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Envisioning the Future of Special Education Personnel Preparation in a Standards-Based Era

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Abstract

The authors consider the future of special education personnel preparation by responding to an overarching question: *What frameworks might teacher educators use as a basis to promote special education teacher effective performance now and in the future?* In answering this question, they summarize current trends in the context of schooling and special education (i.e., Common Core State Standards [CCSS], multi-tiered systems of support [MTSS]) and what these contexts demand of special education teachers. The authors propose a practice-based model for fostering effective special education teacher performance. Grounded in the science of learning, the model includes approaches in teacher education that align with this literature. Implications for implementing the model are provided, which recognize current constraints on schools and colleges of education, to better promote this model for fostering effective performance.

As part of *Exceptional Children*'s series of Special Feature articles, we were asked to consider the future of personnel preparation and special education. This is a tall order given that personnel preparation encompasses a wide breadth and depth of topics. Thus, we focused our work around one overarching question we believe is essential to consider as we look to the future of special education personnel preparation: What frameworks might teacher educators draw from to promote special education teacher effective performance? In answering this question, we first summarize current trends in the context of schooling and special education (i.e., the Common Core State Standards [CCSS], multitiered systems of support [MTSS]) and what these contexts demand of special education teachers (SETs). As part of this discussion we present a case for why the time is right to shift attention to issues of quality in special education personnel preparation. Next, we present a model for fostering effective SET performance grounded in literature on the science of learning and present approaches and strategies in teacher education that support what we have learned from this literature. We conclude with implications for how special education personnel preparation might be refocused, particularly given current constraints on schools and colleges of education, to better promote this model for fostering effective performance.

What the Current Context Demands of SETs

Today, more than any time in history, SETs are expected to play a role in developing and supporting rigorous content instruction for

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students with disabilities that is technology-rich. Pressure for students with disabilities and their teachers to meet high standards is evident in a national movement that all students graduate "college and career ready" by, among other things, successfully meeting a rigorous core of content standards for various subject areas (Haager & Vaughn, 2013a). Many states have adopted the CCSS (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010). The CCSS support clear outcomes teachers are expected to teach to ensure students, including those with disabilities, can compete successfully in a global economy (Common Core State Standards Initiative, n.d.). The CCSS provide little guidance to ensure students with disabilities are successful in meeting the demands of a more challenging curriculum, leaving general education teachers and SETs with the task of determining how to provide students with disabilities appropriate instruction that achieves these high goals (Haager & Vaughn, 2013a), including instruction in areas in which teachers may need considerable professional development (PD), such as writing (Graham & Harris, 2013).

At the same time states are adopting more rigorous content standards, they are simultaneously implementing MTSS for preventing academic and behavioral difficulties through high quality, research-based core instruction provided to all students and increasingly intensive, personalized tiers of intervention that incorporate evidence-based interventions when students are unable to respond successfully (Chard & Linan-Thompson, 2008). Although models of MTSS vary, most make use of a minimum of three tiers of instruction and support, with general education teachers holding the majority of responsibility for core instruction at Tier 1 and SETs delivering intensive, personalized instruction at Tier 3 (Fuchs, Fuchs, & Compton, 2012).

To succeed in school contexts driven by MTSS and the CCSS, SETs need to have extensive knowledge of how to support students with disabilities in achieving rigorous content standards. Although it could be argued this requisite knowledge has characterized the work of special educators for quite some time, today's context ups the ante, requiring SETs to be extremely proficient in the content, interventions, assessments, and technology to support students' learning needs (Lignugaris-Kraft, Sindelar, McCray, & Kimerling, 2014). Rhetoric from *Our Responsibility, Our Promise* (Council of Chief State School Officers, 2012) underscores the greater demands placed on teachers: "higher expectations for students have led to higher expectations for teaching and leading" (p. 27).

Special education teachers will need well-developed collaboration skills to communicate and work with various service providers in the ways required to design cohesive and precise instruction. This collaboration will need a much tighter focus compared to past models wherein SETs provided consultative services to general educators or recommended accommodations that would allow students with disabilities to access the general education curriculum (Brownell, Sindelar, Kiely, & Danielson, 2010). In current contexts, collaboration will center on (a) collecting and interpreting initial and ongoing assessment data, (b) planning precise classroom and intervention instruction that is carefully coordinated and targets the key CCSS content and skills students with disabilities need to master (c) measuring students' response to classroom or intervention instruction, and (d) making changes to instructional plans based on the assessment data. All of this will have to be coordinated across multiple tiers, further necessitating SETs be skilled collaborators and data-literate (Council of Chief State School Officers, 2012).

SETs will also need more extensive curricular knowledge, particularly (a) the general education curriculum and the literacy and numeracy demands the curriculum places on students and (b) literacy and mathematics strategies for intervening in student learning (Graham & Harris, 2013; Haager & Vaughn, 2013b; Powell, Fuchs, & Fuchs, 2013). Closely tied to this curricular knowledge is the need for more extensive knowledge of technologies that can make curriculum accessible to

students with disabilities and support their learning, as well as knowledge of how learning plays out in increasingly technology-rich modern learning environments (Smith & Kennedy, 2014). The bottom line is SETs will have to be more knowledgeable, skilled, and responsive given the more challenging curriculum demands placed on students and the high stakes accountability systems in place to assess students' achievement.

