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Loretta Mason-Williams, Jacqueline R. Frederick and Candace A. Mulcahy

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# Building Adaptive Expertise and Practice-Based Evidence: Applying the Implementation Stages Framework to Special Education Teacher Preparation

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## Abstract

Preparing pre-service special educators to meet classroom demands requires teacher preparation programs to design experiences for students to demonstrate routine expertise, while also building adaptive expertise. In this article, the authors describe a capstone project that meets these needs and prepares pre-service special educators for their role in the development of practice-based evidence. These aims align well with the Council for Exceptional Children's Professional Standards. To describe this project and how it meets these aims, we used the Implementation Stages framework. Outcomes reflect an increase in pre-service special educators' ability to research and design usable interventions based on evidence-based practices. Implications for special education teacher preparation programs include the need for faculty to provide instruction in a wide variety of interventions, and to provide channels for the pre-service special educators to disseminate their research within the field.

## Keywords

adaptive expertise, special education, teacher preparation, evidence-based practices

Within special education teacher preparation, the need for a clear vision of teacher quality and frameworks to guide the preparation and evaluation of pre-service special education teachers (SETs) has been noted (Sindelar, Brownell, & Billingsley, 2010). In light of this, De Arment, Reed, and Wetzel (2013) offered a framework of adaptive expertise, expecting pre-service SETs to have both content knowledge (referred to as routine expertise) and the ability to apply it flexibly and creatively (Bransford, Derry, Berliner, Hammerness, & Beckett, 2005). Defined as “the interaction of efficient and innovative uses of knowledge,” adaptive expertise allows professionals to use problem solving and innovation to approach challenges in novel ways

(De Arment et al., 2013, p. 217). Considered a “gold standard” for professional educators, applying this framework within SET preparation requires programs to create opportunities for students to demonstrate both the routine expertise of special education practices and opportunities to develop their ability to adapt practices to meet the needs of the students and the classroom.

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Field experiences, especially student teaching, may provide such opportunities. For instance, common experiences in teacher preparation programs during student teaching include “solo weeks” and the development of an Individualized Education Program (IEP). These authentic experiences provide a chance for pre-service SETs to demonstrate routine expertise. As they respond to challenges in the classroom, pre-service SETs begin developing adaptive expertise, adapting information learned through coursework and readings to the structure of the classroom. The mentor teacher plays a critical role in this development, assisting the pre-service SET to adjust to the emotions, practices, and critical thinking required of a special educator (Roberts, Benedict, & Thomas, 2014).

Concurrently, there is a growing understanding that special educators must be more than consumers of research—they must also be contributors and work in partnership with researchers to inform the wider research community (Kratochwill et al., 2012). Within classrooms, pre-service and in-service SETs have a unique vantage point of the implications and outcomes of interventions applied in real classroom settings. Referred to as practice-based evidence (PBE), findings generated by classroom teachers can provide opportunities for researchers to assess the efficacy of an intervention in a variety of settings, the supports needed for implementation, and the difficulties teachers may face (Kratochwill et al., 2012; Smith, Schmidt, Edelen-Smith, & Cook, 2013). To prepare SETs to participate in this process, preparation programs, especially at the graduate level, must include assignments and training that allow pre-service SETs to learn how to locate research- and evidence-based practices, to design interventions and implement them within a classroom, and to understand the importance of fidelity to treatment.

Final, cumulative projects in SET preparation programs may provide opportunities for pre-service SETs to demonstrate both their routine and adaptive expertise and to participate in the development of PBE. Similar in many ways to a master’s thesis or action research project, we developed the Capstone

Intervention Project (CIP) to replace a lengthy portfolio process. Rather than focusing on a personal interest or idea, the CIP requires pre-service SETs in a graduate-level special education preparation program to design a student or classwide intervention to implement based on an operationally defined academic, behavioral, or social need. The CIP provides a dynamic, authentic method to evaluate many of the skills necessary to a SET, including (a) identifying specific student and/or classwide needs through a variety of informal assessments; (b) selecting appropriate, research-based interventions; (c) collecting and analyzing data; and (d) determining the effectiveness of an intervention and identifying next steps. In addition, the CIP requires the pre-service students to demonstrate their adaptive expertise as they implement the CIP within the realities and constraints of a classroom, thereby potentially contributing to PBE.

