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Secondary Teachers' Adolescent Literacy Efficacy and Professional Learning Considerations

Rachelle S. Savitz
Associate Professor of Literacy Studies, East Carolina University, Greenville, North Carolina, USA

Jennifer D. Morrison
Sam Houston State University, Hunstville, Texas, USA

Christy Brown
Clemson University, Clemson, South Carolina, USA

Charlene Aldrich
College of Charleston, Charleston, South Carolina, USA

Britnie D. Kane
The Citadel, Charleston, South Carolina, USA

W. Ian O'Byrne
College of Charleston, Charleston, South Carolina, USA

ABSTRACT

School requests for professional learning on adolescent literacy often stem from low or stagnant reading scores on state standardized assessments and legislative policies that require educators to complete literacy coursework. These decisions are often made without teachers' voices, requiring teachers to take coursework they may not need or learn in ways that may not align with their content. To address this issue, we used our researcher-created and validated survey to ask middle and high school teachers about their self-efficacy toward adolescent literacy based on various professional characteristics, such as years of experience, teaching grade levels, content area, and taking the state-required literacy courses. Findings note that certain disciplines are more efficacious toward specific literacy practices, and taking state-required literacy courses is insignificant. Our implications are written for literacy scholars and teacher educators to revisit the premise and promise of the 2017 ILA Standards for K-12 literacy professionals, emphasizing the importance of being cognizant of our strengths and highlighting the need for collaborating and learning with and from teachers of all disciplines.

Introduction

As literacy scholars and teacher educators, we support middle and high school teachers' ability to incorporate literacy within their instruction. School requests for professional learning on adolescent literacy often stem from low or stagnant reading scores on state-standardized assessments and legislative policies that require educators to complete coursework and professional learning connected to adolescent literacy (International Literacy Association and National Council of Teachers of English [ILA & NCTE], 2017). State departments of education or school administrations often decide on literacy learning objectives without considering teachers' pre-existing expertise, viewing teachers as having little to no knowledge about adolescent literacy and equating low reading scores with this perceived lack of literacy knowledge. With so many teachers now required to learn about and incorporate adolescent literacy within instruction, our task as teacher educators is often to instruct "all things literacy" in one or two courses or a few professional learning opportunities (ILA, 2017). While we know this is not enough time or opportunity to meet such needs, we must be intentional and learn what teachers actually need before and during these learning moments. Teachers have extensive expertise based on their experiences and prior learning. Therefore, teachers' voices and input are essential to co-developing professional learning with an understanding that everyone holds important and pertinent knowledge and everyone is learning with and from one another.

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Therefore, we conducted a study to gather [State] teachers' perceptions of their efficacy across adolescent literacy practices using a survey instrument with several subscales created by our research team (O'Byrne et al., 2020). We first investigated adolescent literacy subscale composite mean scores across the respondents and then by teacher demographics, such as the subject area they taught or their having taken the state-required literacy course (SLC). With this in mind, our purpose was twofold: to explore teachers' expertise and efficacy of adolescent literacy in our state, viewing their knowledge through an asset-based lens as opposed to a deficit one, and to extend previous research on moving beyond a one-size-fits-all professional learning framework (e.g., Bean & Ippolito, 2016; Ippolito et al., 2019; Main & Pendergast, 2017).

Even though Tschannen-Moran and Johnson (2011) found demographic variables to be weak predictors of teachers' self-efficacy, we explored our data this way because we intended not to determine why teachers identified as efficacious but more so to explore certain assumptions posited by school districts and state legislation. For example, the legislation requiring only one or two adolescent literacy courses assumes that teachers who take the SLCs perceive themselves as efficacious in implementing adolescent literacy, even though the instructors of these courses have highly variable levels of expertise—from reading-certified, literacy-trained individuals to those without the necessary knowledge and experience but who have been approved by the state as providers for these courses. Similarly, based on our experiences, we wanted to explore an assumption often told to us by school administrators that English language arts (ELA) and social studies (SS) teachers are more efficacious than other content area teachers because, traditionally, humanities content tends to be more focused on reading and writing skill attainment (Graham et al., 2014). Finally, because of the state's emphasis on testing across grade levels and assessment being part of all state-required coursework, we explored teachers' efficacy for assessment.

While our research aims to extend beyond the survey to inform policy and practices and then potentially establish communities of practice, we want to clarify why we chose self-efficacy to frame our survey items. Extensive research shows how teachers with high self-efficacy are more likely to seek out and try new instructional methods, try harder to provide ongoing support for all students' achievement even when some struggle, and strengthen students' sense of efficacy (Bandura, 1997; Hodges et al., 2019; Zee & Koomen, 2016). Previous research also emphasizes a positive correlation between a teacher's literacy pedagogical content knowledge and self-efficacy for literacy instruction (Coelho, 2020; Leader-Janseen & Rankin-Erickson, 2013) and a positive association between teachers' self-efficacy and the quality of instruction they provide for student achievement (Cantrell et al., 2013; Graham et al., 2001; Timperley & Phillips, 2003; Tschannen-Moran & Johnson, 2011; Varghese et al., 2016). We also know that if teachers are provided intensive, application-based professional learning specific to their needs, their efficacy increases (Dismuke, 2015; Rogers-Haverback & Mee, 2015; Tracy et al., 2014). Therefore, if schools want to increase teachers' knowledge and efficacy in adolescent literacy, teachers' self-efficacy must be assessed *before* determining the contents of professional learning. As such, the following research questions (RQs) guided our study:

RQ1: What components of adolescent literacy do [State] middle and high school teachers feel efficacious?

RQ2: How does teacher self-efficacy in adolescent literacy instruction vary by teacher demographics?

By answering these questions, we aim to identify what this means for literacy-scholar-developed professional learning and the potential use of communities of practice.

We want to acknowledge our positionality as literacy scholars and teacher educators and that our backgrounds impact our insight into the texts, practices, and contexts in different content areas. Our research team includes members with expertise in intersecting disciplines that connect with literacy. Even though most of us have taught *content area reading and writing* courses or *disciplinary literacy* courses, we do not assume that we are experts or have insider knowledge about all the content, skills, and dispositions required in these varied contexts.

Professional Learning

Although our survey explored teachers' self-efficacy in adolescent literacy, this study aimed to inform professional learning practices and policies. We believe teacher learning is deeply rooted in pedagogical beliefs and experiences and aligns with teachers' needs and contexts. Aligning with other research (Lee et al., 2021; O'Brien & Ortmann, 2017; Zenkov et al., 2016), we view our content area colleagues as knowledgeable about what literacy "looks like" in their content, and we believe professional learning should be co-constructed together rather than literacy leaders serving as sages on a stage. Therefore, we situate our research within a body of work connected to the professional learning of adults and educators: professional learning, andragogy, and communities of practice.

Pertinent to this study are our experiences where professional learning often occurs in silos, and the necessary time and resources are not provided by their school to learn and grow with others through collaborative learning

(Di Domenico et al., 2018; Dobbs et al., 2016) based on teachers' unique needs (Main & Pendergast, 2017). This type of professional learning is often predetermined and unresponsive, instead of empowering or building teacher agency in their learning (Robertson et al., 2020).

Luckily, our field has identified numerous necessary characteristics for high-quality and intentional professional learning. For instance, Desimone's (2009) meta-analysis highlighted effective professional learning characteristics—things that are needed to support teacher learning—including relevant content, active learning approaches, coherence with teacher knowledge and beliefs, sufficient duration for pedagogical and intellectual change, and collective participation for supportive ongoing discourse. Similarly, Darling-Hammond et al. (2017) identified that effective professional development is content-focused, incorporates active learning, supports collaboration, uses models of effective practice, provides coaching and expert support, offers feedback and reflection, and is ongoing. Research also showcases the strengths of building partnership literacies through school–university partnerships (e.g., Lee et al., 2021; Zenkov et al., 2016). Such professional learning is ongoing, need-based, job-embedded, content-driven, and collaborative, which Learning Forward (2015) identifies as the hallmarks of effective professional learning in general and within literacy scholarship (e.g., Kerns et al., 2018). This understanding is the *reason* behind our study—we want to gather teachers' perspectives on implementing adolescent literacy *before* engaging in professional learning.

Framing professional learning as collaborative and more than superficial knowledge acquisition leads to the creation of a learning community where people interact with one another and share their experiences and expertise in social contexts (Robertson et al., 2020). As Knowles (1984, 1989) has pointed out, adults require professional learning that acknowledges their lived experiences; recognizes their multitude of knowledge, motivations, interests, needs, skills, and goals; orients them to learning and motivation; and allows them to connect with others. Therefore, Lave and Wenger's (1991) communities of practice framework is compatible with our study because it posits that collaborative members are equal collaborators within their professional community, and learning is situated by sharing a passion or desire to learn something new together (Wenger, 2004). Communities of practice support teachers through challenging situations and strengthen teacher empowerment (Fisher et al., 2020; Gonçalves et al., 2022; Tannehill & MacPhail, 2017). Knowledge and experience are negotiated and renegotiated to form new meanings based on community contributions, exchanges, and dialogue (Lave & Wenger, 1991) to solve mutual problems (Timperley et al., 2020). By doing so, community members negotiate their identity as individual learners and community members (Wenger, 2010).