Quality Special Education Personnel Preparation

The current schooling contexts we have described, as well as more than 2 decades of criticism being waged against teacher preparation housed in higher education (e.g., Hess, 2001; Walsh, 2001), has placed increased pressure on colleges of education to demonstrate they are capable of producing teachers who are able to provide more rigorous, effective content instruction. Political pundits assert traditional teacher preparation has been ineffective in preparing preservice teachers to be able to secure adequate student achievement gains. Such vocal opposition to formal teacher preparation has spurred a heated debate between deregulationists and formalists regarding how to reform teacher preparation (McLeskey & Ross, 2004). As we look to the future of special education personnel preparation, we envision this debate lasting for quite some time and without a predictable outcome. As formalists who champion the stance that improved SET quality will result from improved personnel preparation, we believe it is critical that the field makes strides in garnering public support for this position. Two ways to do this are (a) to redesign personnel programs so they are better aligned with what is known from research on the science of learning and (b) bolster the research base undergirding SETs' work.

To develop the knowledge and skills necessary to meet the heightened rigor and accountability of current schooling contexts, both preparation and policy reform will be required. Historic supply and demand issues in special education have resulted in broad certification and licensure patterns and multiple pathways into the classroom (Brownell et al., 2010; Geiger et al., 2014). In most states, SETs are licensed to teach in PK–12 settings and respond to a variety of student needs (Geiger et al., 2014). These broad licensing patterns have resulted in preparation programs that are designed to prepare SETs to provide instruction to students across multiple content areas and grade levels, co-teach with general education teachers, and collaborate with parents. In addition, shortages have encouraged a variety of approaches to preparation, including brief coursework preservice teachers complete after they secure a bachelor's degree, 2 to 4 years of preparation in more traditional undergraduate programs, and residency programs in which special educators take positions in public schools while they are completing teacher preparation coursework (Boe, 2014; Rosenberg, Boyer, Sindelar, & Misra, 2007). Such heterogeneity across programs and lack of focus within programs are not likely to provide beginning SETs with the practice-based opportunities they need to learn to teach more effectively. The time to address this challenge is now.

For the first time in the field's history, pressure to keep pace with unabated SET demand has decreased. The number of SETs employed in U.S. public schools recently has declined (Boe, 2014). Between 2005 and 2009, the number of SETs employed in U.S. public schools fell to 389,904 (IDEA Data Center, n.d.), a drop of 8.8%. SET demand decreased in 30 states, and in 12 states, the decline exceeded 10%. The decrease in total demand for SETs was associated with a concurrent 3.9% decline in the number of students with disabilities, most of whom have learning disabilities. For once, it may be possible to focus attention on issues of quality over quantity in special education personnel preparation. Yet what would a teacher education program that focused more attention on issues of quality look like? What research on effective learning and teacher education might support the design of programs that help special educators acquire the knowledge and skills to work within MTSS

and help students with disabilities achieve CCSS goals?

A Practice-Based Framework for Fostering Effective Teaching

If MTSS is to be implemented as a mechanism for helping students with disabilities achieve CCSS, then special education personnel preparation must be able to produce teachers who can work successfully in such a context. It will be difficult to do this if three fundamental aspects of teacher preparation remain the same. First, teacher preparation programs cannot continue to prepare SETs broadly and hope they will develop the depth of knowledge and skill fluency needed to teach rigorous content within an MTSS framework. Second, to develop competence, teacher education programs must incorporate ways of preparing SETs that help them to practice using these essential knowledge and skills; practice opportunities should be grounded in research and include collaboration practice with general education teachers. Third, general education teacher preparation will need to change in rather substantial ways to ensure preservice teachers have the skills and abilities to work within an MTSS framework, an important point that requires discussion beyond the scope of this article.

In accordance with Grossman and McDonald (2008), we propose special education teacher preparation return to a competency-based approach, popular in the 1970s and 1980s, with a few new twists. Special education (and general education) preparation should consider moving away from teaching about practice to constructing more opportunities for candidates to practice teaching in structured, carefully sequenced, and closely monitored practical experiences, ones in which special education teacher candidates practice the knowledge and skills they will need to collaborate around and implement tiered instruction. Although this idea may not seem novel, it is not the status quo for teacher education (both in general and special education) for a number of reasons within and outside teacher educators' control (Grossman, Hammerness, & McDonald, 2009; Grossman & McDonald, 2008).

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In a study of preparation experiences across various helping professions, Grossman et al. (2005) found teacher education provides fewer opportunities for novices to practice elements of teaching and receive immediate feedback compared to other professions (Grossman et al., 2005). According to Grossman and McDonald (2008),

> while the field of teacher education has developed a number of pedagogical approaches that enable novices to study the complexity of teaching practice in some detail . . . university-based teacher educators leave the development of pedagogical skill in the interactive aspects of teaching almost entirely to field experiences, the component of professional education over which we have the least control. (p. 189)

Further, Grossman and McDonald argued it will be important for programs to reconsider how they can begin to structure such practice without depending entirely on PK–12 cooperating teachers who supervise preservice teachers during field experiences.

Although there are examples of SET preparation programs that have made concerted efforts to structure experiences with an eye toward providing candidates with appropriately sequenced, scaffolded, and structured practice-based opportunities (e.g., Ross & Lignugaris-Kraft, in press), it would be difficult to argue convincingly that this is common practice. As such, we present a framework, based on what is known about expertise and what promotes its development, that could guide the design of special education personnel preparation to be more practice-based. Fundamental to a practice-based approach, however, is clarity about what special education preservice teachers will.

