachingscan.com/ctscan/?Mason

Table 2. *Demographic Data for Middle Schools by Content-Area*

Demographic Data for Middle Schools by Content-Area				
	Science Schools *n* = 4		Social Schools *n* = 7	
Demographics	Lower Range (%)	Upper Range (%)	Lower Range (%)	Upper Range (%)
Race/Ethnicity				
Asian	5.3%	12.7%	0.3%	1.5%
Black	7.9%	23.1%	0.6%	5.5%
Hispanic	18.3%	65.1%	24.9%	89.2%
White	15.5%	52.5%	8.1%	68.9%
Other[a]			0.8%	4.7%
ELL Status	10.6%	52.9%	6.8%	44.2%
Students with disabilities	11.6%	12.5%	7.4%	18.0%
Free/reduced lunch	15.8%	66.4%	64.2% ***One school less	80.4%

Note. [a] Includes two or more races

Four observations were conducted for each teacher. Descriptive field notes, taken at five-minute intervals throughout each lesson, captured contextual data important for understanding teacher practices in writing. For example, student grouping, models of co-teaching, and support provided by personnel such as paraprofessionals was recorded. In the present analyses, whole class writing adaptations were documented within each observation. Five adaptations selected based on findings from previous survey research (e.g., Graham et al., 2014), were coded as a presence (coded as 1) or absence (coded as 0) when used within an observed lesson. The five adaptations included use of the following: (a) graphic organizers, (b) guided notes, (c) visual mediated instruction, (d) defining objectives, and (e) rubrics. Observations of each adaptation were summarized as the percent of teachers who used a given adaptation across any of the observed lessons. To establish reliability on the CT-Scan, a second observer coded 20% of all observations. Inter-observer agreement averaged .93 across all double-coded lessons.

After all observations were completed, a 30-minute semi-structured individual interview was conducted with teachers. Eleven open-ended questions (see Appendix A) were used to elicit verbal responses. Interview questions were developed based on themes noted from the observational data and field notes. The interview questions sought to obtain information about general educations teachers' instructional preferences, including adaptations for instruction, when teaching SWD in middle grade science and social studies classrooms. Specifically, interview questions encouraged participants to elaborate on topics and issues related to writing and related to adapting instruction for SWD. Interviews were transcribed and de-identified by three doctoral students. Two scorers separately identified themes in each interview (e.g., adaptations such as graphic organizers to support writing). The themes were compiled into separate Excel documents. The scorers worked individually to track the frequency of reoccurring themes with each interview. The frequency of themes was established and compiled. Scorers checked the frequency of each theme with each blinded interview. Interrater agreement averaged 96.5% across the semi-structured interviews. Discrepancies were discussed and agreed upon. To establish the validity of assertions, quotes from teachers were compiled for each theme.

Analysis

Descriptive statistics (i.e., percentage of use by teachers) were calculated to summarize quantitative data on the use of instructional adaptations collected from classroom observations. For the qualitative analysis, a coding system was developed by noting and recording words and phrases in the responses and observations that represent recurring topics and patterns (Bogdan & Biklen, 2006). Codes were used to segment data into simpler, general categories, and to expand and tease out data for interpretation (Coffey & Atkinson, 1996). Validity and reliability of analysis was established by ensuring the credibility of data collection and interpretation (Brantlinger et al., 2005). To strengthen credibility, triangulation occurred across all data sources and investigators and research staff with multiple perspectives. Conclusions, concurred by multiple researchers, were supported by sufficient participant information and demonstrated through quotations in transcriptions.

RESULTS

Our research findings explore the influence of pre-service and in-service training for teachers when teaching writing and when teaching SWD. We also explored teachers' perceptions regarding opportunities and challenges related to integrating writing in content areas and adapting instruction for SWD. Results underscoring the major findings for each research question across each of our three data sets (i.e., questionnaires, observations, interviews) are described in the following sections - influence of pre-service and in-service training, instructional adaptations, instructional practices, and opportunities and challenges.

