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The what, when, and how of preservice teachers and literacy across the disciplines: A systematic literature review of nearly 50 years of research

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H I G H L I G H T S

- Synthesized research encompassed three categories: *perceptions*, *resistance*, and *experience*.
- Preservice teachers' beliefs are strongly impacted by instructional context.
- Preservice teachers' perceptions of literacy use within content area disciplines increased.
- Positive gains in knowledge of literacy practices across the disciplines were demonstrated.

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A B S T R A C T

To organize nearly five decades of research regarding teacher preparation in literacy across the disciplines, this study systematically examined and qualitatively synthesized the *what*, *when*, and *how* of the research, resulting in three overarching categories: (a) perceptions, (b) resistance, and (c) experience. Key findings include that when preservice teachers receive instruction through coursework and practicums, their perceptions toward providing literacy instruction in future teaching contexts became more positive. However, researchers often measured such instruction's effect upon content-area literacy courses in the short term, rarely exploring future classroom implementation. Additionally, recommendations for practice and implications for future research are given.

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For decades, integrating literacy instruction within content-areas (formerly known as content-area reading and now content-area literacy) has been advocated by educational researchers (Durkin, 1978/1979; Dobbs, Ippolito, & Charner-Laird, 2016; Gray, 1925); despite such advocacy, literacy practices typically remain segregated from the other disciplines. Discrepancies may result from the disparate research base, particularly in the translation of research to the classroom. In spite of content-area literacies' long trajectory in education (Banton Smith, 1934), the density and

systematic nature of the research has not reached the same rigorous levels bestowed upon other literacy topics such as fluency or phonemic awareness. Therefore, the foci of this review was to better understand the preparation of preservice teachers to implement literacy within discipline-specific courses—what has happened, developed, and changed in the field.

1. Conceptualizing the review

1.1. Rationale and importance of this research

As the primary pathway to knowledge acquisition, reading is an essential component of all disciplines of learning and instruction (Horning, 2007). Strong literacy skills enable students' success in all

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realms of life, including school and work (Alliance for Excellent Education, 2011). Additionally, Common Core State Standards (CCSS; National Governors Association Center for Best Practices [NGA Center] & Council of Chief State School Officers, [CCSSO], 2010) address the need for students to read and engage with complex literary and informational texts. Specifically, “students must learn to read, write, speak, listen, and use language effectively in a variety of content areas, so too must the standards specify the literacy skills and understandings required for college and career readiness in multiple disciplines” (CCSS, 2010, p. iii).

Current standards are rooted in a rich history of studies in content-area literacy research, that include Bader & Pearce, 1983; Dupuis & Askov, 1978; Dupuis, Askov, & Lee, 1979; Stieglitz, 1983 and Usova, 1978. Usova (1978) worked to analyze content-area teachers’, reading specialists’, and administrators’ attitudes toward reading instruction and its effectiveness across all grade levels. He reported that if “content-area teachers are to be effective in the teaching of reading skills, they must possess sound and positive attitudes toward reading instruction” and that “no content area is devoid of reading skills” (Usova, 1978, p. 24), which is still true today. At this same time, Dupuis and Askov (1978) and Dupuis et al. (1979) investigated inservice teachers attitudes about content-area reading and identified that graduate-level courses in content-area reading provide teachers with a deeper understanding and benefits of reading in content-area classes; although these studies focused on inservice teachers, direct implications can be made for teacher preparation.

Influential in the 1980s, Bader and Pearce (1983) investigated the effectiveness of methods courses, specifically content-area reading courses, in which they reported “that preservice teachers may need increased field experiences prior to content area reading instruction ... to sensitize undergraduates to the importance of content reading” (Bader & Pearce, 1983, p. 118). While Stieglitz (1983) researched the effect of required content-area reading courses on preservice teacher attitudes and practices, results indicated that preservice teachers’ positive attitudes toward content-area reading may not transfer to their instructional practices.

Yet, researchers and teachers still argue about the optimum process of integrating reading and writing into content-area instruction and revisit the question Artley (1944) posed nearly 70 years ago: “who teaches reading?” After decades of focus on traditional content-area literacy, (e.g., study skills), Fisher and Ivey (2005) concluded that “reading and writing strategy instruction has not focused on what really matters to content-area teachers” (p. 3). Moreover, the 2010 *Advancing Adolescent Literacy: The Cornerstone of School Reform* report established an initiative focused on adolescent literacy. With this report, and other research shifting attention from literacy experts to content experts, disciplinary literacy instruction is aimed at introducing students to problem solving, specialized thinking, and communication within each distinct discipline (International Reading Association [IRA, now International Literacy Association, ILA], 2012).

Content-area literacy therefore remains a curious case, in that despite noble intentions, large-scale inclusion in teacher preparation programs and decades of research, the concerted results of such efforts have been underwhelming. Simply put, doing more of the same will not yield the desired results, but what are the next logical directions? To transform instruction and research in this area, we believe that “historical perspective allows for reasoned reflection and a certain wisdom that can be easily lost when one is immersed in ongoing study and practice” (Alexander & Fox, 2004, p. 33). As such, to fully codify the current state of content-area literacy we need to position the knowledge base within a historical context.

In particular, content-area reading instruction, as evidenced

through the analysis of research themes, has not always progressed in a particularly systematic fashion but instead has responded to both internal and external forces. These forces can be uncovered through analyzing the trends in the literature base. An understanding of how such historical forces shifted the focus of research allows us to more critically examine which forces are influencing the work of today. Perhaps then, we can resist temptations to follow “what is hot” and instead build upon the most promising findings of previous researchers.

Similarly, through analysis of methodological quality and rigor over time, we are examining our epistemology of content-area reading. Methodology and epistemology are intrinsically linked because our methodological limitations directly limit what and how we know. A systematic review allows current researchers to build upon the strength of previous methodologies and better address the limitations that have beleaguered past research. Only by fully understanding the work of the past will we be able to think about the challenge anew.

1.2. Constructs of literacy

As researchers, we acknowledge several camps surround the research in content-area and disciplinary literacy; thus, a brief historical perspective provides insight for their development. Over the decades, *content-area reading* expanded to include the skills of writing, speaking, and listening to learn specific content and is now referred to as *content-area literacy* (Vacca & Vacca, 2005). More broadly, content-area literacy describes the student-centered approach of incorporating reading and writing instruction in content-area classes to promote students’ learning of content area information as well as literacy skills (Fisher & Ivey, 2005). Notably, starting in the 1990s, textbooks and professional organizations, previously using *reading* in the titles, changed to *literacy*.

Furthermore, *disciplinary literacy* refers to the integration of authentic, content-specific literacy practices into the processes and discourses of disciplinary study (Fang & Schleppegrell, 2010; Moje, 2008; Rainey, 2015, 2017; Reisman, 2012; Shanahan & Shanahan, 2008, 2012) and “to the shared ways of reading, writing, thinking, and reasoning within academic fields” (Rainey & Moje, 2012, p. 73). More recently, disciplinary literacy has dominated the discussion regarding adolescent learners. According to Shanahan and Shanahan (2008), disciplinary literacy describes the advanced, specialized, and critical literacy resulting from embedded instruction in content-area classes. Still, it must be understood that disciplinary literacy, as viewed through multiple perspectives, recognizes that “each perspective shares a focus on text, language, and other symbol systems” (Moje, 2007, p. 12).

