Contribution of Research

The Science of Reading: Pathways of Pedagogy for Preservice Teachers

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Abstract

Faculty in two Educator Preparation Programs examined the models of pedagogy adapted in response to the Science of Teaching Reading (STR) mandates. These are revised traditional literacy courses, the use of service-learning projects which include a reading lab, and a stand-alone STR exam preparation course. The programming reveals a convergence of literacy instruction, the new reading wars, education policies, and a commitment to preparing preservice teachers to succeed.

Keywords: Science of Reading, literacy, preservice teachers

The "Science of Reading" (SOR) age evokes memories of the era of the reading wars with a renewed focus on how students learn to read, or not (Dewitz & Graves, 2021; MacPhee et al., 2021). Even with the increased access to literature, over a hundred years of reading research, state and national reading standards, standardized testing, and phonics instruction, Johnny may still not read (Thomas, 2022). While the media has found in this topic an issue that is sensational and emotive; at the center of the debates and headlines about SOR are the students. Educators may cite the National Assessment of Educational Progress (NAEP) results that show students are reading below expected levels as a cause for alarm. The most current data shows that the beleaguered 4th-grade students' reading performance continues to decline (National Center for Education Statistics, 2022). The trends in this data have been consistent over the course of the assessment, despite research and investments in literacy assessment (Hindman et al., 2020). Others may scrutinize Educator Preparation Programs (EPPs) and declare they are not adequately preparing preservice teachers (PSTs) to teach reading; it is also questioned if in-service teachers themselves have sufficient content and pedagogical knowledge to teach the reading and the same criticism is leveled at teacher-educators (Wetzel et al., 2020).

The authors, who are teacher-educators from two Texas universities examined the different pedagogical pathways that are used in their EPPs to address the issues fostered by the Science of Reading-inspired mandates. They propose the goal of instruction and program design is ultimately to prepare a new generation of teachers to provide evidence-based literacy and provide their students with the related skills that are essential for all areas of their lives, but there are now other requirements. EPP instructors now must also prepare PSTs for the Texas Science of Teaching Reading(STR) exam which is a recent requirement for some certifications. (Wetzel, 2020).

The Science of Reading and State Policies

The Science of Reading movement has as its "manifesto" a focus on the five components of literacy shown to be critical for reading success as reported by the National Reading Panel Report and related experimental research (Hindman et al., 2020; Wetzel et al., 2020); phonics, phonemic awareness, fluency, vocabulary, and comprehension. There is an emphasis on systematic

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phonics instruction; Shanahan (2020) suggests that some STR advocates may only be referring to decoding in their debates. Thomas (2022) describes the SOR legislation that is emerging as strongly supporting phonics instruction to the exclusion of both research as well as other factors that affect reading development and achievement. This may be an oversimplification of SOR, and it is a reduction of the reading process. In the *lattice model* of reading for example(Hindman et al, 2020), reading is conceptualized as a combination of dynamic processes that involve code-based applications, but also text and reader factors.

The reader factors matter and the sociocultural contexts of their lives; if these other influences are not included in the SOR discussion, Wetzel et al.(2020) assert that the narratives on the science of reading instruction are incomplete. What is the role for example of multilingualism?

States such as Texas have enacted policies in recent years that are partly inspired by the Science of Reading movement; over 25 states have passed related laws and guidelines (Schwartz, 2022). Based on Texas legislation, the 2019 House Bill 3(HB3), all K -3 teachers and principals are required to participate in teacher literacy achievement academies (Texas Education Agency, 2019). The Texas Education Agency (TEA) described the academies as being based on the *Science of Teaching Reading* (STR) which it defined as "evidenced-based reading methods that best support the development of skilled reading" (Texas Education Agency, 2019, p.2). The Science of *Teaching* Reading refers specifically to the Texas standards and exam and is based on the Science of Reading movement. Both terms are used in this paper and are related but not synonymous.