An essential aspect of a community of practice is the need for reflective and ongoing dialogue (Brock et al., 2021; Dobbs et al., 2016), where all community members presume some sense of vulnerability to learn with and from others (Kelly & Cherkowski, 2017). A back-and-forth is necessary so that community members do not feel isolated or dependent on others telling them what to do. Traditionally, communities of practice view one group of people as the legitimate peripheral participant(s) that learn through membership in the community: newcomers apprenticing and learning from more knowledgeable members (Eshcar-Netz & Vedder-Weiss, 2021), where those being apprenticed undergo identity transformation and slowly engage fully in their learning (Wenger, 2010). We envision each member being a legitimate peripheral participant based on their expertise.

Notably, research on communities of practices identifies problems with the framework, such as insufficient investment in the process and resistance to change from individual members (Di Domenico et al., 2018; Fisher et al., 2020). These challenges may occur based on the belief that only one expert is in the room. At face value, viewing the literacy person within this community as the expert based on their background, experiences, and educational learning makes sense. However, if teaching adolescent literacy practices across content areas and contexts is the goal, this assumption needs to include the expertise of *all* community members to form a multimember community of practice (Wenger, 2010). Ultimately, all teachers must feel a sense of belonging and empowerment as individuals and community members (Tannehill & MacPhail, 2017), which means understanding and valuing the expertise of all. Therefore, professional learning on adolescent literacy requires learning when teachers feel efficacious, so that professional learning aligns with these best practices of adult learning and connects to the International Literacy Standards for literacy specialists. Literacy scholars and specialists may need to question what we know about literacy across the content areas and how we position ourselves in these settings, potentially reimagining how we lead through collaborative expertise.

Adolescent Literacy

The following section provides a brief history of the development of adolescent literacy constructs discussed in depth in previous adolescent literacy research, with some constructs only recently being discussed in literacy literature. The constructs we discuss highlight how we understand adolescent literacy and what framed our survey subscales. We believe that each construct discussed is

integral to teaching adolescent literacy; therefore, we believe it is crucial to understand teachers' efficacy for each to understand the vast expertise of teachers.

Literacy Stances in Middle and High School Classrooms

Research emphasizes that an essential component of effective adolescent literacy is a teacher's ability to discern, understand, and then explicitly embed certain literacy practices within all classrooms (Lent & Voigt, 2019; Spires et al., 2020), such as teaching terminology, ensuring student comprehension, and crafting writing practices (Collins et al., 2018). We view adolescent literacy as the "big picture," where there is a blend of content-area and disciplinary literacy (ILA, 2018). Content area literacy prompts teachers to embed and integrate specific literacy-related skills (e.g., prediction or summarization) to support comprehension in their classrooms. As a result, standardized reading and writing approaches have been incorporated across all secondary classrooms, including within music, physical education, and visual arts courses (Bryk et al., 2015; Ravitch, 2020).

Meanwhile, disciplinary literacy prompts teachers to see literacy as a tool to support reading, writing, and processing, as well as comprehension, communication, and production within each discipline. This way, students (and teachers) explore and understand the values, dispositions, habits of mind, and practices that guide the selection of the literacy strategies that students should use to make sense of discipline-specific text and engage within the process of that particular field (Kane et al., 2021; Goldman et al., 2016; Savitz et al., 2021).

The focus of this research moves away from which stance is prioritized and instead toward understanding what teachers need to know to support their adolescent learners in their classrooms. Fortunately, numerous literacy scholars have explicitly explored and identified adolescent literacy practices and what is deemed effective (or not).

Constructs of Adolescent Literacy Practices Within Middle and High Schools

In 2008, Kamil et al. published foundational work examining successful reading programs, which was then followed by several other meta-analytical studies. These meta-analyses have proposed the following recommendations for improving literacy for adolescents, thereby necessitating teacher knowledge in these areas: (1) explicit vocabulary instruction; (2) direct instruction of comprehension strategies; (3) extended discussion and interpretation of text; (4) increased student motivation and engagement; (5) intensive individualized interventions based on quality assessment for "struggling" readers[1] (Kamil et al., 2008); (6) ongoing, meaningful feedback on students' reading progress; (7) cooperative learning; (8) explicit writing instruction to boost reading skills (Herrera et al., 2018); (9) use and navigation of technology; and (10) utilization of critical literacy, disciplinary literacy, and multicultural pedagogies (Baye et al., 2016). Baye et al. (2016) sought to contextualize their analysis within several current issues affecting secondary reading and reading instruction, including Common Core State Standards; shifts in student diversity and their subsequent funds of knowledge; and an increased focus on civic engagement, multimodalities, and multifaceted ways "that students can engage with their world" (p. 134).

Over time, scholars have advocated for additional components to the definition of adolescent literacy. Graham et al. (2018) argue that effective literacy programs must expand beyond just reading instruction and instead focus on a balance of reading and writing; they also emphasize the need for text production in strengthening students as literacy learners. They argue: "A program that combines both reading and writing instruction increases the likelihood of teachers using reading and writing together in a supportive way as envisioned by the functional model of reading-writing relations" (p. 281), and it is most vital to integrate these instructional practices to "enhance both skills at the same time" (p. 282).

In light of the release of the Common Core State Standards (2010), the ubiquity of technology, and rapid changes in student diversity, including linguistic diversity, Reynolds (2020, 2021) argues for the inclusion of additional topics in defining adolescent literacy: (a) text selection and text complexity, including multiple-source text sets; (b) digital literacy and multimodal composition; (c) disciplinary literacy; (d) writing; and (e) an expanded understanding of adolescents. This includes a greater focus on English learners and how "concepts like translanguaging (e.g., Seltzer & de los Rios, 2021) demonstrate how new lenses on teaching English learners can reframe multilingualism as the norm, rather than the exception" (p. 41). Additionally, the definition of adolescent literacy includes recognizing that adolescents have different decoding, morphology, and vocabulary literacy needs than emergent literacy learners.

Missing Adolescent Literacy Considerations

In considering these studies, we created subscales based on commonplace adolescent literacy and teacher practices. However, many of these studies and meta-analyses did not discuss aspects of instruction necessary for classrooms, such as instructional practices that equitably support diversity through asset-based pedagogy and critical literacy related to inclusive and multimodal texts and technologies. Educators need to consider that while many of the programs and practices identified within the meta-analysis

reports (Baye et al., 2016; Herrera et al., 2018; Kamil et al., 2008; Reynolds, 2021) have demonstrated a significant impact on students' reading levels, they do not necessarily fully reflect the complexity and multifacetedness of what constitutes high-quality adolescent literacy in the 21st century.

Asset-Based Practices and Critical Literacy

Asset-based approaches are crucial in secondary classrooms, where instruction values students as individuals and ensures curricula incorporate student experiences and interests. This type of learning is student-centered; views diversity of thought, belief, and background as assets to build upon; and assumes students and their communities are asset-rich (Garoutte & McCarthy-Gilmore, 2014). Culturally responsive and sustaining practices welcome students for who they are within curricula, instruction, and materials and view all students as academically valued and valuable (e.g., Kane & Savitz, 2022; Ladson-Billings, 2014; Paris & Alim, 2017) instead of deficit dispositions and corresponding language that views students as broken. Teachers believe all students can engage in complex tasks and critical thinking with appropriate scaffolding, differentiation, and approaches that promote students' cultural knowledge and lived experiences, recognizing diverse ways of being, speaking, learning, and knowing (Gay, 2018; Ladson-Billings, 2021; Paris & Alim, 2017). Asset-based approaches incorporate authentic and real-world situations within instruction, including community and outside perspectives, that lead to action and change (Picower, 2015; Skerrett et al., 2018). Students develop academically *and* critically by examining and challenging historical, social, political, and economic inequities (Flint & Jaggers, 2021; Kinloch et al., 2020; Ladson-Billings & Dixson, 2022). For these reasons, we identify asset-based practices as necessary components of adolescent literacy.

One-way teachers embed these affirming practices is through the use of critical literacy, which is often not accounted for in the previously mentioned meta-syntheses. E. Bishop (2014) defines critical literacy as

> (a) mobilizing learners as social actors with knowledge and skills to disrupt the commonplace; (b) conducting research, analysis, and interrogation of multiple viewpoints on an issue; (c) identifying issues focused on socio-political realities in the context of the lives of the learners; (d) designing and undertaking actions focused on social justice outside of the classroom; and (e) reflecting upon actions taken and creating vision(s) for future project(s) (p. 55).

In other words, middle and high school students learn how to examine, analyze, and critique texts; evaluate author intent and biases, embedded or hidden messages, and missing or silenced voices; and assess the trustworthiness of what they are reading across all texts, content areas, and classrooms (Morrison, 2020; Vasquez et al., 2019). Teacher learning also centers students' learning about other people, cultures, societies, and/or biases. Therefore, professional learning for adolescent literacy requires shifting perspectives at times and learning about asset-based pedagogical practices.

Equitable and Authentic Texts

Relatedly, when teachers design authentic and culturally sustaining instruction, they must curate and use equitable texts where students can explore identities, both their own and others' (Sims Bishop, 1990; Tschida et al., 2014). These texts should be relevant, of interest, and connected to students' lived experiences. Texts should represent how literacy practices and engagement in learning have expanded in the age of digital, visual, and multimodal text interactions (Radakovic et al., 2022). For instance, there is often a misconception about what "counts" as text, with an emphasis on textbooks and other print-based materials and an overreliance on Lexile numbers instead of examining how non-print-based texts can provide the provocativeness, ambiguity, and complexity that yield high-level critical thought (Savitz et al., 2023; Strong et al., 2001). Therefore, professional learning should ensure mutual understanding and the ability to select and use complex, equitable texts within instruction, where certain texts are not privileged in specific content areas over others (e.g., ELA, SS, science, and math); there is a need to explore and understand how other content areas (e.g., music, fine arts, and physical education) also use texts to connect with adolescents (Chandler-Olcott, 2017; Dobbs et al., 2017; Hinchman & O'Brien, 2019; Lent & Voigt, 2019).