Not surprisingly, Dunkerly-Bean and Bean (2016) documented that domains are “at odds with each other” (p. 448) and that literacy scholars have spent energy distinguishing between content-area literacy and disciplinary literacy. For example, the *Journal of Adolescent and Adult Literacy* (2010) published debates between Heller and Moje in response to the “Call for Change” in secondary literacy (Heller, 2010, p. 267). Heller critiques Moje’s call for change, contending that literacy is essential, but questions whether “to assume that disciplinary practice is what goes on—or should go on—in secondary schools” (p. 268). In response, Moje (2010) noted Heller’s use of *amateur* in reference to secondary students and teachers but clarifies her work, stating “literacy theorists, researchers, and teacher educators would do well to consider approaching secondary literacy instruction from the standpoint of the people who teach in the school subject areas” (p. 276).

Nonetheless, researchers (e.g., Darling-Hammond & Youngs, 2002) asserted that preservice teachers need appropriate preparation to teach literacy in general and in content-specific classes.

Given the broad historical perspective and current debates surrounding the content-area literacy and disciplinary literacy frameworks, we chose to identify studies that addressed the preparation of preservice teachers within either or both frameworks.

1.3. Context of previous reviews

Despite national attention focused on literacy development, nearly 8.7 million students in grades 4–12 lack sufficient reading and writing skills (NICHD, 2000). While Risko et al. (2008) suggested that adequately preparing teachers can make a difference, one content-specific literacy preparation course may not be sufficient (Hall, 2005). Therefore, this systematic review contextualizes teacher educators' preparation of preservice teachers to address dynamic literacy needs.

We elected to examine articles published from 1969 to April 2017. Our starting point reflects the initial publication year for the federal government's national educational progress reports (National Assessment of Educational Progress), which attempted to promote equity across states. Further, Herber's book, *Teaching Reading in Content Areas*, was published the following year, representing the first research-based resource providing teachers with content-area literacy strategies.

Two previous reviews (Hall, 2005; Risko et al., 2008) informed our work. Hall's (2005) review of research evaluated preservice and inservice teachers' attitudes and beliefs toward reading instruction in content-specific classes. She also examined content-area teachers' motivation for teaching (or opting not to teach) reading in content-area classes. According to Hall's (2005) final analysis of 19 studies, published between 1970 and 2003, the majority of preservice teachers displayed positive shifts in their attitudes toward teaching reading in the content-area classroom. Shifts were attributed to the content-area reading courses required for preservice teachers; however, the findings reported that the positive attitudes did not always transfer from preservice preparation into their classroom instruction (Hall, 2005). Hall concluded that teachers' beliefs regarding content-area literacy and their roles as teachers differ foundationally: preservice teachers ground their knowledge in prior experiences, while inservice teachers recognize the need to teach students with diverse backgrounds, individual interests, and reading abilities (2005).

Risko et al. (2008) conducted an extensive critical analysis on reading teacher education in general. They reviewed 82 empirical studies, published between 1990 and 2006, on "teacher preparation for reading instruction" (p. 252). Their results indicated that "reading teacher preparation programs have been relatively successful in changing prospective teachers' knowledge and beliefs, and a smaller number of studies document that under certain conditions pedagogical knowledge influenced actual teaching practice" (p. 252).

Although unique in content and structure, these two reviews framed a natural need for this systematic review. Particularly, Hall's research offered support with her review of attitudes and beliefs of preservice and inservice teachers' toward content-area reading instruction, yet her research found that teachers rarely "receiv[ed] specific instruction regarding effective strategies for increasing comprehension within their own subject area" (2005, p. 411). Conversely, Risko et al. (2008) critical analysis focused on teacher preparation in reading instruction in general, but not specific to content areas. The topics (e.g., Hall, 2005) and methodologies (e.g., Risko et al., 2008) informed and strengthened the conceptual and theoretical frameworks developed for this systematic review and influenced the following research questions:

1. In studies published between 1969 and 2017, what are the predominant themes in the research on preservice teachers and literacy instruction across the disciplines?
2. In the studies focusing on preservice teachers and literacy instruction across the disciplines, how has the methodological quality of research changed across these five decades?

2. Method

The *systematic review* method (e.g., Hannes, Claes, & Belgian Campbell Group, 2007; Risko et al., 2008; Torgerson, 2007) was used to investigate and synthesize findings for nearly five decades regarding literacy across the disciplines that focused upon preservice teachers. We applied a four-step process: (a) searching for/compilation of studies, (b) multi-step screening process according to *a priori* inclusionary criteria, (c) methodological analysis of the selected studies according to *a priori* quality indicators, and (d) a qualitative synthesis of the selected studies (Torgerson, Porthouse, & Brooks, 2005).

In comparison to other methods, this approach has been critiqued as "taking a reductionist perspective on research evidence, potentially leading to limited findings" (Davis et al., 2012, p. 81); nonetheless, this methodology afforded our team the opportunity to demonstrate the relevance of diverse research methodologies (e.g., quantitative, qualitative, mixed methods). Additionally, our use of a methodological quality coding criterion limited the number of inclusionary studies, but this reflects our aim to not only collect published research in this area but to also evaluate the quality of that research.

2.1. Literature search

This extensive literature search we utilized the Educational Resources Information Center, PsycINFO, Linguistics and Language Behavior Abstracts, and ComDisDome databases and focused on three search terms—*content area*, *literacy*, and *preservice or inservice teachers* (see Fig. 1). We then expanded the original three terms by using synonyms from the databases. *Content area* focused on the actual classes and content, *literacy* addressed literacy in the context of the content instruction, whether in content area literacy or disciplinary literacy; and, *preservice* was the focus of the research.

2.2. Inclusion/exclusion criteria

To assure a systematic process, the review included all research methodologies; furthermore, all 3413 retrieved articles were reviewed and screened using the seven inclusionary criteria: (a) published in English; (b) published in a peer-reviewed journal; (c) published between 1969 and 2017; (d) conducted in United States, (e) examined empirically ("based on knowledge that all papers published had received two rounds of blind peer review for inclusion on the program and for publication" [Risko et al., 2008, p. 255]), (f) addressed literacy instruction or literacy across disciplines; and (g) analyzed instructional practices of preservice teachers. After the initial June 2012 search, an updated search was completed on April 6, 2017; this includes studies published since the original search date.

First, we applied these criteria to the articles at the abstract level. Upon completion of the abstract-level screening, we screened all 714 articles at the full-text level. After removing two irretrievable articles and articles that solely focused on inservice teachers ($n = 98$), the sample condensed to 53.