The content of the STR curriculum covers the range of English and Language Arts components ranging from oral language development, phonological awareness, fluency, phonics, and reading comprehension- virtually the continuum of literacy skills. The academies involve cohorts in districts led by leaders trained by the state. Teachers are required to submit artifacts as evidence of their progress and compensation was introduced for participating teachers. To date, over 100,000 teachers have completed or have been enrolled in the program (Texas Education Agency, 2024a). The TEA is currently transitioning to having EPPs provide the reading academy training (Texas Education Agency, 2024b). It is uncertain if the voluntary option to participate will remain.

It is five years into STR in Texas and the renewed focus on emergent literacy, what has been the effect? This may be hard to measure fully and objectively based on such factors as the effects of the pandemic and remote learning. However, the state's reading data, as measured by The State of Texas Assessments of Academic Readiness (STAAR) exams for students can provide some insight into the trends in literacy achievement. In the past four years, the data continues to show that less than half of students in the elementary testing grades are meeting the state standards for reading on grade level (Texas Education Agency, 2022a).

The TEA mandated the Science of Teaching Reading (293) exam as a requirement for certification for early childhood- 6 teacher candidates that went into effect in 2021 (Texas Education Agency, 2020). The certification is required for five of the Texas certification categories including 1) Early Childhood: EC-Grade 3; 2) Core Subjects with Science of Teaching Reading EC-6; 3)Core Subjects with Science of Teaching Reading; Grades 4-8; 4) English Language Arts and Reading/ Social Studies with Science of Teaching Reading: Grades 4-8; and 5) English Language Arts and Reading with Science of Teaching Reading: Grades 4-8.

Currently, novice teachers must participate in the Reading Academies, even after passing the STR certification exams. As mentioned, the goal is to transfer the responsibility of providing these academies to the EPPs. The exam has 90 multiple-choice questions and one-constructed response question.

The Science of Teaching Reading (STR) Standards

The STR standards address the content and pedagogical knowledge teacher candidates who will work with students up to age eight in the five teacher certification areas cited should demonstrate. The standards are divided into three sections (Pearson, 2024): an overview, and a section on the components of reading development and reading pedagogy. The standards correlate with the Texas Prekindergarten Guidelines and the English and Language Arts standards. Teacher candidates are expected to have comprehensive knowledge of selected reading skills which

range from foundational skills in oral language and phonological awareness, phonics, to comprehension skills. Relating to pedagogy, teacher candidates should understand the principles of reading instruction and assessment. There are references to the use of "evidence-based" literacy practices throughout the Pearson document, but whose and what evidence; is not defined. It may be left to interpretation. That is a criticism leveled at the Science of Reading guidelines. The National Reading Panel results are associated with the SOR movement, but its findings on the effectiveness of phonics in kindergarten and after first grade (Thomas, 2022) appear to contradict the push for a phonics-heavy approach that has become synonymous with SOR. The data from the National Reading Panel is mentioned explicitly in the STR exam documents, as "scientifically based reading research " (Pearson, 2004, p. 4) on which the reading knowledge and pedagogy must be based.

A companion to the STR standards is the "Science of Teaching Reading" testing framework which provides more elaboration on what preservice teachers and expected to know and show. The framework is composed of four domains and 13 competencies on which the certification exam is based. The competencies correspond with the reading development components which are identified in the STR standards. There are repeated references that the candidates should know the "concepts, principles, and best practices"(Pearson, 2024, p. 4) in each domain and that are "research and evidence-based" (p.5) There is more specificity in the examples that are provided for each competency, but even there, the references to ambiguous best practices and research-based strategies persist.

Shanahan (2020) supports the premise that the identification of what works in reading instruction should be based on experimental data, but there is a caveat. Firstly he argues, that not all students who are taught using the method that is considered research-based learn to read adequately, and some students learn to read without using the method. Also, qualitative data about what is happening in classrooms can provide context and information about what is working. It is unlikely that the testing conditions in the experimental studies are replicated with fidelity every time a teacher uses the method with the students. Is the data on what is effective in reading instruction truly comprehensive if it does not use information from other methodologies that show positive learning outcomes in reading for students? In reality, teachers use a variety of instructional strategies successfully to teach reading (Wetzel et al., 2020). Regardless of the debates that swirl about what exactly the best reading practices alluded to in the documents are, teacher educators must prepare their students for the STR exam and the evolving pedagogy of reading that they will encounter in classrooms.