Focus on High-Leverage Practice and High-Leverage Content

In experts, conceptual knowledge and skills along with situational knowledge (or understanding of when to apply particular knowledge and skills) are well integrated, organized, and easily accessible (Bransford, Brown, & Cocking, 1999). Experts have "the knowledge and skills readily available from memory that are needed to make sense of future problems and opportunities" (Brown, Roediger, & McDaniel, 2014, p. 2), and such well-integrated knowledge is acquired through practicing in increasingly complex settings over time. Limited research on highly effective teachers in general and special education suggests these findings about experts can be applied to teachers (see Brownell et al., 2014, for a review).

Two years of preparation, however, is insufficient to prepare SETs or any professional to be an expert (Ericsson, 2014). Teacher preparation programs need some way of focusing on the essential content and instructional practice of effective special education teaching. Researchers in general education have argued there are foundational skills of teaching that cut across subjects, contexts, and grade levels (e.g., leading a discussion, assessing student work, and planning instruction), as well as essential skills and knowledge that are particular to specific subjects or contexts (Ball & Forzani, 2009; Grossman & McDonald, 2008). Such practices have been referred to as *high-leverage practices* and *high-leverage content*.

The concept of high-leverage practices is likely familiar to special education teacher educators, as a competency-based approach to personnel preparation was common in the 1970s and 1980s (Brownell et al., 2010; Christoplos & Valletutti, 1972). Thus, it is easy to argue from research that explicit instruction, engaging guided practice, corrective feedback, and collecting and interpreting progress-monitoring data might be considered core competencies or high-leverage practices in special education (Heward, 2003; Swanson & Sachse-Lee, 2000).

Once high-leverage practices are identified they can be modeled and practiced across different content areas using content-specific strategies (e.g., using explicit instruction in reading to teach a summarization strategy) so teacher educators can demonstrate how the practice changes depending on the structure of the content being taught, which brings us to an important point. The integration of what SETs know about the content and how to use high-leverage practices and content-specific pedagogies to enact it is essential to developing well-integrated knowledge and practice. Special education preservice teachers, however, often only have a year or two to develop essential content knowledge. Thus, it will be equally important for teacher educators to decide on the critical content (e.g., whole number operations, knowledge of fractions) and content-specific strategies (e.g., schema activation strategies) they want to target—the high leverage content. This high leverage content could be the key knowledge beginning SETs will need to deploy when providing reading and math intervention instruction in MTSS.

As preservice SETs learn how to teach, they will also need to learn how to coordinate their efforts with general education to provide effective MTSS that help students with disabilities achieve the CCSS. Although there is less research supporting collaborative teaching practice, key collaborative skills, such as collective planning, active listening, and negotiation, must be taught because there is a legal foundation in special education for collaboration with professionals and parents (Turnbull, Erwin, Soodak, & Shogren, 2011) and because effective collaboration makes enactment of coherent evidence-based tiered instruction possible (Brownell et al., 2010).

We realize the idea of high-leverage practices in special education personnel preparation may feel like a "back to the future" approach and something faculty are already teaching to their SET candidates; however, identification of high leverage content, and the use of carefully crafted, sequenced evidence-based opportunities to practice learning how to teach high-leverage practices and

high leverage content rather than about them is likely less common. Yet such an approach will be one important way of readying a competency-based approach to learning to teach special education.

Using the Science on Learning to Support a Practice-Based Approach

Ideally, movement toward a more practice-based approach to SET preparation would be grounded in research on effective teachers and effective teacher education. However, there is insufficient research in general and special education preparation to constitute such a foundation (Lignugaris-Kraft et al., 2014). Thus, we draw on what is known about the science of learning and how effective performance develops and combine those research findings with what is known about effective teacher education pedagogy to support a practice-based approach to special education teacher preparation.

Several decades of research in psychology, sports, neuroscience, and medicine have revealed some guiding principles and strategies for improving learning that can be applied to teacher education (and in some cases have already been applied) and which can go a long ways toward improving teachers' learning (Ericsson, 2014). Carefully sequenced and calibrated practice, also referred to as *deliberate practice*, that builds on one's current level of knowledge and skill in conjunction with expert feedback on performance seems to be foundational to the development of effective performance over time. Drawing on Ericsson (2014), we refer to this as *deliberate practice with performance feedback*. Deliberate practice with feedback has been documented in other performance-based professions, such as surgery, as critical to developing expert performance. It is common knowledge that if you require delicate surgery, you should seek the surgeon who has performed the procedure most often, and there are important reasons for why this is the case. Deliberate practice with feedback in authentic settings allows surgeons to develop routines they can implement fluently and a schema for interpreting and evaluating the surgical process as it unfolds.

For deliberate practice to be effective with teachers, it must be carefully designed to increase in complexity over time while decreasing in level of support (Berliner, 2001). The process of gradually increasing independence of performance has been referred to as *scaffolding* (Gibbons, 2002; Wood, Bruner, & Ross, 1976). Scaffolding allows skilled instructors or coaches to prevent cognitive overload. Gradually increasing the level of complexity of knowledge and tasks over time while demanding increasingly independent performance provides opportunities for teachers to achieve deep levels of knowledge integration without being overwhelmed by the complexity of real teaching environments (Grossman et al., 2009).

Many of the principles and strategies we introduce will be recognizable, as decades of empirical support across disciplines support them. Our argument, however, is not that these principles are sound or new, but rather they should be anchors for special education teacher preparation in ways that are systemic and far-reaching. Moreover, it is important to recognize these principles and strategies help teacher educators make decisions about how to structure and sequence practice-based approaches when they do not have a substantive research base in teacher education to draw on for making such decisions.