The CIP also emphasizes the skills and dispositions expected of special educators, aligning well with the recently adopted *Initial and Advanced Preparation Standards* from the Council for Exceptional Children (CEC; see Table 1). At both levels, the standards emphasize teacher use of research- and evidence-based teaching practices and the role of SETs in the research process. At the Initial Level, beginning SETs must be prepared to “select, adapt, and use a repertoire of evidence-based instructional strategies to advance learning of individuals with exceptionalities” (CEC, n.d.-b, p. 6). After gaining teaching experience, individuals who meet standards for Advanced Level special education specialists must be prepared to “apply knowledge of theories, evidence-based practices, and laws to advocate for programs, supports, and services for individuals with exceptionalities” (CEC, n.d.-b, p. 3). In addition, according to *Standard 4: Research and Inquiry* and *Standard 5: Leadership and Policy*, special education specialists use evidence-based practices in their instruction and assist in the research process and provide leadership. Therefore, special education preparation programs, especially at the graduate level, must ensure SETs have opportunities to be prepared to meet these standards.

**Table 1.** Council for Exceptional Children (CEC) Initial and Advanced Level Special Educator Preparation Standards.

Initial level	Beginning special education professionals . . .
1. Learner development and individual learning differences	. . . understand how exceptionalities may interact with development and learning and use this knowledge to provide meaningful and challenging learning experiences for individuals with exceptionalities.
2. Learning environments	. . . create safe, inclusive, culturally responsive learning environments so that individuals with exceptionalities become active and effective learners and develop emotional well-being, positive social interactions, and self-determination.
3. Curricular content knowledge	. . . use knowledge of general and specialized curricula to individualize learning for individuals with exceptionalities.
4. Assessment	. . . use multiple methods of assessment and data sources in making educational decisions.
5. Instructional planning and strategies	. . . select, adapt, and use a repertoire of evidence-based instructional strategies to advance learning of individuals with exceptionalities.
6. Professional learning and ethical practice	. . . use foundational knowledge of the field and the professional Ethical Principles and Practice Standards to inform special education practice, to engage in lifelong learning, and to advance the profession.
7. Collaboration	. . . collaborate with families, other educators, related service providers, individuals with exceptionalities, and personnel from community agencies in culturally responsive ways to address the needs of individuals with exceptionalities across a range of learning experiences.
Advanced level	Special education specialists . . .
1. Assessment	. . . use valid and reliable assessment practices to minimize bias.
2. Curricular content knowledge	. . . use their knowledge of general and specialized curricula to improve programs, supports, and services at classroom, school, community, and system levels.
3. Programs, services, and outcomes	. . . facilitate the continuous improvement of general and special education programs, supports, and services at the classroom, school, and system levels for individuals with exceptionalities.
4. Research and inquiry	. . . conduct, evaluate, and use inquiry to guide professional practice.
5. Leadership and policy	. . . provide leadership to formulate goals, set and meet high professional expectations, advocate for effective policies and evidence-based practices and create positive and productive work environments.
6. Professional and ethical practice	. . . use foundational knowledge of the field and professional Ethical Principles and Practice Standards to inform special education practice, engage in lifelong learning, advance the profession, and perform leadership responsibilities to promote the success of professional colleagues and individuals with exceptionalities.
7. Collaboration	. . . collaborate with stakeholders to improve programs, services, and outcomes for individuals with exceptionalities and their families.

The purpose of this article is to describe the CIP and how it provides an opportunity for the pre-service SETs to demonstrate their routine expertise in a classroom situation, while also building adaptive expertise. Moreover, the CIP can prepare pre-service SETs for their role in the development of PBE, a goal aligned with the CEC Professional Standards. To

describe the CIP and how it meets these aims, we used the Intervention Stages framework, one of the Active Implementation (AI) frameworks developed by implementation scientists. In special education, researchers at the Scaling Up of Evidence-based Practices Center (SISEP Center; <http://sisep.fpg.unc.edu>) adopted the AI frameworks to guide

system-level change when working with state departments of education (for a complete description, see Fixsen, Blase, Metz, & Van Dyke, 2013). Although the scope and resources available within a teacher preparation program differs substantially from the resources available to the SISEP Center, the AI frameworks provide useful tools for assisting pre-service SETs to complete the CIP or similar projects. Using the Implementation Stages Framework, we describe the process of completing the CIP and how it (a) provides an opportunity to evaluate the routine expertise of our students while also building their adaptive expertise, (b) promotes the research skills necessary to contribute PBE, and (c) aligns with CEC's Initial and Advanced Professional Standards for SETs. We conclude by discussing the implications of including similar projects in special education preparation programs.