Pathways of Pedagogy for EPPs

In this climate change and uncertainty in reading education, EPP faculty are tasked with ensuring their programs meet several objectives related to literacy instruction as described. Faculty in Texas EPPs have reviewed their courses to ensure alignment with the standards (Wetzel et al., 2020). Some researchers contend understanding how both preservice and in-service teachers learn to teach reading is essential in ensuring positive student learning outcomes in literacy (Kim & Snow, 2021). It is hoped this knowledge will foster analysis of not only pathways for success in teaching reading but also provide insight into the future of literacy instruction and research.

Literacy instructors must ensure preservice teachers are learning the best practices in literacy pedagogy and be cognizant of what this looks like in K-12 based on any changes in response to STR mandates. Also, they must prepare their preservice teachers for the STR exam to complete their certifications. It is a balancing act. The authors, who teach literacy courses to undergraduate and graduate students, have identified three pathways or strands in their practice that are used to respond to the changes instituted by the STR addition to certifications and other factors. These are literacy courses, a test preparation course, and the high-impact practice of service learning through a reading lab and a community literacy project.

The first strand in the pathway addresses the literacy courses that were already established in EPP programs. These include children's and young adult literature courses, the foundations of reading and reading pedagogy, and those that address reading difficulties such as dyslexia. The content in some of the EPPs' current course offerings has been modified to reflect the state STR standards requirements (Wetzel, 2020).

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The second pathway focuses on a reading lab model, a 'Reading Academy" where PSTs complete an instructional placement that is a high-impact practice service learning project and also a literacy instruction practicum. The STR exam is largely an application assessment. Students apply the STR content and pedagogical knowledge to different scenarios based on literacy instruction. It includes a component where students analyze an instructional video and student reading data; and complete a constructed response (Pearson, 2024). The Reading Academy provides opportunities for the PSTs to apply their learning with students and reflect on the process. In addition, in one of the programs, a service-learning project with the local library is used for the students to practice their skills. In this context too, students implement a reading program and reflect on the process, learning, and outcomes.

The third pathway features a stand-alone test preparation course that seeks to balance content knowledge, pedagogy, and test preparation. The STR standards form the framework for the course modules, and the students examine the domains and competencies on which the exam is based. The emphasis is on reviewing research-based practices for assessment and instruction and the course culminates with a practice exam, lesson demonstrations, and the development of a strategy toolkit.

There is alignment between the three pathways, and the goal is the same: to ensure preservice teachers will be adequately prepared to teach English Language Arts and Reading, for them to teach students to read, and for the students to become the cliched but true, "lifelong readers".

Pathway One: Literacy Courses

Educator Preparation Programs(EPPs) already had literacy-based courses which some may propose were adequately providing the instruction preservice teachers needed to prepare for teaching (Clark et al., 2017; Hurford et al., 2016). The challenge for EPPs is to review the current programs and ensure that coverage of the STR standards is embedded in the curriculum and instruction. The courses taught at both universities are described with combined or generic titles, with the corresponding STR standards addressed in the order of progression across the degree program. The STR standards are aligned with the Texas Prekindergarten Guidelines and the English and Language Arts Texas Knowledge and Skills (TEKS), so the connections are made when relevant. In this regard, STR standards correlate with the requirements for English and English Language Arts certification content exams too. It is pertinent to remember that despite what the research shows about teaching students to read, it is a complex activity and goes beyond changing course content; there is not one approach that works for all students (Hindman et al., 2020).