In summary, we view adolescent literacy as including the traditional concepts of literacy (i.e., reading and writing) with the inclusion of asset-based pedagogy, critical literacy, and the use of equitable texts.

Methods

In the following sections, we briefly discuss the development of the Teachers' Self-Efficacy in Content-Area and Disciplinary Literacy (CADL) Scale (O'Byrne et al., 2020), which was developed based on Bandura's (2006) assertion that "scales of perceived self-efficacy must be tailored to the particular domain of functioning that is the object of interest," (p. 307–308). Then we present details on the data collection, participant context, and data analysis for our study.

Instrumentation

As detailed in O'Byrne et al. (2020), the development of the CADL scale went through four validation phases: (1) review of relevant and current literature on adolescent literacy to address content validity; (2) solicitation of expert

feedback to address both face and content validity; (3) cognitive interviews with content area teachers to address validity related to response processes; and (4) the use of factor analytic techniques to address construct validity. Based on feedback from the cognitive interviews, we created a glossary to provide researcher definitions for constructs included within items.

The final CADL scale contains three subsections: (1) a 40-item adolescent literacy instruction scale; (2) subject-specific disciplinary literacy items; and (3) teacher demographic and disposition items. In this article, we explore the 40-item adolescent literacy portion of the scale, which included items focused on adolescent literacy, as explored above, and the teacher demographic items. Items in Section 1 of the CADL scale were constructed to measure what is commonly known as foundational literacy instructional practices in middle and high school classrooms, as noted by required standards for teacher education programs and existing adolescent literacy meta-syntheses. The exploratory factor analysis established seven subscales. Table 1 provides the names and definitions of these seven subscales, including any definitions given in the glossary of the survey. All items asked respondents to rate their perceived efficacy with the adolescent literacy item on a 4-point Likert scale. We coded the response options as 4 = *highly confident*, 3 = *fairly confident*, 2 = *developing confidence*, and 1 = *not confident*. "*Not sure*" was also included as a response option.

The CADL scale included eight items on teacher demographics:

- Subject area
- Completion of the required SLCs
- Status as a certified educator
- Years of teaching experience
- Type of teaching position
- Grade levels the respondent teaches
- School setting
- Region of the state in which the respondent's school is located

We did not ask questions about gender, race, ethnicity, or affiliation with a specific school, district, or city because cognitive interviewees shared concerns that this information could lead to a potential lack of anonymity.

Data Collection

To make our survey available statewide to middle and high school teachers, we first sought the input of literacy officials at the [State] State Department of Education. They recommended sending a recruitment email to all middle and high school principals. Therefore, upon receiving institutional IRB approval at our five institutions across the state, we sent an email with a link to our survey and the study purpose to all principals on the state's listserv. We asked the principals to share this information with their respective faculties. We sent one follow-up email 3 weeks after the first. We also used a form of snowballing by recruiting participants at state education conferences aimed at secondary teachers in all content areas. We sent the survey link to 669 principals and shared it with approximately 80 educators at state conferences. Unfortunately, there is no way of determining which administrators shared the recruitment email with their faculty and which did not. Due to this uncertainty, it is not possible to determine a response rate. The survey link was live for 9 weeks.

Participants

Two hundred six teachers completed the adolescent literacy section of the CADL Scale and were subsequently included in the factor analysis of this instrument. Of these 206 respondents, 39 did not complete the remaining sections of the CADL Scale, so there were 167 respondents to the demographic items. Table 2 summarizes the response distributions for the demographic items. The grade level question had a "check all that apply" response format with options from 6th through 12th grade. There were many possible combinations with relatively few observations per combination, so we collapsed the observed combinations into either middle, high, or both. We classified any combination of 6th, 7th, and 8th grades as middle, any combination of 9th, 10th, 11th, and 12th grades as high, and any combination that mixed 6th–8th grades with 9th–12th grades as both.

From the information available in the 2018–2019 [state] professional certified staff files (Dickenson et al., 2020), our sample was determined to be reasonably representative of the population of all middle and high school [state] educators in terms of years of experience, teaching position, and grade level taught. However, ELA teachers and teachers from the Lowcountry region were overrepresented in the sample, while P.E. teachers and teachers from the Midlands region were underrepresented.

Data Analysis

The response data were downloaded from Qualtrics and imported into JMP© Pro 16 statistical software for analysis. All variable names and response options were recoded based on analysis needs. Following data cleaning, we examined graphical displays and numerical summaries of the distribution of each variable to determine missingness rates and identify any unusual observations.

In the adolescent literacy portion of the CADL Scale, few respondents (less than 10%) ever selected the "*not sure*" option, though one math teacher did choose this option for more than half the items. Thus, these responses

TABLE 1
Definition and Items by Survey Subscale

Subscale	How we defined this subscale	Survey items
Equity Instruction and Critical Literacy (Equity)	We viewed this subscale as encouraging readers to actively analyze, question, and compose texts and the strategies readers use to help them gain insight into issues of power, position, and privilege. This type of teaching understands and incorporates the cultures and backgrounds of students into the mastery of curriculum so that curricula are relevant to the cultural worlds from which students hail and substantively incorporated in the pedagogy of the classroom. It requires a belief that America's strength lies in its unity of purpose and diverse cultures.	Provide opportunities for students to examine their current roles, their possible future, and the roles of others in society Create instructional opportunities for culturally relevant and culturally sustaining pedagogies Provide opportunities for students to address or counteract harmful narratives Create opportunities for my students to critically analyze text Create opportunities for my students to critically respond to a text Provide differentiated instruction appropriate for students' specific needs Use evidence-based interventions to support reluctant writers Support students to use multiple literacy strategies before engaging with all types of text
Analysis and Purposeful Use of Text (Analysis)	We viewed this subscale through the lens of how text is selected and curated for use in classrooms and how complexity is determined by teachers. We provided the following information in our glossary at the onset of the survey: Text complexity relates to the level of challenge a text provides based on its quantitative features (e.g., sentence and word length, Lexile), its qualitative features (e.g., required background knowledge, maturity of subject), and required reader-text interaction in relation to the skill and cognitive development of the reader.	Determine the text complexity of digital text Determine the text complexity of print Determine the text complexity of non-print Critically evaluate course materials to ensure that they meet the literacy demands of my content area Organize texts to support the content area and literacy learning Provide instructional support for complex texts
Authenticity: Engagement, Interest, and Relevance (Authenticity)	We viewed this subscale through the lens of the fact that students are provided with instruction and materials representing their lived experiences and situations that are authentic and relevant to them. We provided the following definitions in the glossary at the onset of the survey: In school literacies are the school-ordained, institutional practices of producing and consuming the curricular knowledge of content area syllabi, disciplines, and assessments required to advance through the grades and graduate. Out-of-school literacies are the literacy practices that are not school-ordained and are not directly associated with school-driven assessments and advancements. These often transpire within social, political, and/or needs-driven contexts, such as filling out government forms, ordering goods from an online merchant, engaging in social media, engaging in entertainment, artistic, or religious events, or even sending a birthday card.	Students are interested and engaged in literacy in school Students are interested and engaged in literacy outside of school In school literacies to engage and motivate students instructionally Out-of-school literacies to engage and motivate students instructionally To bridge home-literacy learning, background experiences, and home language(s) with learning Connect literacy practices used in my content area to students' personal lives Texts that are appropriate to my content area(s) and allow students to see people/characters who are both like and unlike themselves A wide range of print, non-print, and digital texts within my content area that are appropriate for students' backgrounds and interests
Differentiation of Instruction (Differentiation)	We viewed differentiated instruction as the process of adapting instructional and curricular content, processes, and products in a way that recognizes the specific cognitive, affective, modal, and interest-based challenges and strengths of students. We connected motivation to differentiated instruction because teachers must understand students' needs and interests to differentiate learning.	Motivate students to read in my content area Motivate students to write in my content area Provide opportunities for independent reading within my content area Support students to use multiple literacy strategies during their engagement with all types of text Use evidence-based interventions to support reluctant readers Use evidence-based interventions to support highly skilled writers Support students to use multiple strategies after engaging with all types of text Use evidence-based interventions to support highly skilled readers

(continued)

TABLE 1
Definition and Items by Survey Subscale (*continued*)

Subscale	How we defined this subscale	Survey items
Progress Monitoring and Assessment (Assessment)	We viewed assessment as a wide variety of methods or tools used to evaluate, measure, and document students' academic readiness, learning progress, skill acquisition, or educational needs.	Use feedback to engage and motivate students Use formative assessments Use summative assessments Balance curricular expectations and content standards with students' interests Use collaborative learning opportunities to help students reinforce content area literacy learning
Instructional Technology (Technologies)	We viewed digital texts as texts sourced on and dependent upon electronic platforms, including, but not limited to, articles with hyperlinks, social media posts, email, and others. We defined multimodal texts, sometimes called "multisensory texts." A text in which more than one sense is activated for engagement is therefore received through multiple avenues or modes and in non-linear ways with pictures, graphics, video, sounds, and, in some cases, smells.	A wide range of digital and multimodal tools to support students' literacy learning A wide variety of digital texts and tools to support student learning goals in my content area A wide variety of strategies to effectively utilize instructional technologies to support student learning goals in my content area
Multilingual Literacy Practices (Multilingual)	We viewed evidence-based as having three components: The teacher's access to scientifically researched and peer-reviewed clinical trials; the teacher's professional knowledge of his/her students' cultures, values, and contexts; and the teacher's professional skills and training to comprehend, appraise, and apply the practice(s).	Use evidence-based interventions to support English language learners' writing Use evidence-based interventions to support English language learners' reading

were treated as missing data and did not contribute to a respondent's subscale score, as opposed to being assigned a score of 0, as this would incorrectly treat such responses as being lower than a response of "*not confident*." Because respondents could skip questions or respond with "*not sure*," the composite subscale scores of each respondent were calculated as the mean response value across all answered items for that particular subscale.