## Implementation Stages and the CIP

The Implementation Stages framework guides the activities pre-service SETs undertake to complete the CIP, as they move from learning about the variety of research- and evidence-based interventions (Exploration) to implementation and reflection (Full Implementation). The framework consists of four phases to organize the activities necessary to successfully implement new programs (Exploration, Installation, Initial Implementation, and Full Implementation; <http://implementation.fpg.unc.edu/module-4>). As the students move through the stages, they must demonstrate their adaptive expertise and engage in a process that may lead to contributing PBE. Table 2 provides a general timeline for the CIP process, along with a description of the activities completed during each phase and the CEC standards addressed.

### Stage I, Exploration: Identifying Challenges and Seeking Solutions

During this first stage, stakeholders communicate the strengths and needs of the current

system. This includes collecting assessment information, identifying strengths, and determining needs (A.I. Hub, n.d.; Fixsen et al., 2013). Stakeholders identify the appropriate research- and evidence-based interventions that might be appropriate and investigate the types of resources and people needed to successfully implement the essential components of the intervention. Essential to this stage, all members of the intervention team must buy-in to the intervention selected and support the necessary changes (Fixsen et al., 2013).

For students completing the CIP, the Exploration Stage occurs in the first few weeks of student teaching. Prior to the semester, the pre-service SETs attend orientation meetings to review the CIP expectations, discuss the meaning of research- and evidence-based practices, and learn about the Human Subjects Review process (see the appendix for an example seminar schedule along with required tasks to be completed). Once in their placement, pre-service SETs rapidly become acquainted with the classroom and school setting, the variety of professionals they will interact with (including related service providers, paraprofessionals, and co-teachers), and the curriculum. Pre-assessment data and discussions with the cooperating teacher help generate potential ideas for the CIP. After gaining familiarity with the students, classroom, and routines, the pre-service SETs gather informal data on a student, small group, or class in need of intervention. Using those data, they investigate available research- and evidence-based practices that address the behavior of interest, are appropriate for their setting, and meet identified student or classroom needs. Understanding how to interpret and apply assessment data to determine appropriate interventions for individual learners aligns with 1, 2, and 5 of CEC's Initial Level Standards and 3 and 4 at the Advanced Level.

To be critical consumers of research and potential producers of PBE, novice special educators must understand what makes a practice research- or evidence-based and where to locate information. Seminar topics and required readings include review of the existing standards for research- and evidence-based

**Table 2.** The CIP Activities, Implementation Stages, and the CEC Standards.

Implementation Stages Framework	Exploration	Installation	Initial Implementation	Full Implementation
Timeline CIP activities	Orientation to Week 3 Review CIP expectations  Discuss evidence-based and research-based practices, human subjects review process Become acquainted with student teaching setting, personnel, and students	Weeks 4-6 Meet with seminar leader to discuss IRB proposal  Submit protocol to university IRB  Training on intervention implementation for self and others involved (including identified student or class, cooperating teacher, paraprofessionals)	Weeks 7-11 Gain IRB approval, parent/guardian consent, and student assent (if appropriate) Begin intervention  Make adjustments to intervention based on initial implementation, data analysis, reflection on instructional practice, and feedback from others	Weeks 12-15 and beyond Reflect on findings of CIP  Create research poster  Write research paper  Participate in Research Forum  <i>Note.</i> Some pre-service SETs also present their findings at the state CEC conference and develop manuscripts for publication at this point
Aligned CEC standards	Initial Level 1, 2, 3, 5 Advanced Level 2, 3, 4	Initial Level 5, 6 Advanced Level 3, 4, 5	Initial Level 2, 4, 5, 6, 7 Advanced Level 1, 3, 5, 7	Advanced Level 3, 4, 5, 6

*Note.* CIP = Capstone Intervention Project; CEC = Council for Exceptional Children; IRB = institutional review board; SET = special education teachers.

practices, as well as how to use resources such as the What Works Clearinghouse and the National Secondary Transition Technical Assistance Center (NSSTAC). In addition, students investigate websites and “teacher friendly” journals, such as *Teaching Exceptional Children*, *Beyond Behavior*, and *Intervention in School and Clinic* to seek out appropriate interventions. Independently, students reflect on which intervention may be most appropriate to their situation and how it can be applied, often seeking guidance from the seminar leader and other faculty members before choosing a specific intervention. The student teachers must demonstrate that the intervention selected is research-based by finding and evaluating at least three peer-reviewed manuscripts on the implementation of their selected interventions. Learning to evaluate the evidence available before trying to implement research- and evidence-based practices is an important first step to building PBE (Kratochwill et al., 2012).