Interleaved and distributed practice. Interleaved practice requires learners to discern among different concepts within the same practice session (Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013; Taylor & Rohrer, 2010). For example, when teaching students how to solve mathematics word problems, it is more beneficial to have them practice several types of word problems at one time (e.g., subtraction that results from comparing, part-part-whole, or change problems) as opposed to practicing only one type of problem at a time (e.g., just change problems). Interleaved practice requires learners to develop the conceptual knowledge to discern differences between problems and then decide what knowledge and skills are necessary to

solve them accurately (Roediger, 2014). When learners are able to better discern the underlying structure of problems, they are more able to easily recognize those problems when they occur again and use their knowledge to solve them (Brown et al., 2014).

Distributed practice (Willingham, 2014) means spreading learning out over time. If given 8 hours to study for a test, the principle of distributed practice suggests learning will last longer if study sessions are broken into two 4-hour blocks of study instead of one block of 8 hours. Distributed practice requires learners to tap into their memories to retrieve knowledge about different problems and such opportunities to rehearse existing knowledge leads to deeper, long-term learning (Rohrer, 2009; Willingham, 2014).

Situated in content and authentic contexts. Research comparing experts to novices in most professional domains, including teaching, shows experts' knowledge is highly contextualized (Farrington-Darby & Wilson, 2006) and dependent on experiences they have acquired over time (Fadde, 2007). Experts' conceptual knowledge in a particular domain is well integrated with their experiences. For instance, medical doctors' knowledge of symptoms associated with disease is combined with their experiences treating patients manifesting different combinations of those symptoms. Well-integrated knowledge bases enable experts to rapidly recall information and recognize patterns or fundamental principles (Berliner, 2001; Ropo, 2004) more quickly and efficiently and thereby devote more mental effort to finding solutions (Fadde, 2007). The more opportunities learners have to learn and apply newly acquired knowledge in authentic situations, the better the learning outcome. This is why some research in teacher education has demonstrated the importance of providing preservice teachers with practical teaching experiences that enable them to learn how to use the knowledge they are acquiring in their coursework, both the subject knowledge and the effective pedagogies for enacting that knowledge (Darling-Hammond, Hammerness, Grossman, Rust, & Shulman, 2005).

Promote self-assessment of performance. Performance feedback is essential to helping learners recognize what effective practice looks like (Ericsson, 2014). Research has shown external, expert feedback is not the only kind of feedback that leads to successful learning. Self-assessment or reflection on one's own learning is an equally important factor. Reflecting on one's performance in terms of what did and did not work has been shown to help learners transfer knowledge and skills to new contexts (Scardamalia, Bereiter, & Steinbach, 1984). The beneficial effects of reflection are thought to occur because it requires learners to retrieve knowledge and prior experience from memory, connect these ideas to new experiences, and then mentally rehearse what could be done differently (Brown et al., 2014, p. 27). It should be noted that the type of reflection that promotes successful learning is focused, critical, and goal-oriented (Boud, Keogh, & Walker, 2013), and the ability to analyze performance accurately is important for developing effective self-reflection (Zimmerman & Campillo, 2003). Thus, to become self-reflective, learners will need feedback on and practice analyzing performance so they in turn can more effectively evaluate the quality of their own performance.

Practices in Personnel Preparation That Align With the Science on Learning

Although there is no substantive research base on teacher education, several reviews of research have identified pedagogies that align with the science on learning, and these pedagogies can be incorporated in a sequential way into coursework and field experiences to promote special education preservice teachers' competent practice (Dieker et al., 2014; Leko, Brownell, Sindelar, & Murphy, 2012; Kamman, McCray, Brownell, Wang, & Ribuffo, 2014). For most pedagogies, evidence supporting their effectiveness is at an emergent level but can be considered promising because they make use of several principles known to promote successful learning and effective performance. We concur with

Lignugaris-Kraft et al. (2014) in acknowledging these pedagogies would benefit from additional, more rigorous investigation.

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Deliberate, scaffolded practice opportunities. A thorough review of the special education preservice education literature revealed several studies that incorporated deliberate practice with feedback linked to practical teaching experiences (Leko et al., 2012). Findings from studies reviewed showed teachers made progress acquiring knowledge and skills when there was deliberate practice with feedback built on knowledge and skills preservice teachers were acquiring in coursework (Alexander, Lignugaris-Kraft, & Forbush, 2007; Al Otaiba, Lake, Greulich, Folsom, & Guidry, 2012; Al Otaiba, Schatschneider, & Silverman, 2005; Maheady, Jabot, Rey, & Michielli-Pendl, 2007; Spear-Swerling, 2009). In the studies that follow, preservice teachers had opportunities to develop greater domain expertise by integrating their knowledge in key content areas with practice and these opportunities were structured, calibrated, and sequenced. They also received feedback from more experienced educators or were taught to analyze their own or a peer's instruction (Benedict, 2014; Mallette, Maheady, & Harper, 1999), thus aligning with several principles from the science on learning.