To affirm that the factor structure found in O'Byrne et al. (2020) still holds when including a cross-loaded item about reluctant readers only on the Equity subscale and with "*not sure*" responses treated as missing values, we conducted a confirmatory factor analysis using Mplus Version 8.6, and the fit statistics indicated acceptable fit (CFI = 0.955; TLI = 0.951; SRMR = 0.064; and RMSEA = 0.072). Reliability was evaluated using Cronbach's alpha as a measure of internal consistency, with values above 0.70 generally considered acceptable. For the 40-item adolescent literacy scale, alpha was 0.97, indicating excellent internal consistency. For each subscale, alpha values ranged from a low of 0.87 for the assessment subscale to a high of 0.94 for the multilingual subscale.

As noted previously, 39 of the 206 respondents to Section 1 of the CADL Scale (or 18.9%) did not go on to complete the remaining two sections. This number is larger than the 5–10% typically considered acceptable for listwise or pairwise deletion. A one-way MANOVA provided moderate evidence of a difference in the mean subscale scores between those who did and did not respond to the demographic questions (Wilks' Lambda $F(6,166) = 1.89$, $p = .0860$). To be conservative, a response of "Missing" was treated as its own demographic category in the subsequent analyses involving teacher demographics.

We conducted statistical analyses following this missing data analysis to investigate each research question. To address RQ1, exploring which adolescent literacy components [state] middle and high school teachers felt efficacious, both visual and numerical summaries of the adolescent literacy subscale scores were constructed. To address RQ2 on examining teachers' self-efficacy in adolescent literacy instruction by teacher demographics, a multivariate analysis of variance (MANOVA) test was conducted with the seven subscale scores designated as response variables and the categorical demographic variables included as explanatory variables. Though we would have liked to examine interaction effects among these demographic variables, our limited degrees of freedom did not allow for this. In all MANOVA tests, we used the value of Wilks' lambda to assess statistical significance. If the omnibus MANOVA test was statistically significant (i.e., yielded a p-value less than the traditional .05 cut-off), then univariate MANOVA tests were carried out to determine which particular explanatory variables were significant predictors of the response. For these significant predictors, we used one-way ANOVA tests to determine which categories of the variable had significantly different mean responses and Tukey intervals to determine how large these group differences might be.

TABLE 2
Demographics of Participants

Characteristic	*n*	%
State literacy course completion		
Yes	102	62.2
No	62	37.8
Certified educator		
Yes	158	96.9
No	5	3.1
Years experience		
0–3 years	19	11.5
4–7 years	19	11.5
8–14 years	47	28.5
15+ years	80	48.5
Teaching position		
General education teacher	141	85.5
Special education teacher	13	7.9
Instructional or literacy coach	6	3.6
Media specialist	4	2.4
Support personnel	1	0.6
Grade level		
Middle	65	39.6
High	80	48.8
Both	19	11.6
School setting		
Rural	86	52.4
Suburban	48	29.3
Urban	30	18.3
Region		
Upstate	50	30.3
Midlands	31	18.8
PeeDee	23	13.9
Lowcountry	61	37.0
Discipline		
English language arts	62	37.1
World languages	12	7.2
Math	27	16.2
Science	20	12.0
Social studies	26	15.6
physical education	3	1.8
Visual arts	10	6.0
Performing arts	7	4.2

Note. For variables where counts do not sum to $N = 167$ some respondents skipped the item.

This process of first conducting an omnibus MANOVA test to determine if there are any statistically significant differences before examining separate MANOVA tests for each explanatory variable and only then considering ANOVA tests for the statistically significant explanatory variables was done to protect against the known issue of inflated Type I error rates that occur when making multiple comparisons. Furthermore, we chose the Tukey method for all pairwise comparisons as it gives further control of the familywise error rate and represents a compromise between the liberal Fisher's least significant difference approach and the conservative Bonferroni method. We went on to report Cohen's *d* effect sizes for the statistically significant results as a measure of their practical importance.

Throughout our analysis, care was taken to adhere to the recommendations in the American Statistical Association's 2016 statement on *p*-values (Wasserstein & Lazar, 2016). That is, when possible, we did not pick one arbitrary cut-off at which results were considered statistically significant but rather discussed *p*-values as a continuum of the strength of evidence for a result. When explicit cut-offs were needed, as in when deciding whether to include a missing category in the analyses or whether to conduct follow-up tests, we always chose a conservative approach for that situation.

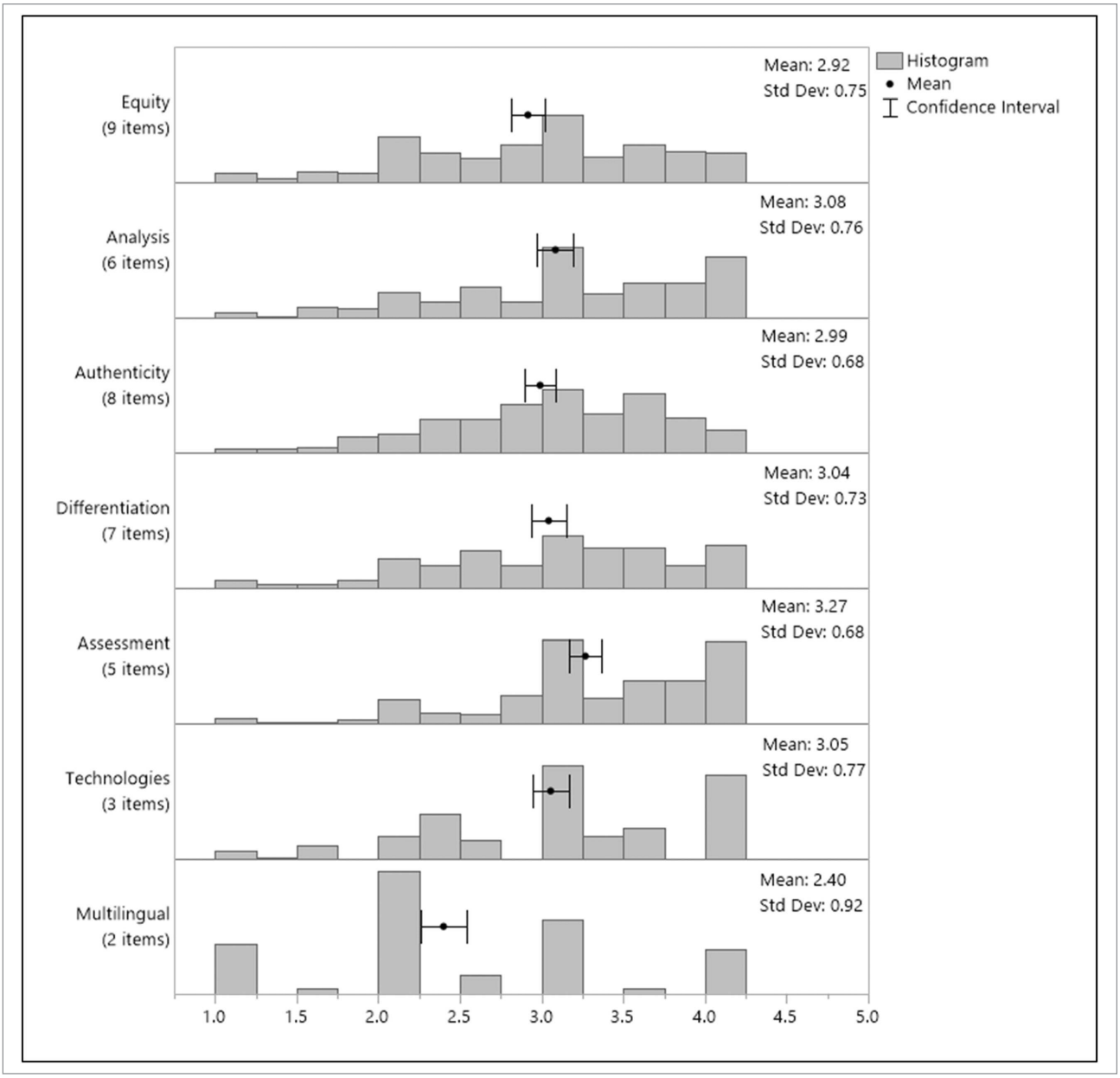
Results

We first present holistic data to answer RQ1. Then, we share results specific to the teacher demographic to address RQ2.