Course: Early Childhood Research-Based Instruction

The students who are seeking the Early Childhood Prekindergarten -Grade 3 and Early Childhood -Grade 6 certifications are required to complete this course. While it is not specifically a literacy course, the curriculum includes components that are related to STR and also to ELAR instruction. The students study the *Texas Prekindergarten Guidelines*. There are three domains: *Emergent literacy: Language and Communication; Emergent Literacy; Reading,* and *Emergent Literacy*: *Writing* which support the requirements of the STR standards (Texas Education Agency, 2022b). The *Guidelines* provide information about the expected learning outcomes for prekindergarten 3 and 4 and the description of the learning behaviors and skills of the students. The PSTs also learn about early childhood development, the content that relates to language and cognition, and the relevant theories that are important to their overall understanding of literacy development.

There is a field experience requirement where the PSTs complete eight hours of observation at an early childhood center. The documentation part of their observations requires them to identify examples of the instructional activities and connect them with the learning outcomes of the Guidelines. Importantly, the PSTs are given opportunities to observe in settings where students are Emergent Bilinguals and may have special education needs. In the Reading Pedagogy section of the STR standards, reference is made to providing instruction to these groups of students. In many of the exam competencies standards, there are repeated references to candidates knowing the learning needs and characteristics of these learners, and providing differentiated assessment and instruction as needed. So the course addresses the STR standards for both knowledge and pedagogy in foundational or emergent literacy skills.

Course: Foundations of Reading

The Foundations of Reading course is an introduction to the concepts and principles of reading development and pedagogy. All the reading components listed on the STR standards are addressed in the course curriculum. The topics range from oral language, phonological awareness, phonics, fluency, and reading comprehension. There is an emphasis on emergent literacy that builds on the student's knowledge of the prekindergarten learning outcomes. Students study the English and Language Reading TEKS and analyze the K-12 alignment. The focus of the course is mainly on content knowledge; the students are expected to demonstrate an understanding of the foundational concepts of reading development, the best practices of reading instruction, and assessment. They identify various stages of literacy development: oral language, word recognition, spelling, reading, and comprehension skills. The students learn about the importance of phonological awareness and the principles of phonics and word study.

The question of how to teach phonics is central to SOR discussions and continues to be a source of contention for the literacy instruction community (Shanahan, 2020; Wetzel, 2020). To address this, the PSTs learn the related phonics TEKS, and about the different approaches to phonics instruction. What is highlighted is the instruction should be explicit, and systematic, and their students must apply the phonics skills and knowledge in the context of authentic reading and writing activities. The course also covers fluency instruction and assessment, vocabulary development, and reading comprehension. Most of the objectives are for the students to "understand" "describe" and "explain" the concepts.

Class activities include lesson planning and demonstrations, analysis of video instruction, and developing a literary strategy toolkit. The performance assessment requires students to create lesson plans that are suitable for students in K-3 grade levels. The plan demonstrates their application of course content that reflects best practices in literacy instruction, the standards, and content that is appropriate for diverse learners. It contains both direct instruction and formative assessment, from two or more areas of literary instruction. This also helps to prepare students for the questions in the STR exams where the concentration is on the application of content knowledge to learning situations.

Course: Identification and Remediation of Reading Difficulties

This is a field-based course that is designed for the preservice teachers to become knowledgeable about the different reading difficulties their students may present and how to provide responsive and effective interventions. The students also learn the administration, analysis, and interpretation of information reading assessments. Areas assessed include phonological awareness, word recognition, alphabet knowledge, and oral reading fluency. The students also use running records to determine reading accuracy and observe reading behaviors, reading interest inventories, record anecdotal notes/ intervention records. Teachers used running records to inform instruction and still do (Gillet & Ellingson, 2017). The PSTs complete eight hours of tutoring with students as part of the course. They learn about dyslexia, specific learning difficulties, and how other disabilities and issues could affect learning, specifically the acquisition of literary skills.

The PSTs learn to use research-based multisensory intervention strategies to address their tutees' learning needs. For example, they may focus on an area for remediation such as phonemic awareness skills. The students also learn about the instructional needs and strategies for working with Emergent Bilingual students. They analyze the data, assess the students, and design and implement interventions for the students. The performance assessment is a case study on one of their tutees, and the maintenance of an intervention binder that contains assessments, student information, intervention records, and anecdotal notes.