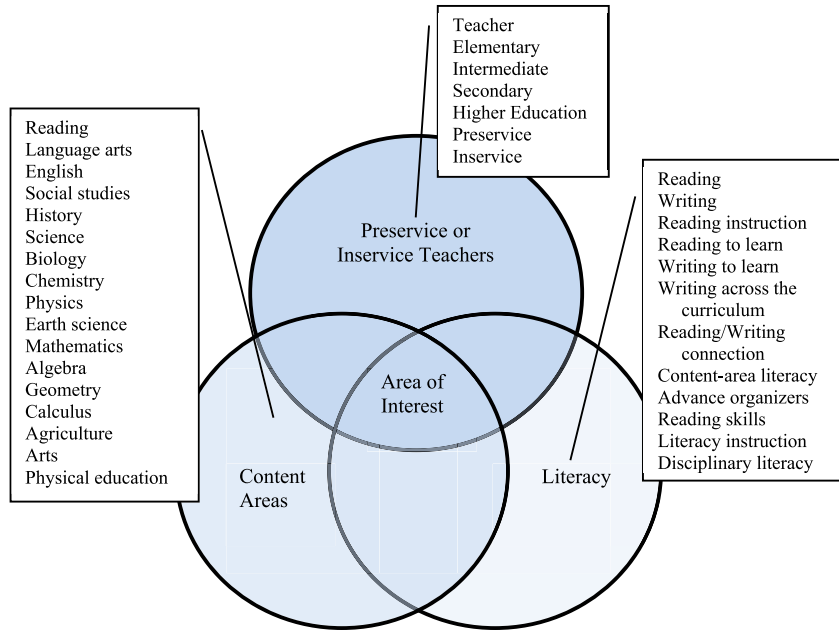


Fig. 1. Diagram of search term clusters.

2.3. Methodological quality evaluation

Following the guidelines established by Risko et al. (2008) and Torgerson (2007), we evaluated 53 studies for methodological quality. The Methodological Quality Questionnaire (MQQ; see Table 1), adapted from the screening tool used by Risko et al. (2008), contains seven indicators to analyze studies' quality and effectiveness (Acosta & Garza, 2011; Authors, 2013). These quality indicators address areas such as theory alignment, findings, reliability and validity, descriptive details of participants' and study

sample, and consistency of findings and conclusions with reported data (Risko et al., 2008).

Given the multiple paradigms and epistemologies of different research traditions, we recognized the complexity of achieving or assessing 'quality.' The American Education Research Association (AERA, 2006) publishing guidelines helped us to address any ambiguities.

The MQQ's seven quality indicators correspond to overall possible scores ranging from 1 to 7. Although Risko et al. (2008) only included studies that met all seven criteria on first review,

Table 1
Methodological quality questionnaire (MQQ).

Standard	Quality Criteria
<p>Standard 1: Provides clear argument that links theory and research and demonstrates coherent chain of reasoning. Explicates theoretical and previous research in a way that builds the formulation of the question(s).</p>	<p>1.1 Explicates theory and/or previous research in a way that builds the formulation of the posed question(s)/purpose(s)/objective(s) that can be investigated empirically.</p>
<p>Standard 2: Applies rigorous, systematic, and objective methodology to obtain reliable and valid knowledge relevant to educational activities and programs.</p>	<p>1.2 Explicitly links findings to previous theory and research or argument for study.</p> <p>2.1 Ensures that methods are presented in sufficient detail and clarity to clearly visualize procedures (e.g., another person could actually collect the same data). Data collection should be described so that readers can replicate the procedures in a quantitative study or follow the trail of data analysis in a qualitative study. For a qualitative study, researcher(s) should report some of the following: number of observations, interviews, or documents analyzed; if interviews and observations are taped and/or transcribed; duration of observations; diversity of material analyzed; and degree of investigator's/s' involvement in data collection and analysis.</p> <p>2.2 Provides evidence of <i>reliability</i>. Was this evidence provided for the data collected (e.g., describe coefficients, test-retest, Cronbach's alpha)? Did researcher(s) provide information about instrument development and study populations (e.g., content-area writing strategies)? For qualitative studies, were characteristics of reliability, credibility, and/or trustworthiness addressed and reported?</p> <p>2.3 Provides evidence of <i>validity</i>. Was this evidence provided for the data collected (e.g., does the instrumentation measure what it is designed to measure and accurately perform the intended function)? Is there information about instrument development and adaptations for specialized populations (e.g., content-area writing strategies)? For qualitative studies, were characteristics of reliability, credibility, and/or trustworthiness addressed and reported?</p> <p>2.4 Describes participants. Was the sample well characterized (e.g., the age/grade and the type of content area)?</p>
<p>Standard 3: Presents finding(s) and makes claims that are appropriate to and supported by the methods that have been employed.</p>	<p>3.1 Findings and conclusions are legitimate or consistent with data collected.</p>

Note. Adapted from Authors, 2013. See also Acosta & Garza, 2011; Risko et al., 2008.

our initial process resulted in three potential dimensions: (a) inclusion of studies meeting all criteria, thus scoring 7; (b) reevaluation of studies scoring 4–6 for possible inclusion; and (c) exclusion of studies scoring 1–3.

2.4. Reliability

To establish reliability for both the selection criteria and the coding criteria, interraters were employed at several phases (abstract, full-text, quality-coding, synthesis) to address reliability at each stage. For calibration and to ensure replicability with the original instrument (Risko et al., 2008), studies included in both this review and the Risko et al. (2008) review were scored by the first, third, and fourth authors (Bean, 1997; Konopak, Readence, & Wilson, 1994; Nourie & Lenski, 1998; O'Brien & Stewart, 1990). After completing this training, a random sampling, 28% ($n = 15$) of the 53 studies, was reviewed for interrater reliability. Interraters assigned a score of 1–7, indicating how many quality criteria were met by each study, and a dimension score of 1–3 (for example, “3”

designates that all 7 quality criteria were met, a “2” designates 4–6 criteria, and a “1” designates 0–3 criteria). The following three coding outcomes were calculated for interrater reliability: (1) 100% for overall inclusion and exclusion, (2) 80.0% ($n = 10$) for total dimension score, and (3) 96.2% ($n = 101$) for individual variable agreement for 105 variables (15 studies, 7 variables per study). It should be noted that 80.0% for the second dimension of coding did not meet our goal of 85% or higher; however, discrepancies only occurred among studies scoring a “1” or a “2.” Therefore, disagreements did not impact the final number of studies scoring a “3” and included in the review.

3. Results

The full screening process, including the selection criteria application at the abstract and full-text levels and the MQQ quality assessment, utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Guide (PRISMA; Moher, Liberati, Tetzlaff, Altman, & the PRISMA Group, 2009; see Fig. 2).