Adolescent Literacy Across Subscales

Figure 1 presents the distribution of composite scores for each of the seven subscales from Section 1 of the CADL Scale. For each subscale, a histogram presents the distribution of respondent composite scores; a black dot represents the mean subscale composite score across all respondents; and error bars representing a 95% confidence interval are

FIGURE 1
Histograms of CADL Subscale Score Distributions



Note. Each error bar is constructed using a 95% confidence interval of the mean.

extended from the mean value. Respondents tended to have the most efficacy in the assessment literacy practices (mean composite score of 3.27) and the least efficacy in the multilingual literacy practices (mean composite score of 2.40). The following section examines how these composite scores varied by demographics.

Adolescent Literacy Self-Efficacy by Demographics

In developing a model for the mean CADL subscale scores, six teacher demographics were initially considered: state literacy course completion, years of experience, teaching position, grade level, region, and discipline. To conserve degrees of freedom, certified educator status was not included, as only five non-certified educators were in the sample. School setting was also excluded because of its strong association with region (a chi-square test of association between these two variables yielded a p-value of .0112). Thus, only one of these two variables needed to be included in the model, as knowing the value of one would be predictive of the value of the other. For the teaching position, the categories of *Instructional or Literacy Coach*, *Media Specialist*, and *Support Personnel* were

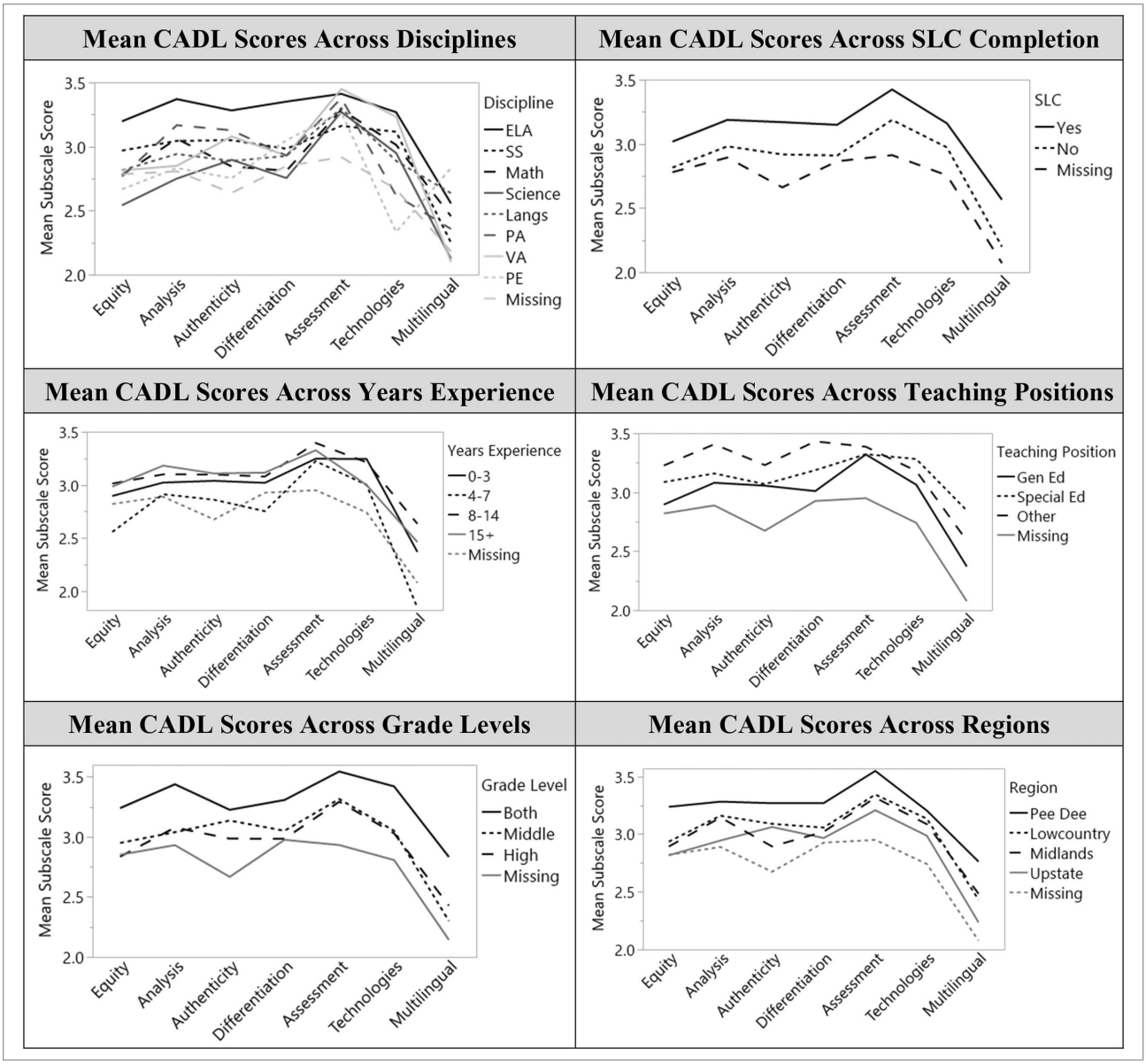
collapsed into one *Other* category due to small counts. The combinations of all the levels of the remaining six teacher demographic variables still define a very large number of groups being compared. Most of the possible combinations were not observed, and the majority of those that were had only one observation per group. Again, this was the reason interaction effects could not be considered in this model, and this also makes the MANOVA assumptions of normality and equal variances in each group difficult to assess. However, the procedure is known to be robust to the assumption of normality and to the assumption of equal variances when the group sizes are nearly equal (Pituch & Stevens, 2016).

The omnibus MANOVA test provided very strong evidence of a difference in mean CADL subscale scores by demographics (Wilks' Lambda $F(132, 851) = 1.35$, $p = .0079$). To determine which particular teacher demographics were significant predictors of self-efficacy levels, univariate MANOVA tests were conducted separately for each demographic variable. There was strong evidence of a difference in mean subscale scores across disciplines (Wilks' Lambda $F(48, 718) = 1.54$, $p = .0125$), moderate evidence of a difference in mean subscale scores across years of experience (Wilks' Lambda $F(18, 411) = 1.60$, $p = .0558$) and grade levels (Wilks' Lambda $F(18, 411) = 1.47$, $p = .0962$), but not much evidence of a difference in subscale scores across state literacy course completion status (Wilks' Lambda $F(12, 290) = 1.35$, $p = .1921$), teaching positions (Wilks' Lambda $F(12, 290) = 0.72$, $p = .7292$), or regions (Wilks' Lambda $F(18, 411) = 0.77$, $p = .7398$).

To help visualize these differences, Figure 2 plots the mean score of each CADL subscale separately for the different categories of a given teacher demographic. For example, the top-left panel of Figure 2 plots the mean score of each CADL subscale separately for each of the eight disciplines, with the variable the MANOVA procedure identified as having the strongest predictive relationship between mean subscale scores. In comparing disciplines, this plot reveals that ELA teachers tended to have the highest levels of self-efficacy, and science teachers tended to have the lowest levels of self-efficacy across the measured constructs. However, science teachers felt more efficacious on both the Assessment and the Technologies subscales than teachers in many subject areas. Although the relationships were not statistically significant, the plots in Figure 2 show that teachers who have completed the state literacy courses tended to have higher levels of self-efficacy than those who have not; teachers with 4–7 years of experience tended to have lower self-efficacy than those with either more or less experience; teachers in "other" positions tended to have higher self-efficacy than general education or special education teachers; teachers working in both middle and high schools tended to have higher self-efficacy than those working exclusively in one setting. However, the observed differences evident in the plots for state literacy course completion status, years of experience, teaching position, grade level, and region variables were not statistically significant at the 5% level and could be due just to random chance in the sample selection and not a true difference in the population. However, it is also possible that these results were not statistically significant due to limitations such as sample size or the questionnaire design.As a follow-up to the MANOVA tests, one-way ANOVA models were fit separately for each of the seven subscale scores by discipline, the only demographic variable identified as statistically significant at the 5% level, to identify which of the particular constructs measured by the CADL scale differed significantly by discipline. Statistically significant subject area differences were found in the mean Equity ($F(8, 186) = 2.18$, $p = .0306$), Analysis ($F(8, 177) = 2.24$, $p = .0269$), Authenticity ($F(8, 197) = 3.41$, $p = .0011$), and Differentiation ($F(8, 170) = 2.48$, $p = .0145$) subscale scores. In all cases, Levene's test did not reject the null hypothesis of equality of group variances at the 1% level, and no issues with the normality assumption were identified in the residual versus fitted plots, such that the ANOVA modeling assumptions were judged to be reasonable and the use of the procedure was justified.

As a follow-up to the ANOVA tests, Tukey intervals were created comparing group means on the subscales with statistically significant differences (Equity, Analysis, Authenticity, and Differentiation) to identify which particular disciplines had significantly higher or lower levels of self-efficacy than others in these areas. The significant differences that were found are summarized in Table 3. As can be seen in Table 3, the mean Equity, Analysis, and Differentiation scores were significantly higher for ELA teachers than for science teachers at the 5% significance level. The mean Differentiation score for ELA teachers was also significantly higher than for math teachers at the 5% significance level. ELA teachers also had a significantly higher mean Authenticity score than teachers who did not report their discipline at the 5% significance level. The effect sizes (that is, Cohen's *d* values) reported in Table 3 are all either above or very close to the 0.8 threshold typically used to identify large effects, providing further evidence that these differences are not just statistically significant but also practically important. The identified differences summarized in Table 3 are also visually evident in the line plot of mean CADL scores across disciplines in the top-left panel of Figure 2. There we see relatively large gaps between the solid black line representing ELA teachers and the solid medium-gray line representing Science teachers for the Equity, Analysis, and Differentiation subscales. Relatively large gaps are also seen between ELA teachers and teachers that chose not to report their discipline on the Authenticity subscale and between ELA teachers and Math teachers on the Differentiation subscale. The magnitudes

FIGURE 2
Line Plots Comparing the Mean CADL Subscale Scores across the Categories of each Demographic Variable



Note. ELA, English language arts; SS, Social studies; Langs, World Languages; PA, Performing arts; VA, Visual arts; PE, Physical education; SLC, State literacy courses.

of the differences that were not identified as statistically significant can be judged from this plot as well.