The PSTs often identify this course as being most effective in preparing them for the STR exam due to the application of their learning in authentic activities to plan lessons and teach and assess the students they tutor. In the STR course which follows the semester after the completion of this one, the PSTs apply their experiences from working with these students to the scenarios in the practice questions. The data analysis and record keeping support their preparation to respond to the constructed-response questions. More specifically, the course addresses the teacher content knowledge and the pedagogy standards of the STR. The students must apply their content knowledge, but also assessment, planning, and progress monitoring skills.

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Course: Reading Language Arts Instruction

This course reflects both the pedagogy and the instructional contexts of literacy instruction. The students learn and practice different instructional strategies and activities such as implementing structured literacy, small and large group reading and writing instruction, using learning centers, integrating technology in literacy, and creating literacy-rich environments. Students plan lessons and units using the TEKS, observe instruction, analyze instructional videos, and complete demonstration lessons. This course serves as the preparation for the candidates taking the English Language Arts and Reading Content exams and is also for those seeking English certifications in the secondary grades.

The course follows the reading blocks format so the students see all aspects of the typical instructional sequence for literacy instruction, particularly in the K-5 classrooms. The debate about balanced literacy and workshops is important to mention here. The students still learn about shared and interactive reading and writing, guided reading, and structured independent reading; those are the contexts in which reading instruction occurs in the classrooms where they observe; Terry(2021), says teachers want to know, "what should I do on Monday," (p.85) while the debates about what to teach and how, continue. In real-world classrooms, teachers are using the strategies they know work with their students and an assets-based approach (Wetzel et al., 2020) and they believe the experiences of these practitioners are not acknowledged in the SOR sphere. Also, some of the guidance is contradictory. There is an emphasis on using decodable readers, but the research on their use is limited and the findings are not generalizable (Petscher et al, 2020); the authors explain this does not mean the books do not have value, but more information is needed about when they use is effective and for whom.

This course corresponds with both the STR standards knowledge strand that requires the candidates to be familiar with the English and Language Arts TEKS and know how to apply them to teaching and assessment. It also fulfills the requirements for the STR Reading Pedagogy: instruction, assessment, and planning.

Course: Children and Adolescent Literature

Children and adolescent literature refers to multiple genres of quality text that are created for these age groups. The course is designed to include motivational as well as effective methods of teaching with and about this literature, assessment, and contexts of literature instruction such as book clubs. The content covers the different literature genres, current and historical issues, and trends such as book bans, evaluating literature, diverse literature, reading comprehension, and curriculum planning. The students specifically review the English and Language Arts TEKS related to comprehension, genres, vocabulary, self-sustained reading, reading response, and author's purpose. The reading-writing connection is explored in the context of writing genres and composition skills and using the literature as mentor texts for teaching writing.

The STR standards that relate to reading fluency, vocabulary, and comprehension are similarly addressed in this course. They are integrated into modules about different literacy genres, frameworks, and best practices for literacy instruction. Students participate in lesson demonstrations, book clubs, and immersion activities to learn about contemporary and traditional texts. They learn about the value of supported independent reading where students are monitored, all students have access to the books in multimodal formats, and the importance of students having motivation and choice. This is similar to the goals of Scaffolded Silent Reading (Reutzel & Juth, 2014).

Course: Disciplinary Literacy/ Content Literacy

This course centers literacy skills as discipline-specific tools for supporting learning across the different curriculum areas. Preservice teachers in this course are not only seeking certifications in areas related to STR; the subjects are diverse and may include music, physical education, chemistry, and mathematics. Yet, central to the different content areas are literacy skills; those are needed to access and demonstrate learning in all subjects. Students analyze the TEKS for their subject areas and find that there are standards related to reading, writing, and speaking. Consequently, the course content covers instruction in reading, writing, discussion, questioning, cooperative learning, vocabulary, assessment, and digital literacies specific to and across the disciplines.