Of the 49 teachers, 19 taught sixth grade, 17 taught seventh grade, and 13 taught eighth grade (see Table 1 for teacher demographics). Questionnaire results for training in writing instruction and for training in teaching students with SWD are reported for science and social studies teachers in Figure 2. All 49 teachers also completed the interview; results are reported as within the themes related to opportunities and challenges in writing instruction and providing adaptations (see Figures 3 and 4). Each teacher's class was observed four times for a total of 196 observations across the 49 teachers. Observed percent of adaptations are reported in Figure 5.
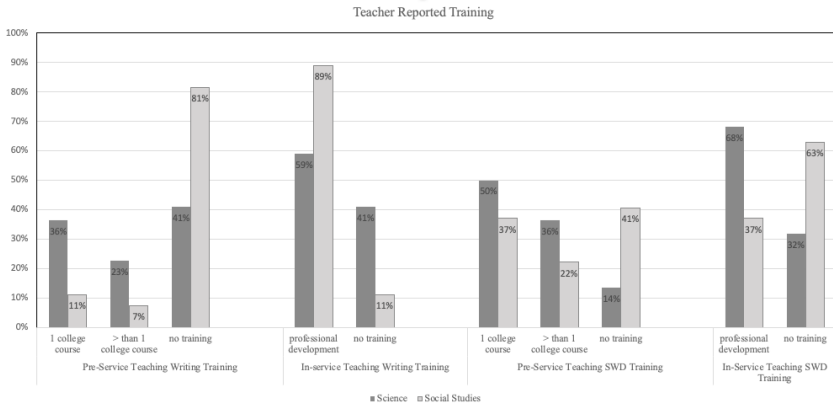

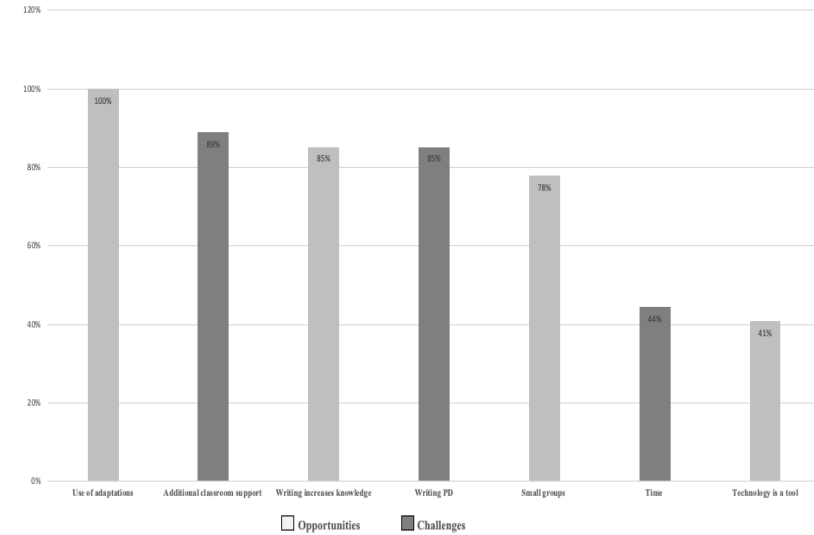*Figure 2.* **Teacher Questionnaire: Training**
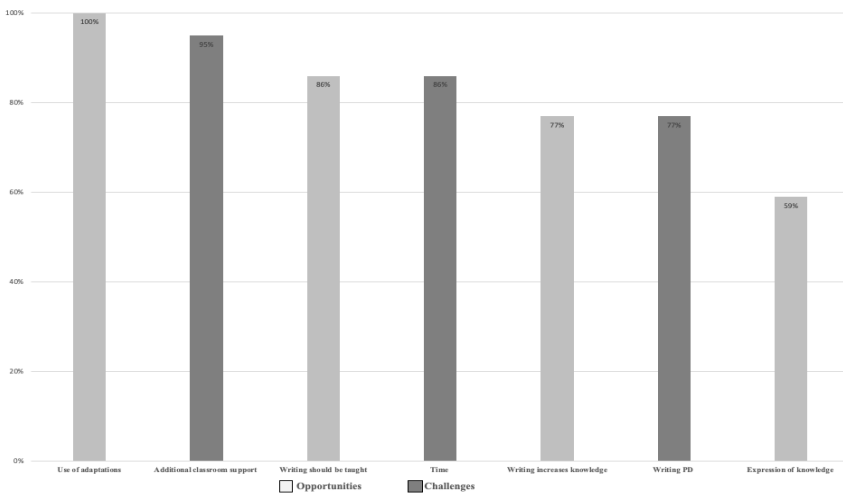
Figure 3. **Teacher Interviews: Science Themes**