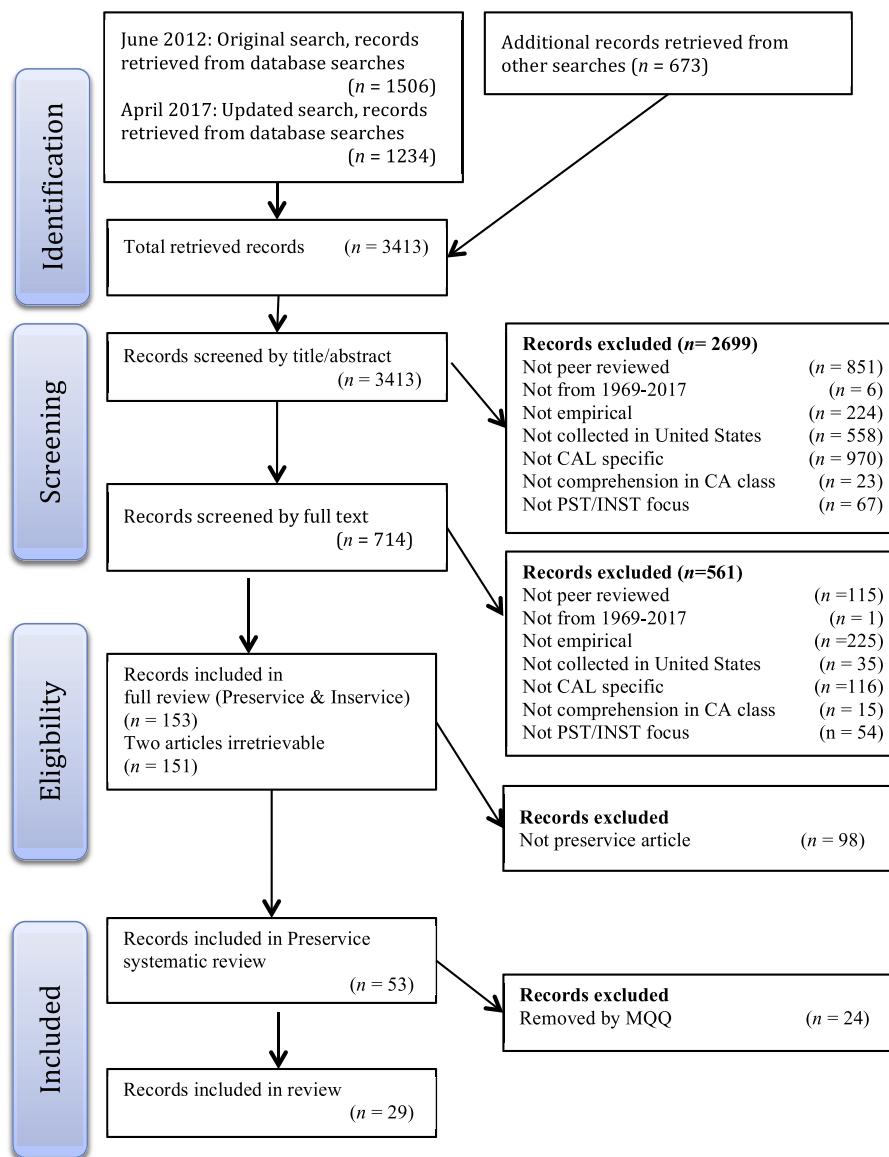


Fig. 2. Flow diagram of article selection process. Adapted from “Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement,” by Moher et al. 2009, PLoS Medicine, 6(7), pp. 1–6.

3.1. Descriptive characteristics of studies

Twenty-nine studies were included in the qualitative synthesis. Identifying characteristics of each study were coded for the following elements: participants' characteristics, setting, researchers' roles, and the research methods and analyses. Twenty journals, primarily literacy focused, were represented.

3.1.1. Study participants

Inclusionary studies focused on preservice teachers, while four studies included both preservice teachers and inservice teachers. Studies were sorted by levels of instruction: (a) undergraduate versus graduate, (b) combination of both undergraduate and graduate, or (c) 5th-year post-baccalaureate certification programs. Nearly all 29 studies, 96.6% ($n = 28$), included undergraduate students, whereas four studies were conducted with 5th-year post-baccalaureate students, and one study involved students enrolled in master's degree-completion programs.

3.1.2. Content areas

Particularly important is the instructional setting in which studies were conducted. The predominant setting, represented in 79.3% ($n = 23$) of the studies, was a content-area reading, or literacy methods course, a typical one-course requirement for state certification for secondary preservice teachers (Bean, 1997; O'Brien & Stewart, 1990). Other instructional settings included an undergraduate physics course ($n = 1$), methods courses in mathematics and reading ($n = 1$), science and reading ($n = 1$), social studies ($n = 2$), and language arts ($n = 1$). The selected research primarily documented the preparation of preservice and undergraduate secondary education majors in content-area literacy methods courses.

3.1.3. Research methods and data analyses

In the final 29 studies, researchers implemented myriad data sources, including surveys, pre- and post-inventories, interviews, student work (e.g., projects/artifacts, student writing, observations, reflection papers). Inclusionary studies used varied methodologies: 13.8% ($n = 4$) quantitative, 75.9% ($n = 22$) qualitative, and 10.3% ($n = 3$) mixed-methods. This distribution supports the need for a review that includes multiple research methods, thus providing a rich context for analyzing research about preparing preservice teachers for literacy instruction across the disciplines. Important to the current study is the similar distribution of qualitative research included in this review and Risko et al.'s (2008) study, in which 62% of the included studies were qualitative. This provides evidence of the reliability and validity for our systematic screening process.

3.2. Synthesis of studies

Following the parameters for conducting systematic literature reviews (Risko et al., 2008; Torgerson et al., 2005), we sought to synthesize the research questions and findings in the included studies. Similar to the inductive analysis process conducted by Risko et al. (2008), we evaluated the final 29 studies to identify themes. In addition to the descriptive review of the included studies discussed in the previous section, an essential part of systematic literature reviews is the qualitative synthesis of the studies. Gall, Gall, and Borg (2007) described this need to "increase an understanding of the phenomena" apart from or alongside the reporting of statistical data (p. 120; see also Graham & Perin, 2007a, 2007b).

Initially, emergent themes were extrapolated from studies using key terms and discussions surrounding the studies' research questions. In seeking commonalities in the studies' research foci,

we identified themes such as application, beliefs, experiences, metacognition, motivation, pedagogy perspectives, preparation, resistance, and strategies.

Next, these varied themes were closely analyzed in the context of the studies (i.e., research questions and purpose) and using a constant comparison process (Glaser & Strauss, 2009) themes were grouped into broader categories that encompassed the studies' conceptual foci. As the purpose of this particular review was to evaluate studies with the focus on literacy across the disciplines, there were three emergent categories (i.e., perceptions, resistance, and experience) from the abovementioned themes. The category of *perceptions*, the emotional disposition toward literacy across the disciplines, was represented by 41.4% ($n = 12$) of the inclusionary studies; *resistance*, the academic opposition to literacy across the disciplines, was represented by 6.90% ($n = 2$); and *experience*, the pedagogical acquisition/application of literacy across the disciplines, was the largest group, represented by 51.7% ($n = 15$). Notably, the majority of the inclusionary studies discussed resistance 65.5% ($n = 19$) in relation to literacy across the disciplines; however, often it was used as either a springboard or support for their primary research topic (Table S1).

3.2.1. Perception: emotional predisposition toward literacy across the disciplines

The *Perception* studies accounted for 41.4% ($n = 12$) of the research and concentrated on preservice teachers' personal beliefs or perceptions about literacy instruction in discipline-specific classes.

3.2.2. Beliefs about literacy instruction

In response to legislation mandating content-area literacy courses for preservice teachers, much immediate (and continuing) research evaluated the impact of these required courses. While specific results are mixed, each of the following six studies revealed that content-area literacy courses promoted positive attitudes towards literacy (Colwell, 2016; Daisey, 2009; Donahue, 2000; Konopak et al., 1994; Reinke, Mokhtari, & Willner, 1997; Saine & West, 2017), though it is worthy to note that research varied by content and purpose. For example, Reinke et al. (1997) reported that participating preservice teachers, had generally positive perceptions about mathematics and reading integration; saw the value and need of the experiences gained through working with school-aged students to help deepen their knowledge; and had an understanding of literacy integration in the context of mathematics instruction. Konopak et al. (1994) reported that participating teachers' orientations were positive toward content-area reading but their orientation varied regarding how reading takes place and their approaches to instruction.