Structured tutoring. One deliberate practice opportunity is coursework coupled with structured tutoring experiences. Within special education, several research teams have investigated the effects of this learning arrangement and found it can (a) increase student performance in reading (Al Otaiba, 2005; Al Otaiba et al., 2012; Maheady, Mallette, & Harper, 1996; Saddler & Staulters, 2008), (b) improve preservice teachers' ability to collect data (Maheady et al., 1996), (c) improve preservice teachers' instructional practices (Al Otaiba, 2005; Saddler & Staulters, 2008; Spear-Swerling, 2009; Spear-Swerling & Brucker, 2004), and (d) increase preservice teachers' knowledge (Al Otaiba, 2005; Al Otaiba et al., 2012; Spear-Swerling, 2009; Spear-Swerling & Brucker, 2004). As an example, Al Otaiba (2005) investigated the effects of a tutoring experience on eight preservice teachers' knowledge of phonics and English word structure. As part of a service-learning project linked to a university-based course, preservice teachers tutored English language learners who were struggling in reading. Preservice teachers implemented a code-based tutorial program for 15 sessions across 10 weeks. Al Otaiba reported multiple benefits of the tutoring experience including students who "gained an average of .18 standard score points per hour of tutoring on word attack, .38 on word identification, and .30 on passage comprehension" (p. 245). The preservice teachers' knowledge of language structure also improved from 57.5% to 99.4% questions answered correctly on the Structure of Language assessment developed by Mather, Bos, and Babur (2001). Analysis of preservice teacher reflective journals indicated the participants developed deeper and more practically informed understandings of individualized instruction, scaffolding, and behavior management.

Such positive outcomes were replicated 7 years later when Al Otaiba et al. (2012) conducted a randomized-control trial that investigated the differential effects of implementing two early literacy tutoring programs on preservice teacher knowledge, application, perceptions of preparedness, and student achievement. One program was highly structured and scripted, drew on evidence-based direct instruction practices, and included explicit code-focused (i.e., phonemic awareness, phonics, and fluency) and meaning-focused (i.e., vocabulary and comprehension) instruction. The other program only provided structured meaning-focused instruction. Although both tutoring programs led to gains in preservice teacher

knowledge and student achievement, effect sizes were larger for preservice teachers and students in the more structured tutoring program that included code and meaning-focused instruction. Preservice teachers in this condition also reported feeling more prepared to teach reading and demonstrated greater ability to apply coursework knowledge.

Coursework coupled with field experiences. A second learning arrangement that introduces increased complexity in preservice teachers' learning experience is coursework aligned with supervised field experiences. Experts assert this learning experience is critical to preparing more effective teachers, because it provides multiple opportunities for preservice teachers to situate their learning in practical experiences (Boyd, Grossman, Lankford, Loeb, & Wyckoff, 2009), and without such opportunities SETs were found to have difficulty applying their knowledge (Leko & Brownell, 2011). Most teacher preparation programs provide practical teaching opportunities, but these experiences vary widely in duration and quality (Darling-Hammond, Chung, & Frelow, 2002), and there is no definitive model for crafting the ideal practically based learning experience. In fact, the 2010 *Report of the Blue Ribbon Panel on Clinical Preparation and Partnerships for Improved Student Learning* (National Council for Accreditation of Teacher Education, 2010) called for more focused research to identify features of effective clinical preparation.

The extant literature does, however, provide some guiding principles that seem to advance special education preservice teacher knowledge and practice. Across several studies the coupling of content-area coursework and carefully crafted field experiences that provided abundant practice opportunities with feedback increased preservice teacher knowledge and skill and in some instances student performance (Alexander et al., 2007; Maheady et al., 2007; Utley, 2009; Van Laarhoven, Munk, Lynch, Bosma, & Rouse, 2007). For example, Alexander et al. (2007) carefully designed a mathematics methods course coupled with a field experience to help preservice teachers learn to use direct instruction and assessment strategies. First, preservice teachers acquired basic mathematics content and pedagogical content knowledge within a methods course. Preservice teachers were then presented with two case studies in which course instructors helped them apply their knowledge of mathematics direct instruction and assessment. Then, preservice teachers analyzed a third case independently and were provided with corrective feedback. Once the course concluded, preservice teachers applied their newly acquired knowledge and skill in a practicum. Field supervisors trained in an observation protocol visited classrooms three to five times and provided preservice teachers with feedback. Preservice teachers demonstrated gains in knowledge and an ability to apply direct instruction practices to classrooms. In addition, preservice teachers' students improved on concepts and skills taught as demonstrated in the curriculum-based assessments (CBAs) collected. This study is an example of how teacher educators can craft preparation experiences that scaffold teachers' learning in specific content over time, ultimately ending in applied practice in real classroom settings.

Performance feedback and reflection. Critical to the development of effective performance is corrective feedback that highlights well-executed aspects of performance and those that need to change. A comprehensive review of performance feedback in special education teacher education demonstrated performance feedback is an effective pedagogy for promoting preservice teacher implementation fidelity of evidence-based practices including direct instruction, differential reinforcement of alternative behaviors, three-term contingency trials, and peer-assisted learning strategies (Cornelius & Nagro, 2014). Performance feedback also increased teacher-specific behaviors identified as opportunities to respond, verbal expansions, and providing student corrections, among others, but the evidence was not as consistent across all reviewed studies (Cornelius & Nagro, 2014).

In special and general education personnel preparation, multiple individuals are positioned

to provide preservice teachers with feedback including course instructors, university supervisors, and cooperating teachers. However, the degree to which they provide effective feedback is unknown. There are, however, some vehicles for providing feedback that have been shown to promote teacher performance.