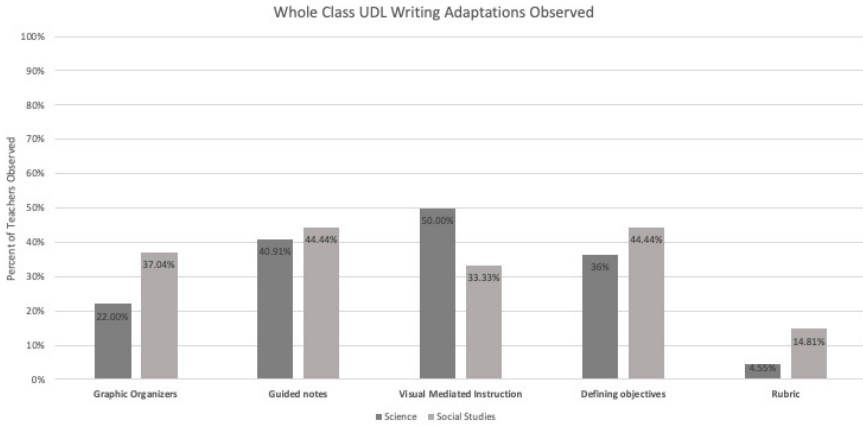*Figure 4.* **Teacher Interviews: Social Studies Themes**

Figure 5. **Observations: Whole Class Writing Adaptions**

Influence of Pre-service and In-service Training

We first explored the influence of pre-service and in-service training for teaching writing and teaching SWD on teachers' perceptions. The questionnaire results indicated that 41% of science and 81% of social studies teachers reported receiving "no preservice training" to support writing in their content area. One science teacher recalled, "I don't remember any programs that trained me how to teach kids to write. I had classes in the English department that taught me how to write." Teachers (41% science; 11% social studies) reported receiving training after they began teaching, for example a social studies teacher noted, "yes, bits and pieces in staff meeting". Substantiating findings from the questionnaire, teachers stated a need for training in teaching writing (77% science, 85% social studies). When asked about training, one social studies teacher noted, "It's kind of hit and miss…".

The second question asked teachers to report information about training received to specifically support SWD. Teachers (14% science; 41% social studies) reported completing at least one pre-service college course that focused on SWD. A science teacher recalled, "It was a while ago, but I remember it focusing on just what the disabilities are, not necessarily how to teach students who have them." When noting taking a college course, social studies teachers reported needing at least one class for state certification. Thirty-two percent of science and 63% of social studies teachers reported no in-service training focused on SWD. Two social studies teachers noted in-service training focused on co-teaching. Interestingly, the need for additional training for working with SWD did not emerge as a prevalent theme during the interviews. When asked about supporting students' needs, many teachers noted a reliance on the expertise of special education personnel, "…that training that the special ed teachers has is really, really important. They bring that in and share it with me."

Adapting Instruction

Observed adaptations were recorded as those used for the whole classroom and those used for individual students. For whole group instruction all teachers used

adaptations such as graphic organizers (22% science; 37.04% social studies), guided notes (40.91% science; 44.44% social studies); visually mediated instruction (50% science; 33.33% social studies), defining objectives (36% science; 44.44% social studies), rubrics (4.55% science; 14.81% social studies) to support writing (see Figure 5). In addition, observations indicated that small group instruction was used by all teachers. In science, when supporting individual students, three teachers used enhanced visually mediated instruction (e.g., enlarged text, live translation), two used voice application systems (e.g., microphones), one allowed their students to write in their native language, and 18 provided one-on-one student support. In social studies, three teachers used one-on-one student support, no other individualized adaptation was recorded during the observations.