While additional research found that preservice teachers hold positive beliefs about disciplinary literacy, Colwell (2016) points out that "these beliefs may influence and conflict with the practices they implement (p. 44). Likewise, Daisey (2009) cautioned that for sustained change of attitude, "it is essential to walk preservice teachers through reading experiences that promote ownership and enjoyment by including choice, relevancy, and variety, to suggest that they are reading for themselves rather than others" (p. 178). Furthermore, positive beliefs results are often mixed because changes did not fully counteract that many preservice teachers exhibited apprehension to the course, course projects (i.e., blogging, Colwell, 2016), or literacy instruction in general.

Though preservice teachers from the reviewed studies may feel negatively about their own desire to read for pleasure/recreation, they placed value on students having a positive disposition towards recreational reading. For example, Konopak et al. (1994) concluded that prospective teachers' orientations aligned with their selection

of instructional practices. Similarly, Donahue (2000) found that students within a content-area literacy course reported greater appreciation for reading and deeper understanding about reading engagement for future students and Daisey (2009) that content-area literacy courses helped preservice teachers become more open to the general view that reading can be enjoyable rather than dreaded.

Warren-Kring and Rutledge (2011) focused on the transference of content-area literacy by incorporating one-on-one tutoring components for preservice teachers and adolescent students. Specifically, preservice teachers completed 10 tutoring sessions ranging between 30 and 60 min, to support preservice teachers' learning through the application of content into an instructional context (e.g., Colwell, 2016; Reinke et al., 1997). Additionally, recent research has yielded positive results into preservice teachers' knowledge growth and attitude change through more rigorous course experiences.

Notably, there are limitations regarding transfer to classrooms. The rationale for addressing attitude is that preservice teachers, after having positive and rewarding reading experiences, are more likely to integrate literacy in their classrooms and convey positive notions of reading (Daisey, 2009; Nourie & Lenski, 1998; Park, 2013). However, this link cannot be assumed without direct empirical evidence.

Lesley, Watson, and Elliot (2007) examined preservice teachers' metacognitive practices in their development as teachers and as readers. The researchers prompted preservice teachers' metacognition in the context of their content-area literacy classes and aimed for preservice teachers to comprehend texts with a broad, questioning stance. Unfortunately, other researchers discovered that the majority of the text connections (e.g., Tovani, 2004) made by preservice teachers were lower-level text-to-self connections; however, preservice teachers in Park's (2013) research directly referenced text-to-self and text-to-world connections, valuing purposeful reading practice. Nevertheless, preservice teachers made minimal text-to-world connections and no text-to-text connections during class readings. Although content-area literacy classes teach the importance of critical reading (Lesley et al., 2007) and self-monitoring during reading, these practices were limited in use for preservice teachers.

3.2.3. Literacy instruction, research, and content-specific instruction

Investigation of content-area instruction encompasses, typically, four core classes (ELA, mathematics, science, and social studies) (Bangert-Drowns, Hurley, & Wilkinson, 2004; Donahue, 2003). However, Dowdy and Campbell (2008) investigated preservice and inservice teachers' beliefs in the context of arts-based instruction. The researchers interviewed participants about their perspectives on literacy practices and found that the young teachers who showed evidence of growth valued the arts in their content area classes.

In the four core classes, content-area literacy research for preservice teachers has provided only minimal attention on mathematics relative to the work reported for science and social studies. Reinke et al. (1997) reported that preservice teachers have little knowledge about interdisciplinary teaching in connection with mathematics instruction and examined the perceptions of 123 elementary preservice teachers who taught all subjects, including math. Preservice teachers reported that combining writing and mathematics instruction is helpful for learning problem-solving skills. Finally, positive perceptions were evident when integrating reading into mathematics methods courses. Similarly, Wilburne and Napoli (2008) determined that by the end of a combined language arts and mathematics methods class, participants believed

connecting literature and mathematics was effective.

Recently, research in the context of disciplinary literacy has extended the scope of research on writing in content-area instruction. For example, both Colwell (2016) and Saine and West (2017) conducted research on writing instruction within social studies. However, according to research (Pytash, 2012; Saine & West, 2017) teachers are still unprepared to teach writing confidently and effectively, therefore continued research in the area of writing across the disciplines is encouraged.

Researchers (Colwell, 2016, Daisey, 2009; Warren-Kring & Rutledge, 2011; Wilburne & Napoli, 2008) indicated that methods coursework for preservice teachers may promote positive beliefs regarding literacy instruction across the disciplines. Within the category of *perception*, many studies examined and reported change in preservice teachers' beliefs toward literacy across the disciplines through their preparation, application, or teaching practices (Donahue, 2000; Dowdy & Campbell, 2008; Konopak et al., 1994; Lesley et al., 2007; Nourie & Lenski, 1998; Park, 2013; Reinke et al., 1997; Saine & West, 2017).

Similar to Hall (2005) and Risko et al. (2008), convergent evidence supports the finding that preservice teachers' beliefs are strongly impacted by the instructional contexts of content-area literacy or discipline-specific methods courses. Studies reported positive change in preservice teachers' beliefs; however, it should be noted that the courses were short-term, typically only one to two semesters in length. These limitations align with findings of Risko et al. (2008), who raise the question about the optimum length of course instruction and research interventions. Furthermore, the need for independent evaluations and replication studies is apparent.

3.2.4. Resistance: academic opposition to content-area literacy

Previously, researchers (Hall, 2005; O'Brien, Stewart, & Moje, 1995; Siebert & Draper, 2008) have concluded that content-area teachers resist the integration of literacy strategies within their instruction (Dobbs et al., 2016). Bean (1997) and O'Brien and Stewart (1990) evaluated preservice teachers' beliefs about reading instruction in the context of discipline-specific classrooms and interpreted that preservice teachers were often academic oppositions to change. Although only two studies comprise this category (6.90%), this was still an important topic for 65.5% ($n = 19$) of the 29 inclusionary studies and included *resistance* as a sub-theme. In total, the research reviewed in our study indicates mixed reactions with regard to reading instruction and discipline-specific learning.

Bean (1997) contended that preservice teachers gravitate to one strategy that they feel is most suitable for their particular discipline rather than viewing the strategies as options on a "menu" and selecting the most appropriate strategy for the particular instructional task. Teachers in Bean's study expressed that the constraints of their strategy selections were related to their disciplines. Bean (1997) concluded that preservice teachers' knowledge, selections, and beliefs have an explicit impact on the reading instruction in the content-area class and he recommended that a follow-up study would provide a better understanding of the preservice teachers' selections and uses of content-area literacy instruction.

In studying preservice teachers' beliefs, O'Brien and Stewart (1990) investigated 250 preservice and inservice teachers' nature of resistance to content-area reading instruction and found that there was a "50/50 split between resistance and acceptance of some aspects of content reading" (p.110). Specifically, teachers' misconceptions of content-area reading were strongly related to "global misconceptions and immutable assumptions about school life" (p. 122); therefore, instructional practices were viewed as incompatible and unnecessary for teaching content-area material.

Despite the paradigm shift from content-area literacy to disciplinary literacy, researchers continue to recognize that teachers resist literacy instruction in content-specific classes. If preservice teachers are not provided with opportunities to learn about literacy instruction in content-area literacy courses, they may not know, understand, or value literacy's place within specific content areas; therefore, literacy will likely be missing from or less prevalent in their instruction. In summary, preservice teachers' resistance is associated with their practices and literacy instruction in content-area methods classes.