Peer coaching. Peer coaching is the pairing of preservice teachers so they can provide feedback to one another to improve their instruction and reflective capabilities. Lu (2010) reviewed studies of peer coaching since 1997 and found it can improve preservice teachers' (a) reflective capabilities, (b) instructional skills, and (c) professionalism, while also serving as a mechanism to provide affective support. Lu, however, noted several challenges associated with implementing peer coaching like scheduling conflicts, the need for advanced planning and extensive programmatic support, and resolving issues that arise from preservice teachers who have inadequate knowledge and skills to serve as strong partners. In special education teacher education, peer coaching has preliminary evidence supporting its effectiveness for advancing preservice teacher knowledge and practices (Hasbrouck, 1997; Morgan, Menlove, Salzberg, & Hudson, 1994) and, in one case, also supporting students' comprehension (Mallette et al., 1999). In this study, the researchers used a multiple-baseline design to study the effects of teams of preservice teacher peer coaches who participated in an afterschool literacy tutoring program. The preservice teacher teams tutored elementary students with disabilities twice a week over an 8-week period. In addition to being trained to deliver literacy instruction, the teams were trained to provide feedback as peer coaches following each tutoring session. Results indicated the peer coaching increased preservice teachers' implementation of effective literacy instructional practices and was highly correlated with improved student comprehension as measured by oral fluency rates and comprehension scores.

Bug-in-ear and eCoaching. When special education preservice teachers receive immediate, positive, and corrective feedback on their performance via technology, it positively influences their attitudes and classroom performance (Rock et al., 2009; Scheeler, McAfee, Ruhl, & Lee, 2006). Technology-enhanced feedback and supervision, referred to as eCoaching (Dieker et al., 2014), is a promising way to deliver one-to-one feedback to preservice teachers without requiring supervisors to be physically present in the classroom. When paired with bug-in-ear, eCoaching can go one step further by providing real-time feedback.

In a recent example, Rock et al. (2014) conducted a 3-year, mixed-methods study of the effects of eCoaching with bug-in-ear on 14 presevice teachers' instructional behaviors, classroom climate, student engagement, and perceptions of the intervention. Findings based on univariate ANOVA repeated-measures analyses conducted for five dependent variables (low and high access instructional strategies, use of redirection, use of praise, and student engagement) indicated long-term statistically significant improvements from Year 1 to Year 3 for all variables except use of redirection. The effect sizes for the four significant variables were around .76. Qualitative analyses indicated the preservice teachers valued the feedback they received and felt it supported their learning and implementation of evidence-based practices.

Fostering collaboration and coordinated instruction. Teacher education researchers have used collaborative teaching field placements involving special and general education preservice teachers with the intent of fostering more collaborative instruction, however the degree to which these arrangements deliberately teach special and general education preservice teachers how to design coordinated instruction is less obvious (Brownell, Griffin, Leko, & Stephens, 2011). Lesson study, however, is one strategy that has potential for helping preservice SETs learn to coordinate tiered instruction with general education teachers. Lesson study

is a collaborative, team-based approach to lesson planning, implementation, and analysis that includes peer support (Lewis, 2002). Traditionally, lesson study occurs through iterative cycles in which groups of teachers plan lessons, execute instruction, and then analyze the instruction (Takahasi & Yoshida, 2004). In most cases after the lesson planning is complete, one group member implements the lesson while the other group members observe. Following the lesson, the group reconvenes to debrief and reflect on the lesson's usefulness at promoting student learning (Lewis, 2002). Lesson study is a pedagogy that has potential to address multiple principles from the science on learning, especially when an expert facilitates the lesson study (e.g., teacher educator, inservice cooperative teacher, researcher). Lesson study provides a structure for teachers to engage in repeated practice of specific skills, receive feedback from an expert as well as peers, and self-analyze their instruction. Findings synthesized across several studies of general education preservice teachers support lesson study as a way to promote preservice teacher self-efficacy (Cohan & Honigsfeld, 2007) and reflection (Cohan & Honigsfeld, 2007; Ganesh & Matteson, 2010; Sims & Walsh, 2009), and its flexible and iterative nature make it particularly promising for crafting carefully scaffolded practice within preservice and inservice settings.

Research on lesson study within special education teacher education is limited but corroborates several of the positive outcomes established in general education. It is particularly compelling because it is the one structure we have discussed thus far that enables general and SETs to co-plan, problem-solve, and coordinate instruction across tiered systems. In one study, Benedict (2014) investigated lesson study as way to provide ongoing, collaborative PD in multisyllabic word study to teams of fourth- and fifth-grade practicing general and special educators. The teams of teachers received PD in word study through content modules and then participated in three lesson study cycles. Using constructivist grounded theory methods, Benedict learned that by the end of the third lesson study cycle, teachers' understandings of content, student needs, and pedagogy became more aligned and integrated with the PD modules. Teachers also became more skilled at collaboratively identifying and appropriately planning for individual students' needs and more adept at analyzing the effect of their instruction on students' performance. The collaborative structure that lies at the heart of lesson study makes it an ideal way for general and special educators to develop similar mindsets about instruction and students' needs (Benedict, Park, Brownell, Lauterbach, & Kiely, 2013).

Moving Towards a More Systemic, Practice-Based Approach

The teacher education pedagogies we have presented adhere to principles derived from the science of learning. Structured tutoring, coursework coupled with field experiences, lesson study, peer coaching, and bug-in-ear provide opportunities for teacher candidates to engage in interleaving skills and to receive performance feedback, which should assist them in developing the ability to assess their own instruction. In addition, it seems likely these practice opportunities could be sequenced to scaffold teacher learning over time; however, less is known about the most effective ways to sequence and time practice-based opportunities.