All teachers (100%) reported using adaptations as an opportunity to improve learning for all students in their classrooms. A science teacher noted, "It started out as SPED kids. But I've learned through the years that, 'Hey, why not apply it to everybody?' Because you're also, while you're trying to teach them writing, you're trying to teach your content." All teachers also noted that small group instruction provided with special education support was important. One social studies teacher highlighted the benefits of small group instruction, "…she would take the small group, and she would model things, where there would be three or four kids, maybe five at her back table. …that was always really great for them…to help them just get started using those sentence stems." Interestingly one science teacher reflected on changes in teacher preparation and certification, "…sometimes that's hard for me to break it down to the level that the kid needs it to compared to some of the college students that are coming out now that are dually certified with regular ed and special ed, which has been the push since was the early, 2000s."

Instructional Practices

Observers and teachers coordinated observations to ensure a writing activity would be included in the day's activities. Of the 135.72 hours of instruction observed, 60.27% of total hours in science and 71.98% of total hours in social studies included writing. Observations of time specifically devoted to writing resulted in both short writing assignments (28% science, 32% social studies) and notetaking activities (72% science, 68% social studies). Observed short writing assignments included activities such as summaries and responses to questions. Only nine teachers in science and two teachers in social studies used extended multi-day writing activities. For notetaking, teachers would ask students to take notes about a picture or write notes on a handout or worksheet. Interview questions did not focus on specific instructional practices, however, one science teacher highlighted the paradox of including writing as a classroom practice, "I will say that I have I implemented more writing this year partly because you came into my room and once I started it, I've kind of got excited about it because I did see some of the deficits and misunderstandings of the concepts I was teaching and I had no idea because kids could answer a question."

Opportunities and Challenges

As noted previously, all teachers report adaptations as an opportunity to support all student learning. Seventy-seven percent of science teachers and 85% of

social studies teachers noted that writing supports content learning as an opportunity to improve students' knowledge of content. As noted by one science teacher, "Yes, I do think it helps students with disabilities specifically. It helps all students, but students with disabilities, like I said before it forces them to process the information in their mind." Social studies teachers also noted, specifically, that writing should be taught (86%) and that writing provides students an avenue for expression (59%). Forty-one percent of science teachers noted the use of technology as an opportunity to support students' writing.

The challenge in meeting all students' needs and the need for additional classroom support was a strong theme in both content areas (89% science; 95% social studies). One social studies teacher noted, "…they gave me an aide this year, which is great because I had a high number of kids with special needs. You know, I think just being the only person in there and trying to meet, everybody's needs that's always my biggest challenge." Both science and social studies teachers focused on the benefits/opportunity of having additional support from a special education teacher or assistant - "I could not do it without my…or I could but it would be very, very hard". Another science teacher noted, "…I don't always have that training as a regular ed teacher, whereas a special ed teacher might have more insight." However, not all teachers defaulted to a reliance on special education support. One social studies teacher noted, "I mean they're my students, I feel accountable to them. I want to take care of them I want to give them as much as I can. And so that's why I'm saying, please, if I can get any training, I'll take it because, I'm here to help."

Eighty-six percent of science teachers and to a less degree, 44% of social studies teachers noted the challenges in integrating writing instruction - more time for writing was needed given the large amount of content to be covered, for example, "Time. Time. Time. And did I mention time?" (science teacher) and "…it's a lot of work that people might not have time for, people might not have the bandwidth for" (social studies teacher).

DISCUSSION

This exploratory study was designed to increase understanding about the writing instruction that students with disabilities (including LD) receive in middle school science and social studies classrooms. Specifically, we examined (a) how pre and/or in-service training and professional development influenced teachers' perceptions about their writing instruction, (b) the adaptations for SWDs that teachers use for writing instruction in these inclusive content-area classrooms, and (c) what opportunities and challenges are reported relating to the integration of writing for SWDs in science and social studies. Data to answer these questions was collected via descriptive (classroom observations) and qualitative (e.g., teacher interviews) sources.