Discussion

As previously shared, there is an emphasis on *what* must occur to improve adolescent literacy without knowing *how* teachers perceive their efficacy in enacting adolescent literacy practices within their instruction. Our study aimed to explore teachers' efficacy in promoting adolescent literacy in our state to showcase their perceived vast knowledge and expertise. As literacy scholars, we feel that exploring the expertise among our participants helps us understand that each teacher brings a wealth of knowledge and growth areas to professional learning opportunities, which is especially important if we prioritize learning alongside and collaborating with teachers. By learning teachers' efficacy in adolescent literacy, literacy scholars and specialists may need to reconsider their understanding of literacy across content areas, moving beyond a one-size-fits-all framework (Ippolito et al., 2019; Main & Pendergast, 2017).

In the following sections, we discuss our results in response to our research questions and come back to our ultimate goal of understanding how these data influence,

TABLE 3
Tukey Intervals and Effect Sizes for Statistically Significant Subject Area Differences on CADL Subscale Scores

Subscale	Comparison	Tukey interval LB	Tukey interval UB	Cohen's *d*
Equity	ELA—Science	0.07	1.25	0.90
Analysis	ELA—Science	0.02	1.22	0.84
Authenticity	ELA—Missing	0.23	1.06	0.99
Differentiation	ELA—Science	0.02	1.69	0.84
Differentiation	ELA—Math	0.03	1.05	0.76

Note. CADL = Teachers' Self-Efficacy in Content-Area and Disciplinary Literacy Scale; ELA = English Language Arts; LB = lower bound; UB = upper bound.

or should impact, professional learning provided by literacy scholars. Without having participants' reasoning for responding, we situate results within current research by providing potential rationales for teachers' varying adolescent literacy self-efficacy. At times, this means exploring the integration of literacy within a subject area based on research to emphasize how, as literacy scholars, there is much we may not know about literacy practices in content area classrooms. Other times, we explore how content area standards include literacy, as standards often drive instruction. We are not generalizing across *all* teachers; instead, we are sharing our participants' efficacy of adolescent literacy to showcase extensive perceived efficacy. By viewing teachers as experts in the room and at the learning table, we extend our discussion and implication to respond to our overarching question—what does this mean for professional learning on adolescent literacy?

Adolescent Literacy Self-Efficacy

In looking at all participants' adolescent literacy self-efficacy across the seven constructs without narrowing by teacher demographics, as noted in the Results section, teachers were most efficacious with assessment practices (with a mean composite score of 3.27). In fact, the three highest item means were for items in the Assessment subscale: the item on summative assessment with a mean of 3.47, the item on formative assessment with a mean of 3.47, and the item on providing feedback to students with a mean of 3.39. This high efficacy is consistent with national educational reform that has increased accountability and high-stakes testing, prompting school districts to teach to the test and eliminate non-tested subjects (Darling-Hammond, 2022; Robinson & Dervin, 2019). Formative and summative assessments, as discussed in the literature review, are central to all successful reading programs and are often a focus throughout teacher preparation and professional learning (e.g., Baye et al., 2016; Herrera et al., 2018; Kamil et al., 2008). Professional learning may focus on standardized assessments as scores can negatively or positively impact students (e.g., not graduating), teachers (e.g., job security based on student scores), and schools/districts (e.g., less funding, poor public relations) (e.g., Darling-Hammond, 2022; Grissom & Bartanen, 2019).

Teachers were less efficacious when balancing curricula and standards with students' interests, collaborative learning opportunities, and equitable instructional practices (mean composite score 2.92). Notably, many states, including ours, censor authentic instruction created with students' interests, cultural backgrounds, and lived experiences in mind. Our respondents do feel efficacious as a whole. However, to increase their efficacy, professional learning could focus on teachers' learning how to create opportunities for students to critically respond to and analyze text and the ins and outs of culturally relevant and sustaining instruction, both low-scoring items on the subscale measuring equitable instructional practices. To do so requires connecting professional learning with teachers' lived experiences, expertise, and academic content with asset-based pedagogy (Picower, 2015; Skerrett et al., 2018) and literacy (Cantrell et al., 2022; Kinloch et al., 2020) for teachers to learn ways to move beyond their fear of engaging in this critical work in the current political environment (e.g., Marchant, 2023).

Connected to equitable practices is the idea that differentiated instruction is based on students' needs and building on their strengths (Smets & Struyven, 2020; Tomlinson, 2017). Professional learning through differentiated instruction does occur (e.g., Dixon et al., 2014; Smets & Struyven, 2020). However, research also posits that teachers lack the necessary training to support diverse reading and writing needs (e.g., Graham et al., 2021; Smets et al., 2022). This aligns with our respondents being somewhat efficacious on our differentiation of instruction subscale (mean composite score 3.04), with the potential need for professional learning to unpack how teachers are motivating students to read/write, supporting students using various literacy strategies, and providing interventions specific to students' reading/writing needs, all topics measured on this subscale, to strengthen teachers' efficacy of these components of adolescent literacy instruction.

Participants were least efficacious when supporting adolescent multilingual learners' reading and writing skills (mean composite score 2.40), which aligns with other research in this area (e.g., Lammert & Steinitz Holyoke, 2020; Viesca & Teemant, 2019). Nieto (2013) points to a possible reason for the lack of efficacy with multilingual learners:

> One result of U.S. insularism has been that teachers and teacher educators need to learn more about the nations from which our newest students come. Even worse, they may harbor negative preconceptions and stereotypes about them. Educators —

> teachers, guidance counselors, administrators, teacher educators, and policymakers — are therefore unprepared for the range of experiences and unaware of the strengths and talents of these young people (p. 107).

Therefore, professional learning needs to begin by asking how teachers support their multilingual readers and writers to gather their current practice and build up from there, including those with expertise in multilingual instruction in the conversation.

These results may not be surprising, as previously discussed research (e.g., Baye et al., 2016; Herrera et al., 2018; Kamil et al., 2008) either did not include these components in their syntheses or only recently began including them. Nevertheless, these topics are considered "hot topics" in literacy, research, and practitioner needs, as noted in the 2021 What's Hot survey (Cassidy et al., 2022) conducted with "25 diverse literacy leaders of various ages, genders, ethnicities, areas of expertise, and professional roles (i.e., administrators, university professors, literacy consultants, literacy researchers, and specialized literacy professionals) who demonstrate broad and recent knowledge of the field of literacy" (p. 3). As literacy scholars and specialists, we need to address the needs of our teachers by engaging in dialogue with them about their concerns and needs. Teachers may feel pressured not to understand the significant challenges students face within and outside our nation's schools, which greatly impact reading, writing, and engagement in school (Kinloch et al., 2020). Teachers may not understand the impact of racial, ethnic, sexual, gender, social class, national origin, and linguistic differences, calling for a need to learn how to incorporate culturally responsive and sustaining practices (Ladson-Billings & Dixson, 2022; Milner, 2021) and what this looks like within each discipline (Ippolito et al., 2019; Kinloch et al., 2020). This type of learning requires vulnerability (Kelly & Cherkowski, 2017) and ongoing reflective dialogue (Brock et al., 2021) across all community members to determine what they already know to increase their efficacy.

Adolescent Literacy by Teacher Demographics

Based on assumptions made by state legislation and school districts, we explored adolescent literacy efficacy by teacher demographics, explicitly looking at the content area and if the respondent took the state-required literacy course.

Adolescent Literacy by Teacher Content Area

When looking at teachers' demographics across the seven subscales of adolescent literacy, the most statistically significant variable was the participant's content area, aligning with Tschannen-Moran and Johnson's (2011) findings on teachers' self-efficacy for K-12 literacy. However, their study did not explore the content area as a demographic variable. In our study, ELA teachers were the most efficacious of adolescent literacy components compared to science teachers, who were among the least efficacious.

This result requires an exploration into why ELA teachers identify as more efficacious than other disciplines, with an understanding that to do so, there must be conversations and learning across all community members so that literacy scholars and specialists understand what literacy entails within each content area's instruction and required standards. Often, the way literacy scholars understand and define literacy is not the same as how content area teachers see literacy within their field. Therefore, our brief unpacking of examples of literacy within ELA, SS, Math, and Science will showcase the vast inclusion of literacy in each discipline, requiring co-learning to increase understanding among all community members. What we share below comes from conducting extensive research and engaging in collaborative discussions with our disciplinary colleagues and teachers with whom we work to center disciplinary expertise. Based on the survey results and often heard assumptions, we focus on the core content areas.