3.2.5. Experience: pedagogical acquisition/application of content-area literacy

Preservice teachers' *experience*, the pedagogical acquisition/application of literacy across the disciplines, was addressed in 51.7% ($n = 15$) of the studies. Published since 2003, these studies measured the need for preservice teachers to teach through varied experiences using multiple approaches (e.g., concept maps, digital discussions, literature circles). Furthermore, there are three sub-categories that consider (a) implementation of multiple literacies—which “reframe literacy” and include technology-based activities “that emphasize other multiplicities (print, talk, image, gesture, art, or even multiple readings of texts of various sorts)” (Cervetti, Damico, & Pearson, 2006, p. 379), (b) the integration of listening, reading, and writing in other content areas, and (c) the use of online learning and domain knowledge.

3.2.6. Learning to teach literacy instruction through writing

Although experiences vary, studies sought a deeper understanding of how and when preservice teachers use writing strategies across the disciplines.

Supported by the Carnegie Foundation for their *Writing Next* report, Graham and Perin (2007b) used a meta-analytic approach to identify effective instructional interventions for helping learners gain proficiency in writing. Graham and Perin (2007b) recommend that preservice teachers have opportunities to analyze, read, and emulate models of good writing. Later, Pytash (2013) turned attention to writing instruction within the context of science. Initially, science preservice teachers lacked explicit instructional approaches for teaching writing, but within a one-semester course focused on “disciplinary literacy instructional methods” (p. 798), the preservice teachers benefitted from practicing “explicit writing instruction fostering students' understanding of scientific writing” (p. 807). In addition, high-quality, explicit writing instruction provides opportunities for authentic writing purposes and can be delivered in various ways (Graham & Perin, 2007b; Pytash, 2012, 2013).

3.2.7. Pedagogy for literacy integration

The most prevalent theme in the experience category explores different instructional pedagogies for integrating literacy instruction for preservice teachers. According to Cox et al. (1998), teacher education has perpetually been center stage in the United States and, accordingly, a substantial amount of research has been conducted on teacher education curriculum, teacher preparation, and teacher knowledge. The following subset of studies focuses on concepts of multiple approaches that were taught and measured in a variety of formats (e.g., concept mapping, tutoring implementation, and learning logs).

Lesley (2004) used a critical literacy lens to explore content-area literacy, teaching students that exercising their “voice to oppressive experiences within oppressive social systems is a unifying goal of critical literacy theories” (p. 323). Sheridan-Thomas (2007) used an organic approach and encouraged preservice teachers to develop individual lenses through class assignments (e.g., online

discussions, reflective logs, and multiple literacies paper). Sheridan-Thomas (2007) reported that preservice teachers developed new lenses for engaging students in literacy discourse while helping preservice teachers to make explicit connections with content-area literacy instruction. More recently, Rodriguez (2015) employed a “Disciplinary Literacies Pedagogy perspective and required preservice teachers to complete a digital book club field experience” (p. 165). Findings indicated that Disciplinary Literacies Pedagogy and field experiences fostered learning for the participating preservice teacher and his students.

From a constructivist perspective, Barry (2012) provided her preservice teachers the opportunity to construct their own meaning when the students designed lessons and activities for literacy from their experiences and trip to a community art museum. During the course activity, preservice teachers were placed in an authentic setting (e.g., art museum) to gain a deeper understanding of applying literacy to the discipline. Skeptical at first, preservice teachers questioned how art could be implemented in their content areas (e.g., Spanish, science, mathematics). After analyzing preservice teachers' lessons and reflections, Barry (2012) reported that her participants found the excursion to be a valuable tool for learning and connecting literacy to the content.

For the *experience* theme, we focused on the specifics of instructional practice and connected “knowledge, teaching, and beliefs while implementing instruction at enhancing all three” (Risko et al., 2008, p. 267). By placing preservice teachers in tutoring and/or field-based practices (Barry, 2012; Daisey, 2012; Feret & Smith, 2010; Nokes, 2010; Rodriguez, 2015), preservice teachers grew from the learning opportunities—serving as a teacher as well as a role model for literacy (Daisey, 2012). Nokes' (2010) action research study, conducted over six consecutive semesters, implemented content-area literacy instruction in his *Methods of Teaching Social Studies* course with the support of the university content-area literacy specialist. As noted in these studies, bridging the gap between intention and practical implementation of content-area literacy strategies may provide necessary but often overlooked stage of scaffolding for preservice teachers. Given the opportunity for applied practice in the field, students are more likely to move from collaborative to independent learning, thus entering a developmentally relevant problem-solving stage, often referred to as the zone of proximal development (Vygotsky, 1978).

Although the researchers in these studies approached the process from different pedagogical stances, the majority reported positive growth for preservice teachers in terms of gaining experience, constructing richer knowledge, and gaining new, deeper knowledge of content and literacy instruction across the disciplines.

3.2.8. “Meta” learning and gaining new knowledge for literacy instruction

From an alternate perspective, Olson and Truxaw (2009) began with the “assumption that preservice teachers' success in and commitment to their disciplines also makes it difficult for them to see how literacy practices are central to the learning of content” (p. 423). Science and mathematics preservice teachers generated “new insights and questions” (2009, p. 429); thus, they recognized a need for teaching reading in their disciplines and progressed “toward an emergent understanding of literacy practices in the content” (p. 429). When preservice teachers bring a well-established grasp of the material, it is often difficult for them to break down the process of learning for their students who are new to the material.

In this category, we examined *experience* from three viewpoints: learning literacy and literacy across the disciplines through writing, integrating literacy pedagogy, and using the “meta” lens of learning and gaining new knowledge for the purpose of literacy instruction.

Several studies examined the effects of using writing strategies, approaches that helped preservice teachers to broaden their scopes of knowledge and develop metacognition regarding literacy integration. Through analysis of this subset of studies, all focused on aspects of teacher knowledge and content knowledge, we found that preservice teachers with varied content-specific instructional experiences (e.g., writing, tutoring, reflection) experienced positive growth in their knowledge of pedagogy and content instruction.

4. Discussion

The three overarching categories of *perceptions*, *resistance*, and *experience* encompass the themes from this synthesis and help organize and inform the research for discussing preservice teachers and literacy instruction across the disciplines. In hopes of further developing understanding of this field and its impact upon preservice teachers' preparation, our systematic review strives to provide evidence for the conversations surrounding the *what*, *when*, and *how* of preservice teachers' preparation and the future of literacy across the disciplines and was guided by two research questions, in the following section we aim to answer them from the review's findings.

4.1. What are the predominant research themes across the disciplines (1969–2017)?

This review contributes to a long-standing dialogue surrounding literacy across the disciplines, particularly focused on the instruction, integration, and preparation of teachers for incorporating literacy instruction in discipline-specific settings. Given the scope of themes we grouped into the three categories of *perceptions*, *resistance*, and *experience*, it is clear that literacy-across-the-disciplines research continues to have a broad foci.

In the first category of *perceptions*, we examined the emotional predispositions of preservice teachers toward literacy across the disciplines, such as their beliefs or perceptions related to literacy instruction and preparation for discipline-specific content. Consistent with findings by Risko et al. (2008) and Hall (2005), the majority of the studies in this review supported the conclusion that preservice teachers' beliefs are strongly impacted by the instructional context of content- and literacy-focused methods courses. Such perceptions included the following: literacy integration (Nourie & Lenski, 1998), preparation (Lesley et al., 2007), and literacy practices and attitudes (Colwell, 2016; Daisey, 2009; Donahue, 2000; Konopak et al., 1994; Park, 2013; Saine & West, 2017; Warren-Kring & Rutledge, 2011). Many studies reported positive change in preservice teachers' views, although the typical interventions were short-term.