General Findings and Implications

Few previous studies have examined content-area writing instruction at the middle school level (e.g., Ray et al., 2016). The central findings from the present study (drawn from observational and qualitative data) corroborate themes from other pre-

vious studies of content-area writing instruction in three ways. First, teachers sampled for the present study reported receiving minimal or no pre- or in-service training that focused on writing instruction for students receiving special education services. Second, teachers who were queried affirmed the belief that writing can enhance learning in content classes and indicated they seek additional tools and resources for teaching writing. Further, most writing tasks reported and observed were predominantly brief and limited in scope (e.g., short answer questions). Our findings are consistent with results reported from previous studies focused on writing instruction for students with LD (Troia & Graham, 2017; Troia & Maddox, 2017) and students in general education (Graham et al., 2014; Ray et al., 2016). In summary, typical content-area instruction tends to incorporate minimal writing instruction, and teachers generally believe that increased instructional support is needed for integrating writing into content instruction.

An important consideration of our findings is how the limited scope of teacher preparation for teaching writing to SWDs described by the science and social studies teachers may have potentially played a role in their perceptions and practices. Although we did not investigate the context of previous writing training, it is possible that state certification/licensure influenced the amount and type of pre-service training received. The teachers in the present study were in different parts of the USA. As such, state certification/licensure requirements may have contributed to less training for science teachers. Interestingly, teachers described that district administrators emphasized the need for more content-area writing, but the actual training they received was limited to only a few strategies. Some teachers indicated training in this area was non-existent. In addition to teacher training requirements, student instructional standards for writing in content areas may also vary across states. Still, only 22% of all teachers observed used extended writing across multiple days. Therefore, despite differences in science and social studies, the lack of pre-service and in-service training for teaching writing, may explain why teachers in both content areas limited writing to notetaking or short written tasks.

The present study also explored if teachers believe that writing is important in science and social studies classrooms. Regardless of training, a majority science and social studies teachers queried (<77%) noted the importance of writing in supporting students' learning (e.g., "…writing is typically a way that students who maybe have not thrived…really express what they know"). Although writing was viewed as an opportunity for enhancing content learning, teachers reported challenges in integrating writing into classroom instruction because of limited time due to content instructional constraints. Overall, the teachers' held perceptions that writing is important, yet over 75% of teachers reported a need for additional training in writing instruction. This finding is consistent with prior research underscoring a need for increased professional development focused on how to provide effective writing instruction (Graham et al., 2014; Ray et al., 2016). Thus, district-level professional development providers, pre-service teaching programs, and researchers should opportunities to collaborate in the near future to address this issue.

In addition to teacher perceptions about writing, we also explored content-area middle school teachers' use of adaptations to support SWDs when writing.

Teachers' self-reported information on the questionnaire and interview corroborate prior survey research findings (Drew et al., 2017; Graham et al., 2014; Ray et al., 2016) suggesting that adaptations are commonly integrated into whole class instruction, but less likely to be utilized with individual SWDs. This finding suggests that teachers may benefit from professional development that includes guidance on how to differentiate instruction in general education. Another notable finding from the present study was the universal use of and teacher acknowledgement of the importance of four out of five key writing adaptations (graphic organizers, guided notes, visually mediated instruction, defining objectives). All teachers noted the benefit of adaptions for all learners (e.g., "…we really use them for all students. We'll make pretty much every accommodation available that we possibly can to everybody."). Teachers did affirm in interviews, and corroborated in field notes, that small-group instruction is applied and perceived as beneficial for students. This finding is encouraging because it demonstrates teachers do identify the need for scaffolded supports for SWDs and recognize the benefits of smaller instructional groupings. This conclusion aligns with effective writing instruction for students with writing difficulties and LD (e.g., Mason & Graham, 2008).

A potentially contrasting finding was how our observations revealed scant use of writing scoring rubrics, and these tools were not mentioned during teacher interviews. It is unclear if the lack of professional development contributed to why teachers did not use the rubrics, or that we simply missed the days that rubrics were used. In addition, we did not explicitly ask about rubrics in our interviews. This finding could lead to the need for more training in assessment and evaluation of student writing within content areas; however, additional research is needed to substantiate this claim.