Ross and Lignugaris-Kraft (in press) provided the only study we could identify where an entire program was restructured to ensure a cohesive, well-sequenced, practice-based approach to preparing special and general education teachers for MTSS instruction. In this program, teacher candidates were hired by the schools in Year 1 of their program to provide Tier 2 instruction in reading and mathematics while they completed coursework that was aligned with these experiences. In addition, they received weekly feedback on their performance from a supervisor. In Year 2, they were hired full-time to work in general education classrooms and provide Tier 2 instruction while receiving biweekly feedback from a supervisor, completing a

student portfolio, and receiving support from a mentor teacher that helped them analyze student data and discuss ongoing challenges. Direct observations of these teachers demonstrated teacher candidates outperformed novice and veteran teachers on opportunities to respond, interactions with students, and student on-task behavior. Both principals and teacher candidates, in surveys and interviews, saw the program as preparing them to be effective beginning teachers. Although these results are promising, more research is needed on how well-structured practice opportunities such as those described here can be sequenced to promote competent beginning special education teacher performance.

Building Capacity for a Focused, Practice-Based Approach to Preparation

Moving toward a practice-based approach to special education preparation is ambitious and may leave teacher educators wondering how to implement it, particularly in unsupportive contexts (i.e., dwindling college of education budgets, lack of support for teacher education, declining enrollments, insufficient numbers of high-quality field placements). We suggest changes that could support the practice-based approach to special education personnel preparation we are proposing. We offer these suggestions with the caveat "Rome was not built in a day"; large-scale, sustainable changes will require long-range vision, considerable effort on the part of teacher educators, and more research to justify the actions taken. Without taking initial steps towards transformation, however, the field will be unable to prepare teachers capable of supporting students with disabilities in achieving the CCSS.

Maximize the Potential of Technology

As we have argued, a practice-based approach to special education personnel preparation is something needed but currently not in place at a systemic level, and that is to some degree difficult to accomplish given challenges associated with field experiences (Grossman & McDonald, 2008; Leko & Brownell, 2011). Maximizing the use of technology to create carefully structured effective practice opportunities will be critical to moving to more practice-based approaches that are sustainable. Bug-in-ear and eCoaching represent the promising, cost-efficient technologies that can provide teacher candidates with performance feedback.

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Further, current technological innovations such as simulations and virtual learning can take scaffolded, deliberate practice opportunities in teacher education to a new level of sophistication in the future. The use of simulators and virtual learning has been widely adopted in professions such as the military, astronautics, and medicine (Gallagher et al., 2005). Virtual learning can streamline and standardize training procedures as well as provide a minimal-risk learning environment. For example, researchers in the field of radiology have developed and validated a virtual reality simulator to provide training in interventional radiology (Johnson, Guediri, Kilkenny, & Clough, 2011) without risk to real patients. At the University of Central Florida, researchers working with scientists from other disciplines developed the TeachLivE™ virtual lab that provides simulated learning experiences with student avatars for preservice and inservice teachers (Dieker, Rodriguez, Lignugaris, Hynes, & Hughes, 2013). Such experiences closely mimic real-life classrooms but can be tightly controlled so teacher education students have opportunities to practice discrete skills, develop routines, receive feedback, and repeat practice with situations that present increasing complexity all without risk of harm to students (Dieker, Hynes, Hughes, & Smith, 2008).

Align Policy Systems to Promote Clear Expectations for Preparation

Current licensure and certification patterns do not promote a shared, focused vision of effective teaching in special education (Brownell et al., 2010). They differ from state to state, and no two states are quite alike. In addition to being arbitrary, certification patterns are broad, certifying teachers to provide instruction to a wide range of students across multiple grade levels in multiple types of settings (e.g., resource, co-teaching). Broad certification patterns are designed to minimize shortages and provide flexibility to school administrators, as more focused certification requirements might reduce the number of available SETs in certain areas. Consequently, SETs are prepared broadly to be "a Jack of all trades, a master of none." Although we appreciate the challenge schools face in finding and retaining highly qualified SETs, we believe the undifferentiated certification structures that help solve that problem create another: Diluting the preparation of SETs (Brownell et al., 2010). Shortages, however, have abated over the past decade (Boe, 2014); thus, renewing a conversation about how best to structure special education certification to support more focused preparation seems appropriate. Ensuring certification systems are designed to support SETs in acquiring the knowledge and skills needed to be interventionists in MTSS is one way of focusing the licensure process and, consequently, teacher preparation (Brownell et al., 2010).

Sindelar, Steinbrecher, and Rosenberg (2014) recently proposed such a differentiated structure in which they considered (a) age or grade differentiation, (b) student ability, (c) content-area requirements, and (d) career structures. They argued that, because secondary special educators must demonstrate competence in the subjects they teach, certification structures could be improved by differentiating elementary from secondary preparation. They also advocated differentiating certification for teaching students who take standard and alternative assessments, as the needs of students taking these different assessments differ so much. Finally, they recommended teachers seeking elementary or standard assessment certification be required first to obtain certification in elementary education. Doing so would provide a firm understanding of the classroom teacher's role in MTSS service delivery and foster the kind of in-depth understanding of curriculum collaboration that that level requires. Finally, they advocated a two-tier system in which full professional certification was differentiated from initial certification and made contingent on the completion of rigorous PD or an induction and mentoring program.

Simply changing licensure standards, however it is done, will be insufficient. Program approval standards, mechanisms for evaluating special education preparation routes and SETs, and standards for beginning teacher induction and PD must reinforce the knowledge and skills special education preservice teachers need to be successful interventionists in a MTSS framework.