Additionally, researchers examined the usefulness of literacy instruction in the context of discipline-specific instruction. Dowdy and Campbell (2008) studied literacy instruction within arts-based literacy instruction and found positive results. By applying literacy to a content area, preservice teachers were provided opportunities to gain knowledge from text, make sense of content, and engage directly with curriculum. For example, Dowdy and Campbell's (2008) preservice teachers were immersed in a workshop approach in which they were guided through "steps that help[ed] them experience the process of creating a product in a particular genre, i.e., using poetry as a means to develop a storyboard, or creating a front page for a newspaper about their own lives" (p. 3). Integrating literacy into discipline-specific methods classes can provide preservice teachers with instructional strategies better suited for the content curriculum and the academic language—the fundamental argument of disciplinary literacy (Shanahan & Shanahan, 2008).

Research focused on the second category of *resistance* revealed that positive beliefs do not always transfer back to classroom implementation. Generally speaking, it is likely that teachers will lack the generative knowledge and skills to integrate literacy instruction when they only receive one content-specific methods course. This finding, however, is not new as over the course of almost five decades of research in this field, the integration of literacy across the disciplines continues to be met with resistance (Fisher & Frey, 2008; Ratekin, Simpson, Alvermann, & Dishner, 1985; Stewart & O'Brien, 1989), especially by those who perceive literacy instruction as a "pedagogy outside the disciplines" (Doerr & Temple, 2016, p. 9), yet by providing teachers with long-term instructional support, literacy instruction across the disciplines can positively impact student learning (NICHD, 2000).

The third category, *experience*, referred to pedagogical acquisition and application of literacy across the disciplines. Approached from different pedagogical vantage points, researchers reported positive growth for preservice teachers in terms of gaining experience, diversifying strategy selection, connecting learning to practice, gaining a deeper knowledge of content instruction, and pedagogy.

In these studies, researchers evaluated the impact of preservice teachers' preparation and helped to develop deeper understandings of *how* and *when* preservice teachers use literacy strategies within discipline-specific instruction. Other studies examined the impact on learning through the use of writing strategies such as journaling (Donahue, 2000; Pytash, 2012, 2013), concept mapping (Alvermann, Frieze et al., 2011), and lesson planning (Alvermann, Rezak, Mallozzi, Boatright, & Jackson, 2011; Konopak et al., 1994; Lenski & Thieman, 2013; Sheridan-Thomas, 2007; van Zee, Jansen, Winograd, Crowl, & Devitt, 2012), along with application through tutoring and/or field-based experiences (Daisey, 2012; Nokes, 2010). The application of strategies during their coursework and fieldwork helped preservice teachers better understand how to integrate literacy with content instruction. Findings suggested that embedding content-area instruction within the application of tutoring or a field-based class enables preservice teachers to experience positive results (Nokes, 2010) while also gaining new knowledge about both themselves and their students (Feret & Smith, 2010; Rodriguez, 2015).

In total, analysis of these studies revealed that preservice teachers with varied experiences of instruction (e.g., application, concept mapping, tutoring implementation, and learning logs) demonstrated positive growth in their knowledge of literacy practices across the disciplines.

4.2. What are the methodological strengths and weaknesses of the reviewed studies?

After completing the multi-step processes for determining the included studies ($n = 29$), we recognize this number is considerably diminished from the original number of studies screened at the full-text level ($n = 714$). We recognize this can be perceived as a critique of this review and therefore provide details regarding the methodological strengths and weaknesses.

In the final corpus of studies, there remained a high level of discrepancy between the amount of details provided in the studies (e.g., participants, data collection, procedures, analysis), and how themes and categories were retrieved from the reported findings (Risko et al., 2008). Out of the 29 studies, only three studies were quasi-experimental (e.g., Daisey, 2009, 2012; Warren-Kring & Rutledge, 2011). Instead of random assignments, the researchers in these studies incorporated intact groups (e.g., a class) and placed each group in either a treatment or control conditions. These quasi-experimental studies provided experimental rigor to the corpus

and served to support findings of observational studies without comparison groups. The other 26 studies were non-experimental and used either purposeful or convenience samples.

4.2.1. Strengths of the research

As a result of the full-text analyses, 29 studies met both the inclusionary and the quality criteria (MQQ; see Table 1) satisfactorily. Two studies should be acknowledged as exemplars. Warren-Kring and Rutledge (2011) conducted a quasi-experimental study, notable for its rigorous research design, while also providing ample details about the context of the study, the research procedures, and clear interpretations of the findings. Donahue (2000) provided a model for an effective literature review and how it can be woven throughout the manuscript to provide a theoretical framework for analysis.

4.2.2. Weaknesses of the research

Critical insights can be gleaned from the published research that was eliminated or reevaluated through the quality evaluation. Overall, 53 studies were evaluated, while the 24 excluded studies earned an average score of 4.17 out of 7.00.

Two areas frequently resulted in elimination could readily be addressed in future research. First, select studies required much analysis to determine their exact aims or research questions. In contrast, more effective studies clearly articulated research questions, provided a definite research purpose, and supported their research with relevant theory. Second, regarding methodologies, some researchers failed to document the implemented instruments or provide detailed participant descriptions. Versus, higher rated studies were unambiguous about the process, naming their research design and providing the reader with pertinent details of the methods and/or instrumentation, which increases the plausibility for replication.

Such high levels of excluded studies illuminate the importance of *a priori* research standards for publishing and for research trends. Finally, it should be noted that more recently published articles tended to meet the expectations outlined in the MQQ more than older studies. This indicates that expectations of peer reviewers may have differed in previous decades and also optimistically provides evidence for improved rigor of research over time.

4.3. Limitations

This systematic literature review is encompassed within a larger study in which the researchers attempted to systematically gather the research on literacy across the disciplines while also evaluating methodological qualities. Hence, this review has several limitations. First, as specified in one of the original inclusionary criteria, the inclusion of studies with data collected in the United States reflects a purposeful decision to focus on teacher preparation in the U.S. We sought to establish a clear, cohesive picture of how U.S. universities incorporate literacy instruction into content-area teacher preparation as a baseline for further international research extensions of this work. Therefore, many studies were excluded in the current study because they were conducted in other countries.

The final number of 29 studies was winnowed from the original pool of 3413. While this reflects the status of the field and quality of publications, such a modest number of studies limits our abilities to find overarching conclusions within a specific area of interest. In particular, the majority of this review analyzed research conducted for secondary instruction, and transfer between elementary and secondary level instruction is not automatic. Additionally, the “Study participants” and “Content area” sections presented in the results of this review provided specific details regarding the levels

of instruction (e.g., elementary and secondary). Due to the nature of the search process and search terms, K-16 articles were reviewed, and logically, more secondary-level articles were found on this topic. Similarly, these proportions reflect, “the movement described by Bangert-Drowns et al. (2004), wherein the self-contained classrooms of elementary school are delineated into separate classes of subject areas beginning in the sixth grade” (Miller, Scott, & McTigue, 2016, p. 93). Furthermore, Miller et al. (2016) also found that “separate classes are increasingly defined as the grades progress, so it is understandable that research on specific content areas would gravitate toward the more sharply defined courses taught during the upper secondary years.” (p.93). The findings presented here are proportionately the same.