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For the students who will complete the STR exam, the course addresses some of the required knowledge and skills. Reading comprehension, especially but not limited to informational texts is addressed in this class. They also learn about vocabulary development and instruction, and text genres. The course therefore addresses some of the reading standards and the pedagogy as delineated in the STR standards and exam framework. Students learn instructional strategies and practice them and conduct demonstrations, discussions, lesson planning, and use technologies to develop resources and lessons. The performance assessment requires students to develop an instructional toolkit that includes skills and strategies that address different reading, writing, discussion, research, and inquiry skills. The application of the content knowledge in these learning activities helps prepare them for analyzing and identifying the application scenarios of the STR exam.

Pathway Two: Service Learning Practicums

There are two service learning projects at both universities that fall into the category of high-impact practice, as well as help the students prepare for the STR exam and future teaching and learning. The American Association of American Colleges and Universities (AAC&U) identifies service learning/community-based learning as a High- Impact Practice(HIP) (American Association of Colleges and Universities, 2023). High-impact practices were originally defined by George Kuh (Kuh et al., 2017) and were recognized as important for student success in undergraduate programs (Chittum et al., 2022). The components of service learning as an instructional strategy include a field-based component, is related to the curriculum, involves real-world analysis and problem-solving, and embeds opportunities for reflection on practice (Kuh et al., 2017). A summary of the research on HIPs in higher education (Kilgo et al., 2015) has identified positive outcomes for students such as engagement, academic achievement, improved retention and graduation rates, work and real-life preparation, and an increased awareness of social responsibility and citizenship.

In these EPPs, the preservice teachers participate in a Reading Academy and Library Read Aloud Service Project that allows them to provide free reading tutoring/ reading enhancement to elementary students from the local school districts. The Reading Academy is aligned with undergraduate reading courses and therefore supports the PSTs' content knowledge, pedagogy, and exam preparation. Additionally, the academy experience develops the PSTs and the university's partnerships with the community. The students provide free tutoring to local students with reading difficulties. They work in partnership with the district's teachers and parents to provide assessments, collate student data, and communicate about student performance. Preservice teachers need opportunities to practice teaching reading with students and receive feedback to refine their skills, and this academy fulfills this experience (Hindman et al., 2020); they propose PSTs' learning should occur in real classrooms, as they do not think exposure to the principles of SOR is sufficient to raise reading achievement.

The impact of the academy on the PSTs' preparation is extensive. The preservice teachers learn the principles of reading instruction and assessment which meet the learning objectives related to the Texas teacher certification standards including content standards: identification, application, and differentiation. The academy corresponds with the Science of Teaching Reading examination standards: content knowledge, pedagogy, and reading development. The experience also supports students' special education courses and the coursework for the TEA dyslexia certificate. The academic benefits to both groups of students are many.

The tutors are assigned individual or groups of students. They assess the students, analyze their data, and plan intervention lessons. The tutors work collaboratively with their peers and complete a coaching cycle with the instructor each week. The culminating project is a case study on one of the academy participants that requires research on the tutees' learning needs, interventions, and reading difficulty. The tutors also maintain a portfolio of student work, their assessment and lesson plans, and student work samples. They learn about the other procedures in a school day related to safety and organization, arrival, and dismissal procedures, and communicating with parents. The academy serves as a bridge to students' clinical teaching experience.

The students who participate in the Library Read Aloud Service Project experience similar benefits. They learn best practices for reading aloud to students, including how to carefully select appropriate literature and strategies

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for reading instruction. This correlates specifically with the STR knowledge of content standards for oral language, vocabulary, reading comprehension, and designing instruction for diverse learners. This project is a part of the Children and Adolescent Literature course. The preparation activities include researching the best practices in read-aloud instruction and choosing appropriate books. The PSTs practice their read-alouds collaboratively in class, troubleshoot issues, and brainstorm ideas. The instructor provides feedback and the PSTs maintain reflective journals of their process.