One assumption often posed by school administrators in the schools we work with is that ELA and SS are more knowledgeable about adolescent literacy. ELA teachers' professional learning often includes specific strategies for supporting literacy learning, including fostering comprehension, analyzing and synthesizing fiction and nonfiction texts, and ensuring the relevancy and appropriateness of texts to meet students' different needs. Additionally, the ELA standards, which inform teachers' instruction, require students to know how to read a variety of literary and informational texts in many ways, which can include the implementation of such literacy skills as discerning vocabulary in context; writing for different purposes (narrative, argumentation); determining writer's craft and intentionality; drawing conclusions; evaluating subtext; identifying and establishing claims; providing clear and convincing evidence to substantiate those claims; and justifying their interpretations of text by using specific examples. Therefore, ELA teachers receive extensive professional learning about adolescent literacy, and their standards communicate traditional thoughts of what literacy is and looks like within instruction.

In shifting now to social studies teachers, as SS often gets brought to professional development with ELA, there is a need to unpack if that is the best option. SS curricula often have substantial content and thematic crossover with ELA and are often brought together for professional learning opportunities. However, when we think about reading and writing in a social studies classroom, the process and instruction differ as each discipline has its own ways of analyzing, assessing, interpreting, and forming new

meaning. Within SS, learning requires not only basic comprehension of texts (Gazioglu et al., 2022; Savitz et al., 2023) but also critical evaluation of them (Hooghuis et al., 2014; Lent & Voigt, 2019; Seow et al., 2019) to negotiate and understand diverse perspectives, collaboratively problem-solve, curate, and synthesize multiple pieces of evidence, and then create or support new interpretations and arguments (Wineburg et al., 2013; Wineburg & Reisman, 2015). Teachers use collaborative discussion and engagement to help students incorporate present-day knowledge to analyze and interpret the past and untangle facts embedded in clashing perspectives (Spires et al., 2020; Wineburg et al., 2013). It is a regular practice in SS courses for teachers to require students to use evidence in their writing (Monte-Sano & Harris, 2012) and defend their claims using debates (Kane et al., 2021; Savitz et al., 2021). Students learn to be democratic citizens who can critically think and analyze relationships between humans and the environment (Kim, 2019; Lesh, 2011).

Many terms and concepts across ELA and SS align with traditional understandings of literacy; therefore, the assumption of social studies teachers' expertise in adolescent literacy makes sense, with the understanding that each teacher's needs and strengths will differ. We also want to acknowledge that literacy educators may feel more knowledgeable about making connections within and across ELA and SS content, meaning these professional learning opportunities could be more connected, inclusive, and collaborative based on shared interests (Lave & Wenger, 1991; Wenger, 2004).

Moving to math, math teachers in our study were less efficacious than ELA teachers regarding differentiated instruction, causing us to wonder about their professional learning and if the focus was on direct instruction and rote memorization (Kacmaz & Dubé, 2022). Much to the chagrin of reformers in math education, math classrooms are often characterized by instruction that privileges following procedures rather than authentic problem-solving and sensemaking (Cobb et al., 2018; Kacmaz & Dubé, 2022; Smith & Sherin, 2020). While math teachers spend substantial time analyzing student data, the extent to which they use these data to inform and differentiate instructional improvement may be limited if professional learning does not focus on ways to incorporate group work and disciplinary literacy in asset-based ways (e.g., Horn et al., 2015; Ippolito et al., 2019; Spires et al., 2020). Notably, effective math instruction requires students to identify patterns and relationships, evaluate data, apply mathematical reasoning, and utilize real-world situations (Lent & Voigt, 2019), all skills connected to literacy, not just complete algorithms. Moreover, when considering equitable math instruction, content can easily connect to how "mathematics—data, mathematical models and numbers—lives everywhere" when we consider the amount of data shared daily (Dingle & Yeh, 2021, n.p.). Therefore, it is essential to have conversations among and between literacy and math educators and scholars.

When thinking about math, literacy scholars may not have an extensive background in math and may not know how to connect elements of reading and numeracy. As peripheral participants in the community, literacy scholars gain access to understanding by learning from members with this expertise (Eshcar-Netz & Vedder-Weiss, 2021; Lave & Wenger, 1991). Mathematics educators learn from these conversations how they already embed literacy in their instruction and ways to differentiate based on student needs (Hinchman & O'Brien, 2019; Siebert et al., 2016), moving beyond seeing literacy as only connected to navigating a narrative word problem or defining pertinent terminology. Yet, mathematics instruction abounds with the various components of adolescent literacy, including having students make meaning of non-print text.

Unfortunately, science teachers are often excluded from professional learning because science is often cut from curricula to ensure more time for high-stakes tested subjects—ELA and math (Darling-Hammond, 2022). Notably, our science teachers were identified as the least efficacious of our respondents on multiple subscales (Equity, Analysis, and Differentiation) of adolescent literacy. Because we cannot explicitly know teachers' reasoning for their reported self-efficacy, we considered what literacy often looks like within instruction and how literacy is defined within the science field and required standards.

Science instruction and content are not static facts, and they do not only include a set of procedures to follow (Alston et al., 2020). Authentic scientific practices are dynamic and ever-evolving. Discoveries yield new questions, and ways of reorganizing or reconfiguring what is known are crucial. Such evolution of thought can be seen in astronomy as the "fact" that there are nine planets in our solar system changed when the discovery of new celestial objects caused a shift in planetary classification and the subsequent reidentification of Pluto as a dwarf planet. Additionally, science classrooms incorporate learning with multiple modalities for students to engage with scientific concepts, terminology, and discoveries (e.g., Townsend et al., 2018; Windschitl et al., 2018), and scientific assessment, similar to math, should be authentic, differentiated, and hands-on to demonstrate learning of scientific principles and processes (Dorroh, 2019; Keeley, 2015).

According to the National Academies of Sciences, Engineering, and Medicine (2016), science literacy requires "the skills and capacities necessary to process and be fluent in the use of words, language, numbers, and mathematics" along with "other skills and knowledge" (p. 3). They continue that "the production or consumption of science knowledge depends on the ability to access text, construct meaning, and evaluate newly encountered information in the specific domain of science" (pp. 16–17). Based on this

information, science instruction requires active use of strong scientific literature and data for students to ponder "why" and "how" more than "what." Instruction can then prompt students to assess the validity of findings and evaluate the quality of evidence, question and explore answers provided, or even determine other answers or questions (Blandford, 2015; Lent & Voigt, 2019).

However, standards inform instruction in classrooms; therefore, let us consider what the standards ask teachers to address and how they relate to adolescent literacy. According to the Next Generation Science Standards (NGSS, 2013), the new standards highlight literacy as an integral part of building disciplinary knowledge in science, explicitly calling for greater attention to social and participatory scientific literacy. According to Susan Berg, assessment lead at the Northwest Evaluation Association [NWEA], there is a significant shift with these new standards to emphasize "multidimensional teaching, learning, and assessment" (Rodriguez, August 2019, n.p.). [State] adopted the [State] *College- and Career-Ready Science Standards in 2021*, which include "performance expectations that are three-dimensional" in science and engineering practices, disciplinary core ideas, and cross-cutting concepts (p. 2). The intent is for students to engage in authentic exploration and the "core ideas of the natural and human-built world as scientists and engineers" across grades K-12 (p. 2).

If we explore further, Dimension 1 is "practices that scientists employ as they investigate, build models, and develop theories about the world and engineers use as they design and build systems," such as mathematical and computational thinking and evaluating communication (p. 3). Dimension 2 is "themes that provide applications across all domains of science and engineering and bridge disciplinary boundaries through which students make sense of phenomena" such as cause and effect and structure and function (p. 3). Finally, Dimension 3 is the "key knowledge that is important over multiple disciplines and K-12, relevant to students or society, and allows for understanding at increased depth and complexity," such as the various science courses (p. 3). Using an engineering design process, students iteratively gather data to define a problem and develop solutions through brainstorming and research, creating and testing solutions.

When we consider how science is linked to equity and criticality, as these were components our respondents identified as less efficacious, these standards cite the National Research Council's, 2012 Framework for K-12 Science Education when they provide this statement on equity:

> Equity in science education requires that all students have equitable opportunities to learn science and become engaged in science and engineering practices; access to quality space, equipment, and teachers to support and motivate that learning and engagement; and adequate time spent on science. In addition, the issue of connection to students' interests and experiences is crucial for broadening participation in science (p. 11)

Therefore, these new science standards for [State] focus on phenomena-based learning and intend to make science instruction more relevant to students' lives, capitalize on the organic curiosity of students, and engage in problem-solving issues as scientists do in real life.

In other words, to be science-literate, students learn and apply scientific knowledge, facts, and processes *and* use language to communicate and share these ideas—all practices connected to adolescent literacy. Sometimes, the language used does not explicitly align with traditional terms that literacy scholars and specialists are familiar with, such as reading and writing. This is an example of the necessity to center science teachers' expertise during professional learning and to determine ways to build a common language about literacy within instruction (Puig & Froelich, 2022). One thing is certain: when we unpack and explore, even in brief, these four content areas, literacy is prominent and featured across all. Therefore, if increased adolescent literacy efficacy is the goal, professional learning must include the expertise of *all* community members (Wenger, 2010), where each member is empowered to share and learn alongside the other community members (Tannehill & MacPhail, 2017).

Adolescent Literacy by State-Required Literacy Course(s)

[State] is one of many that require at least one adolescent literacy course for middle and high school practicing teachers, believing that this one course will support teachers' ability to understand and embed adolescent literacy in their classrooms (ILA, 2017). However, our study did not provide any statistical evidence supporting this assumption in the population of teachers at large, although those in our sample who identified as having an SLC were typically more efficacious than those who did not. This result may not be a surprise—having some training is better than none.