The third limitation is related to the MQQ instrument that was used to evaluate each article's attributes lacks standardization. This limitation is specific to the MQQ's standard 2, which requires that each study “applies rigorous, systematic, and objective methodology.” The term ‘rigorous’ can be interpreted differently across quantitative methodologies; furthermore, consistency among the qualitative studies was difficult to ascertain at times when authors did not specifically name which qualitative research method was utilized.

Another limitation could be perceived in the review's organization and its focus upon the three conceptual categories of *perceptions*, *resistance*, and *experience*. Since the emergent categories come from the included studies, and the research team's specific questions and perspectives, it is necessary to acknowledge the plausibility of other categories or organizational patterns.

Furthermore, it is important to highlight the span of years we addressed for the current study. We acknowledge that the topic of preservice teachers and literacy spans a broader range of years, but our current research addresses specific studies that met the criteria for methodological quality of the research. Since the early 1900s, the need for content-area literacy instruction has been recognized (Moore, Readence, & Rickelman, 1983); despite this fact, it was not until the 1970s that teaching practices and teacher preparation were modified (Gee & Rakow, 1991; Moje, 1996) to include literacy instruction. This improvement continued when states across the U.S. implemented reading course requirements for all middle and secondary majors in education programs (Bader, 1975). These shifts in the area of preservice teacher development markedly impacted the research about preservice teachers and literacy knowledge and implementation, thereby increasing the number of studies available for a systematic review of the research.

4.4. Recommendations for future research

This systematic review of literature contributes to foundational knowledge in the field, as we seek to characterize the relationship between preservice teachers and literacy across the disciplines, and it also revealed the following areas for future research.

4.4.1. Recommendations for quality research in literacy across the disciplines

The past few decades of research regarding content-area literacy have been heavily inundated with preservice teachers' beliefs, including resistance to content-area literacy instruction. Recently, trends have shifted to preservice teachers' college content-area courses and literacy integration (Barry, 2012; Rodriguez, 2011), knowledge (Alvermann, Friese et al., 2011), educational practices (Pytash, 2012, 2013), tutoring and/or field-based instruction (Colwell, 2016; Daisey, 2012; Park, 2013; Saine & West, 2017; Warren-Kring & Rutledge, 2011), and multiple literacies (Colwell, 2016; Saine & West, 2017; Sheridan-Thomas, 2007). Although currently being researched, each topic would benefit from further

exploration as the resultant findings are not yet strong enough to have largely impacted instruction. We concur with Risko et al. (2008) in believing that research not only needs to be new but that we also need to “build on the research we have” (p. 281).

Second, our systematic-review methodology highlighted the need for a stronger focus on research *quality*. Shifts are not only happening in the types of research but also in the quality of research. While 29 studies met all seven criteria; there were additional discrepancies among the quality of the included studies. The AERA guidelines raise the standards for research, and we acknowledge the methodological trends of quality research (Risko et al., 2008). The area of research design merits improvement efforts. We observed that minimal research in this area was devoted to experimental research design. Observational and survey studies are limiting, and they do not evaluate randomized participant selection.

Perhaps as researchers and teacher educators move forward, research should move beyond the oft-utilized surveys to gain a richer understanding of preservice teachers' instructional needs for their future teaching. Specifically, this research would become more feasible by conducting more experimental and quasi-experimental studies, and the benefits of mixed methods. Research would also benefit from evaluating preservice teachers through qualitative data (e.g., case studies and open-ended interviews) and particularly longitudinal studies for the preparation of the next generation of teachers. Analyzing the lasting impact of content-area methods courses and the real transfer to classroom instruction would surely benefit the field.

4.4.2. Directions for future research

Two related topics warrant consideration for future research: (a) integration and advancement of multiple literacies and (b) more expansive research in writing instruction across the disciplines.

New and multiple literacies (e.g., technology) have shifted the traditional roles of pedagogy (Miller et al., 2016). Thus, there is a need to learn why, how, and when to integrate technology into disciplinary learning. Therefore, technology integration should be fused within content-area methods courses to provide preservice teachers with authentic opportunities for ample experience. According to Dietze and Kashin (2013), preservice teacher programs that support the integration of technology have the potential to lead to pedagogical change. Thus, it is important for future research to further explore the integration of new and multiple literacies into the discipline-specific classrooms.

Last, more expansive research is needed in literacy instruction across the disciplines with aspects to writing and writing instruction. Much focus continues to be on reading, though a recent review on writing tasks and strategies in content-area literacy (Miller et al., 2016) provides a systematic foundation for further research in the area of writing. The review explores writing instruction within content-area classes through the categories of context, cognition, and content.

5. Conclusions

We used the expansive systematic literature review methodology to evaluate varying types of research pertaining to preservice teachers, teacher preparation, and literacy across the disciplines. Therefore, evaluative, synthesized research studies such as this review and the preceding research (Durkin, 1978/1979; Hall, 2005; Risko et al., 2008) can inform the creation of future instructional experiences for preservice teachers.

In this review, we are reminded of the complexities and tensions of integrating literacy across the disciplines, especially against the backdrop of the CCSS. Our findings provide researchers with a

foundational understanding of the existing research and more importantly, the trends of that research as we continue to grapple with this multi-faceted issue.

Through applying the systematic literature review process, we took a large array of research from the original 3413 studies and distilled it to a small, yet powerful, group of 29. We evaluated the primary themes found within preservice teacher research and discipline-specific literacy, resulting in an analysis guided by three primary categories: *perceptions*—emotional disposition; *resistance*—academic opposition; and, *experience*—pedagogical acquisition/application.

The first category, preservice teachers' perceptions toward literacy across the disciplines, was initially popular among research in the early 1970s and 1980s and has held constant over the decades only to evolve to include other topics such as resistance, preparation, and transference from the preparation programs to the classroom. Additionally, the depth of research has changed over the years. Older studies utilized questionnaires and surveys, limiting researchers' opportunities to gain a deeper understanding of the participants' beliefs about literacy across the disciplines. Though details about studies conducted in the 1970s and 1980s are brief, we acknowledge their importance and recognize them, as they provided a foundation for current research. Still, our research focus was on the quality review (see MQQ) with foci on how the quality of research has improved over the years, thus many early studies did not meet the inclusionary criteria.

More recently, indicating shifts in epistemological beliefs, scholars have sought a broader understanding of content literacy through the use of case studies, qualitative research, and mixed-methods approaches. The findings of this review are consistent with the documented trends evolving from decades of literacy-across-the-disciplines research. According to Moore et al. (1983), “In order to understand content-area reading instruction, one needs to understand the larger context in which it emerged” (p. 421). This ‘larger context’ grew from the early traditions of rote and imitation learning into the current environment of more deeply developing readers.

Now, in 2018, literacy across the disciplines continues to provoke discussion and examination. Literacy researchers and educators need to move forward by addressing specific disciplines, texts, literacy strategies, and the instructional methods of delivery (Siebert & Draper, 2008) that enable K-12 students to develop into capable readers and writers across and within all disciplines. With a continued yet complex focus on literacy across and within content areas, it is understandable that educational reform has no quick and immediate fix. Consequently, literacy across the disciplines and preservice teachers' preparation will continue to be an area of interest for research. The goal is to work toward finding the best practices for literacy instruction for all students within the changing demands of literacy.

Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.tate.2018.03.010>.

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