Integral to both projects is the use of informal research into evidence-based practices, but also reflection. Ash and Clayton (2009) developed the DEAL Model--a structure of "best practices" for creating critical reflection assignments and associated assessments. The students who complete the library project use this model in their reflections. Ash and Clayton emphasize that learning does not necessarily occur automatically with reflection, but requires critical reflection that fosters a deep understanding. This type of reflection requires structure and planning by the teacher educator.

The projects provide students with authentic contexts for developing their content knowledge and practicing the skills related to literacy instruction and assessment. In both contexts, the PSTs reflect on how these practical experiences refine their teaching skills and give them a more comprehensive understanding of literacy content. The students who participate in the reading academy, identify the experience as the learning activity that most prepares them for the literacy content and STR exams. The projects support the research into practice-based instruction(Hamilton & Margot, 2023) to improve learning outcomes for preservice teachers. The instructors serve as facilitators and coaches to support the students in making connections between content, pedagogy, and their practicum experiences.

Pathway Three: Science of Teaching Reading Course

The Science of Teaching Reading course was initially conceived as a test preparation option. It was intended to meet the needs of the first cohort of teacher candidates who took the STR certification exam. It was a way of ensuring all of the STR standards were adequately addressed. Since then, the STR standards have been integrated into all literacy courses, so this is partly a test preparation course, but also an opportunity for students to deepen their knowledge of both ELAR content and pedagogy. The students are also completing field observation hours concurrently with this course, which supports their learning. Beyond the testing, the course is designed to help the preservice teachers acquire the necessary skills for teaching reading through prekindergarten through the intermediate grades. Based on the STR standards, the ELAR TEKS, and the Texas Prekindergarten Guidelines, students review reading pedagogy, reading development, and the continuum of literacy skills, beginning with oral language through comprehension, reading assessment, and data analysis. Any overlap with the previous courses is intended for review and elaboration.

The course modules correspond with the domains in the STR exam framework, and the students review the related competencies for each domain. This is the last literacy course the preservice teachers complete before the exam, so making connections between the foundation concepts from the other courses is important. They also complete it the semester before their clinical teaching begins. Class activities include the modeling of instruction, analysis of instructional videos and presentations; lesson design, the development of content and strategies notebook, and data analysis. The data analysis and the development of intervention plans in a cycle of responsive teaching help the PSTs prepare for their students, but also for the constructive response component of the STR exam.

The students also analyze and practice exam questions throughout the course. They typically practice about two questions per module. With this activity, the students are expected, for example, to analyze the incorrect answers as well as the correct ones and provide the correct pedagogy or missing or incorrect elements in the answers. This ensures a more comprehensive experience both with the test practice and with expanding their literacy content knowledge. The students complete a practice exam to demonstrate their test readiness at the end of the course.

Reflections and Implications

The preservice teachers at both universities have excelled in the STR exams. The authors believe the three pathways offer a comprehensive foundation of preparation

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that prepares the students not only for the exams but also for becoming effective teachers of literacy.

There is uncertainty about what constitutes "best practice" in these times of science and reading. Mainstays of reading instruction such as balanced literacy and reading workshops, using leveled texts may meet evidence-based standards, depending on whom you ask or what you read (Terry, 2021),. Phonics instruction leads the way, although some researchers say it is not enough, comprehension is key (Duke et al., 2021). The question of whether SOR research and methods include students with reading difficulties, minority groups, and English Language Learners, remains (Jensen, 2021; Wetzel et al., 2020). Then there is the role of the multiliteracies. How extensively are they included in the Science of Reading research? Are the current social and increasingly digitalized contexts of literacy included in what we know about how students learn to read best, now? Analysis of the curriculum and standards for the Science of Teaching Reading does not seem to suggest that there has been a change in the reading materials and how and what students read for the past century.

In EPPs across Texas, educators are keeping abreast of the developments in reading, and ensuring their preservice teachers are prepared (Wetzel et al., 2020). As always, there is a reminder that at the center of the carousel of education policies are students who must learn to read.

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