However, we know that one or two courses in literacy are not sufficient in providing teachers with all the knowledge, practices, skills, and concepts necessary to embed literacy practices effectively within their classroom instruction, especially if coursework does not incorporate teachers' expertise and is not built based on specific disciplinary needs. Unfortunately, while the state approves basic outlined syllabi, the teaching and materials of these courses vary because universities, district-run professional development sessions, and online spaces provide these trainings, with no review of materials or efficacy of courses gathered by the state (S.C. Read to Succeed Act, 2014). Therefore, there is no way to know if these professional learning opportunities and coursework align with what is known as needed for high-quality intentional professional

learning (e.g., Darling-Hammond et al., 2017; Desimone, 2009) or if they were created by building literacy partnerships (e.g., Lee et al., 2021; Zenkov et al., 2016). We also do not know if they were co-designed with teachers' expertise as community members versus teachers having to extrapolate concepts and attempt to apply them within their content areas without clear examples or dialogue (Chandler-Olcott, 2017). Therefore, while requiring one or two adolescent literacy courses may be well-intentioned, and there are some potentially positive results, more information is needed as there was no statistical significance between the two groups of respondents.

Implications

From the beginning of this study, from design to implementation, we eschewed approaches too often taken by others where they make assumptions about middle and high school teachers' knowledge and needs. Instead, we invested in gathering teachers' perspectives, input, and voices from the start. We wanted to ask *them* what *they* knew and felt capable of related to adolescent literacy practices, not what we *thought* they knew. Knowing where to begin is crucial for professional learning, as research notes how content area teachers will explore adolescent literacy in their classroom if provided guidance, mentoring, and support throughout the learning process (Dobbs et al., 2017; Lesley, 2014).

One implication is how we, as literacy scholars and specialists, must consider our roles and the roles of the teachers we engage with during professional learning. The 2017 International Literacy Association standards used by K-12 reading/literacy professionals (i.e., specialists, coaches, and district coordinators) emphasize the importance of embedding literacy instruction in the disciplines and theories that align with adolescent literacy to provide this crucial support to teach in the secondary grades (ILA, 2019; Kerns et al., 2018). This means that specialized literacy professionals do not need to become experts in all disciplines. However, they must recognize if and when they are not knowledgeable about what literacy looks like within disciplines, seeking expertise from those with this knowledge (Elish-Piper et al., 2016; Ippolito et al., 2019). We also need to understand how language and terminology differ across disciplines and how our biases as "outsiders" to the academic discourse, such as within scientific communities (Townsend et al., 2018), impact our assumptions of teachers and our knowledge of what literacy entails in various content areas. Therefore, it is our responsibility to view each teacher through an asset-based lens with an understanding that each person brings expertise and content area knowledge to the discussion (Puig & Froelich, 2022) and that each teacher has varied lived experiences. Professional learning must be ongoing and collaborative, encourage reflective professional conversations (Brock et al., 2021), and be co-designed among community members (Elish-Piper et al., 2016) who equally share in vulnerability (Kelly & Cherkowski, 2017) to problem-solve together (Timpereley et al., 2020) on how to best support adolescent literacy (Dobbs et al., 2017; Ippolito et al., 2019).

Another implication is that professional learning must teach about asset-based pedagogies and equitable instruction/assessment for all learners, including multilingual learners (Elish-Piper et al., 2022; Kinloch et al., 2020; Taylor, 2022). Notably, Standard 4 of the ILA standards (Kerns et al., 2018) emphasizes advocating for equity for diverse students to eliminate school-based practices and institutional structures that are inherently biased. To do so means that, as literacy scholars and specialists, we need to learn more about how our educational school systems create systemic oppression within school practices that influence learning and literacy. (Ladson-Billings & Dixson, 2022; Nieto & Bode, 2018; Picower & Mayorga, 2015). We must also know how to teach about culturally responsive literacy instruction and learn how to confront literacy practices that view students through a deficit lens instead of seeing their excellence, identity, and genius (Kane & Savitz, 2022; Cantrell et al., 2022; Kinloch et al., 2020; Muhammad, 2023).

Finally, many states require all teachers to take at least one literacy course. However, based on our participants' responses, the course makes no statistically significant difference in teachers' efficacy in adolescent literacy. While the reasoning is unknown, we suspect part of the issue is that it is difficult for one or two courses to deeply cover all aspects of adolescent literacy. Additionally, there is no way to determine the degree to which these courses are *purposefully* designed (e.g., Leader-Janseen & Rankin-Erickson, 2013; Tracy et al., 2014). Therefore, while states continue to push legislation that requires teachers to attend such coursework and training, literacy scholars and specialists must continue to emphasize that professional learning should be ongoing, job-embedded, and based on specific needs instead of an add-on silver bullet to "fix" our students' low achievement on standardized assessments or meant to "train" teachers in practices that are not equitable or aligned with their discipline (Darling-Hammond, 2022; Darling-Hammond et al., 2017; Ravitch, 2020).

Limitations and Future Research

As with all observational studies, there is the potential for confounding variables to be the actual cause of any observed effects. For example, it could be the case that teachers of one gender tend to favor certain disciplines over others, and the observed disciplinary differences are actually because of gender differences and not disciplinary

differences. However, as random assignment of teachers to discipline (and the other teacher demographics of interest) is not possible, one could never control for all potential confounders, no matter how many additional variables were included in the study. Even though we conducted cognitive interviews with disciplinary teachers during survey instrument design, item language may have privileged the language of literacy and ELA teachers. A disadvantage of using a survey is that it does not allow participants to clarify or explain their answers. As the survey was anonymous, we could not follow up with any of our respondents.

Therefore, future research may include qualitative components, such as interviews, to seek clarification and elaboration on survey responses. By doing so, the researchers can learn more about the SLC offered to the participants and explore what the course entailed. Future studies could also consist of a larger sample of teachers such that there are large enough counts in the cross-classifications of all characteristics of interest to investigate potential interaction effects. This could reveal, for example, whether the difference in efficacy between ELA and Science/Math teachers on differentiation of instruction is consistent across years of experience or changes as teaching experiences increase. We would also encourage replication studies in other states.

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Conflict of Interest

We have no conflicts of interest to disclose.

NOTE

[1] While the authors of this article recognize that the term "struggling readers" is now eschewed in favor of the term "striving readers" that demonstrates growth potential, we defer to the terminology Kamil et al., 2008 used within their report.

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RACHELLE S. SAVITZ is an associate professor of reading/literacy at East Carolina University after spending five years at Clemson University. Her research explores the intersections of critical inquiry, culturally sustaining pedagogy, trauma-sensitive practices, and disciplinary literacy. Her most recent book is with Teachers College Press, *Trauma-sensitive Literacy Instruction: Building Student Resilience in English Language Arts Classrooms*, and other publications can be found in education journals, including *Teaching and Teaching Education, Literacy Research and Instruction, Whiteness and Education*, and *Journal of Adolescent & Adult Literacy*.

JENNIFER D. MORRISON is a National Board Certified Teacher and Associate Professor of Education at Sam Houston State University after having spent seven years at the University of South Carolina. She currently teaches undergraduates in the middle and secondary teacher preparation programs; advises doctorate students; mentors veteran teachers in pursuing National Board certification; and conducts research in teacher preparation, disciplinary literacy, and culturally sustaining pedagogies. She is Editor-in-Chief for the journal *PDS Partners: Bridging Research to Practice* and serves on multiple Editorial Review Boards.

CHRISTY BROWN is a clinical associate professor of quantitative methodology in the Department of Education and Human Development (EHD) at Clemson University. She teaches doctoral-level courses in statistics for educational contexts and provides statistical support to educational researchers through her role as the founding director of the EHD Quantitative Clinic. She holds a PhD in Quantitative Methods in Educational Psychology, an MS in Statistics, and a BSEd in Mathematics Education, all from the University of Georgia.

CHARLENE ALDRICH, with 20 years of experience in higher education, Charlene Aldrich is an avid content area and disciplinary literacy advocate; her expertise is the ability to incorporate a literacy model of instruction into every content area. In 2014, she partnered with the College of Charleston and its Office of Professional Development to write, design, and deliver Read to Succeed literacy courses at the graduate level. She continues to teach professional development literacy courses through the Charleston County School District. She has worked with Dr. Gregory Berry to produce Literacy for Learning: A Handbook of Content-Area and Disciplinary Literacy Practices for Middle and High School Teachers, Second Edition.

BRITNIE D. KANE, PhD, is an Associate Professor of Literacy Education at The Citadel's Zucker Family School of Education. Her research interests focus on teachers' professional learning across their careers. Recent work has focused on disciplinary literacy in mathematics, and her publications have appeared in *Teaching and Teacher Education*, the *Journal of Mathematics Teacher Education*, *Teachers College Record*, the *Journal of Teacher Education*, the *American Educational Research Journal*, the *Journal of the Learning Sciences*, and elsewhere.

W. IAN O'BYRNE, PhD, is an associate professor of literacy education at the College of Charleston in South Carolina. His research focuses on the dispositions and literacy practices of individuals as they read, write, and communicate in online and/or hybrid spaces. O'Byrne is the author of many journal

articles and book chapters focusing on initiatives ranging from online and hybrid coursework, integrating technology in the classroom, ePortfolio systems, and supporting marginalized students in literacy practices. Ian is a former middle school and high school English Language Arts teacher. His work can be found on his website (https://wiobyrne.com/). His weekly newsletter (https://digitallyliterate.net/) focuses on the intersections between technology, education, and literacy.