Finally, observations indicated that 21 teachers provided one-to-one SWD support; however, additional specialized adaptations for individual SWD were minimal. Collectively, teachers expressed a need for additional classroom support rather than time devoted to additional training, "The other problem is that I'm not a team-taught class and middle school science is not team taught at all. So, I don't have any extra special ed assistance in my classroom. It's just me." This finding suggests that in addition to the need for more professional development in writing, general education content-area teachers also need more opportunities to collaborate with special education teachers who possess the expertise to support SWDs. Having a special education teacher who is trained to adapt and modify instruction present to support general education instruction may create contexts for teachers to learn from each other and incidentally learn new strategies for individualizing instruction.

Limitations and Implications for Future Research

We recognize that there are limitations to conducting two parallel investigations in two regions of the United States in different content areas. Generalizing findings to other regions in the country or to other countries should be made with caution as more research is needed to explore regional differences in teacher-reported factors and instruction. Generalization is especially problematic when evaluating teacher pre-service training for teaching SWD and for teaching writing in content classes which can vary across states and colleges/universities due to teacher certifica-

tion/licensure requirements and due to differences in state content standards. Future research should include more information regarding the context of in-service training, for example, state licensure and certification requirements.

Teacher self-report data is also limited when trustworthiness has not been established (Bratlinger et al., 2005). Our findings would have been strengthened with techniques such as member checking to substantiate the claims made in the questionnaires and during the interviews. However, the triangulation of data with observations supported what teachers reported. In analyzing data, no discrepancy was found for what teachers wrote on the questionnaire, stated in the interview, or for what was observed. Future research should consider additional methods to support methodological rigor.

Implications for Practice

In line with prior survey research (e.g., Drew et al., 2017; Graham et al., 2014; Ray et al., 2016), and what is known about the impact of writing on knowledge acquisition (Graham et al., 2020; Graham & Hebert, 2011), results from our questionnaires, interviews, and observations underscore the need for more school-based (including university-level partnerships) professional development for content-area teachers for teaching writing and for supporting SWD. The science and social studies teachers in our study noted the importance of writing, especially for SWD. However, these same teachers noted lacking the expertise and time to integrate writing within content instruction. These findings have implications for how writing could be better integrated into content-area student standards to ensure instruction prioritizes cross-curricular writing instruction. They also underscore a dire need for more professional development in how writing can be effectively integrated into content-area instruction.

Both science and social studies teachers noted a reliance on special education expertise for supporting SWD during writing activities. This reliance is problematic as additional support is not always available. Therefore, it is critical that science and social studies teachers are provided pre-service and in-service training on how to support SWDs with developing the skills needed to become proficient writers in their classrooms. Attention to this area of professional development is critical to ensure students receive the necessary preparation and supports for post-secondary success and writing in the workforce.

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APPENDIX A

INTERVIEW QUESTIONS

Q1: Please share your thoughts about the role that writing does, or does not play, within middle school science (or social studies) classrooms.

Q2: What instruction or adaptations do students require to be successful at reaching these outcomes?

Q3: Do you think that writing helps students with disabilities to better understand the concepts that you teach?

Q4: Do you have an example of when writing has enhanced students' ability to learn in your classroom?

Q5: Broadly. What are the challenges to incorporating writing instruction within science?

Q6: Are there specific teaching strategies, instructional tools, or adaptations that teachers can use to support writing? Can you provide an example? Are these strategies and tools that you use for everyone in the classroom, or just for students with disabilities?

Q7: Please describe any of your previous training or professional development that has focused on writing in science. What specific types of training would be helpful to you for integrating writing and science?

Q8: Discuss the extent to which you think that science teachers should or should not be expected to teach or assist students with disabilities to improve their writing skills.

Q9: What are some of the specific challenges for promoting writing instruction in your classroom for students with disabilities? Are there any special adaptations that you used to help overcome these challenges?

Q10: Discuss how a special education teacher pushing into your classroom supports writing for students with disabilities. How might a special education teacher come into your classroom, be able to assist with supporting writing for students with disabilities?

Q11: Is there anything different that you might do next year with your special education co teacher for writing and social studies? What instruction or adaptations do students require to be successful at reaching these outcomes.