Fortunately, federal policy makers understand the importance of aligning policy and practice to improve special education personnel preparation. The Office of Special Education Programs-funded Collaboration for Effective Educator, Development, Accountability, and Reform (CEEDAR) Center is an example of how federal support can be dedicated to bringing together key stakeholders for the purpose of coordinated, targeted, and aligned personnel preparation systems for students with disabilities. The CEEDAR Center works with state teams composed of policy makers and preparation providers to help states ensure their policies and practices support the preparation of special education (and general education) teachers to provide evidence-based instruction to students with disabilities.

Coordinate Within and Across Levels of Preparation

Preservice preparation is just the first step in a teacher's journey towards effective performance. For SETs to amass the expertise they need to provide highly effective Tier 3 instruction, plan with their general education colleagues to provide cohesive core and

tiered instruction, and improve their performance over time, preparation must be extended beyond preservice years. Induction and inservice PD must be the next step in a coordinated system of personnel preparation. Identifying high-leverage practices and content for preservice programs can foster a common vision of effective instruction that can be supported and built on in induction and PD. Some of this work has already begun through coordinated efforts among the Council for Exceptional Children, its Teacher Education Division, and the CEEDAR Center. These organizations are working together to identify and vet a set of high-leverage practices for SETs that can be aligned with the work of Deborah Ball and her colleagues.

Such alignment with general education is a trend we envision becoming increasingly important in the future. We have identified increasing intersections between the work of general and special educators in terms of coordinating effective core instruction through the identification of high-leverage practices and content and by arguing a more carefully sequenced practice-based approach to teacher education (Ball & Forzani, 2009; Grossman & McDonald, 2008). In the future, general and special education teacher educators are going to need to find better and more effective ways of coordinating preparation at the preservice level.

Promoting a more seamless transition from preservice to inservice preparation will also require collaboration among state education agencies, preparation providers, and local education agencies. Coherent practice-based learning opportunities across settings will be essential to supporting and extending what SET graduates have learned about high-leverage practices and high leverage content in induction and PD (Brownell et al., 2014). To develop such a seamless system of teacher learning opportunities, induction and mentoring programs will need to be focused on improving instruction within MTSS frameworks, with equal or less attention on providing emotional support. Further, school districts will need to determine ways to provide teachers with ongoing learning supports in environments that are resource poor. Using technology to provide access to high-quality PD as well as opportunities for self-assessment of and reflection on classroom practice (e.g., virtual coaching, video self-reflection; Rock et al., 2009; Scheeler et al., 2006) are different ways districts can support teachers beyond their initial preparation.

Use Research Evidence and Accountability as Leverage for Change

We have presented useful pedagogies, supported by the science on learning, for redesigning special education teacher education to become a more practice-based endeavor. What the field lacks, however, is a substantial research base to support the effectiveness of many of these ideas and bring them to scale in schools and colleges of education across the country (Brownell et al., 2010). To ensure more substantive special education personnel preparation has a future, it is critical that time and attention be devoted to improving and expanding the literature substantiating the work of SET educators, especially in ways that provide evidence this work leads to effective practice in schools. Large-scale studies in SET education, though potentially influential, are not always feasible. Such studies are often too expensive and resource-intensive for SET education scholars to conduct without considerable extramural support. Funding opportunities available through federal agencies like the Institute of Education Sciences do not seem to be a viable solution now or in the future. For one, funding has dwindled (Sparks, 2014), thereby ramping up an already highly competitive process. In addition, research designs most likely to be awarded funding (e.g., randomized-control trials) are very difficult to conduct in teacher preparation (Lignugaris-Kraft et al., 2014). An alternative to expensive, large-scale research is the accumulation of small-scale, yet rigorous, qualitative, quantitative, and single-case studies that, when taken together, create a "critical mass" of empirical support. This approach

will be more feasible and sustainable for SET education researchers across institution types. As argued by Lignugaris-Kraft et al. (2014), in this approach, a large number of teacher education faculty can collaborate to develop the research base necessary to support effective teacher preparation and PD. Teacher education faculty might reassert their importance in preparing teachers if they led efforts to (a) develop practice-focused innovations for promoting effective teacher performance and (b) provide evidence these innovations were effective in developing preservice teachers' knowledge, changing their practices both in structured settings and more complex settings, and fostering student learning in PK-12 settings. Such an ability to demonstrate effectiveness in preparing teachers would go a long way in a context where state and federal policymakers are insisting preparation providers be held accountable.

Conclusion

If educators believe the implementation of MTSS and more effective, rigorous core instruction is essential to the progress of students with disabilities, then one thing is clear: Special and general education teachers must enter the classroom better prepared to operate in such a system, and the supports in the PK–12 system for building expertise must be amped up. To develop such a system, the field needs to rethink substantially the intellectual and financial resources devoted to SET education, both its practice and the research behind it, and to building systems that can support the ongoing development of teachers. Such a system will require policy, practice, and research to work in symbiotic ways. Reforming special education initial preparation (or any individual entity) in isolation is unlikely to result in any meaningful progress. Productive reform efforts will hinge on special education leaders being present at the policy table and in positions of leadership and influence. Although the future of special education personnel preparation is unknown, groups like the Office of Special Education Programs, the CEEDAR Center, the Council for Exceptional Children and its Teacher Education Division, and the Council for Chief State School Officers are putting increased emphasis on improving evidence-based practice in this area. We are cautiously optimistic and believe the footholds provided by the accumulated research discussed will support a step towards enhanced proficiency for beginning SETs, especially if stakeholders at the policy, school, and university levels reach for it together.

Special and general education teachers must enter the classroom better prepared to operate in such a system, and the supports in the PK-12 system for building expertise must be amped up.

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