This initial step in the CIP process forces the pre-service SETs to move beyond simply listing the steps or characteristics of an intervention, common coursework activities, to designing interventions that fit the setting and student needs. This step often requires the students to shift from the more comfortable realm of their routine expertise (knowledge of interventions) to the more challenging space where the students must balance innovation with efficiency when determining which intervention will “work.” Understanding how to balance innovation and efficiency is the trademark of an adaptive expert as these individuals respond “flexibly to variable contexts” and “know how to constructively consider and account for multiple perspectives and potential solutions and modify their existing procedural skills or invent new procedures” (De Arment et al., 2013, p. 220). As the pre-service SETs select which interventions to apply, many express uncertainty and self-doubt, questioning whether their selected intervention will work and make the change desired. This is one of the most “real” components of the CIP, as it mirrors the decision-making process a SET encounters on a daily

basis. As an evaluative tool for faculty, success at this step indicates which students can identify appropriate intervention (their routine expertise), but also supports the development of adaptive expertise as students must reflect on their teaching style, the classroom demands, and the routines in place to support the intervention. During seminar, the CIP is used to discuss the role of professional judgment, decision making, and providing a free appropriate public education (FAPE) to students with disabilities. These discussions align with the CEC standards for identifying and adapting evidence-based practices (Initial Level, Standard 5) and for evaluating and improving practices for individuals with disabilities (Advanced Level, Standard 4). Moreover, as many of the pre-service SETs choose to implement interventions within the context of the classroom, they also demonstrate curricular content knowledge (Initial Level, Standard 3; Advanced Level, Standard 2).

Before moving to the next stage, the pre-service SETs must design what implementation scientists refer to as a “usable intervention.” Usable interventions must be “teachable, learnable, doable, and be readily assessed in practice” (AI Hub, n.d.). This requires the pre-service SETs to have a substantial understanding of the program or intervention, including an ability to define the essential functions of the intervention, to establish operational definitions, and to suggest ways to practically assess performance (AI Hub, n.d.). To do this, the pre-service SETs use the three selected research studies along with trade books, webinars, and additional peer-reviewed research articles (a minimum of 10 sources) that describe the implementation of the selected intervention. With their cooperating teacher, they must work out the details of how the intervention will be implemented, such as where it will take place, the assessments and data to be collected, and who will be involved. Quickly they realize how limited time, space, and resources affect the ability of SETs to apply interventions as they are described in textbooks and journal articles. In defining a usable intervention, the pre-service SETs

must determine how to balance treatment integrity with the contextual realities of the classroom and their role as a SET, all skills essential to developing adaptive expertise. Achieving this balance, or at least attempting to, may also help build PBE as the pre-service SETs must reflect on whether the modifications they make alter the effectiveness of the intervention (Kratochwill et al., 2012).

### *Stage 2, Installation: Preparing for Implementation*

According to the Implementation Stages framework, the next step requires stakeholders to acquire and develop the resources needed to fulfill commitments made at the exploration stage. This includes the “practical preparation”: developing communication pathways, finding space, and purchasing any materials (AI Hub, n.d.). This step also includes preparing the individuals who will apply the new practice (including administrators, classroom teachers, and paraprofessionals) by providing training and identifying any additional support they will need to implement the intervention successfully and with fidelity.

During the Installation phase, the pre-service SETs must submit a protocol to the university’s institutional review board (IRB). This expectation pushes them to define clearly their usable intervention and their plan for training and data collection prior to implementation in the classroom. Although applying for IRB approval places considerable stress on the students, creating the protocol requires them to sort through many of the constraints they will face during implementation and establish a well-defined plan for the CIP. During seminar, the pre-service SETs review a model IRB that describes an intervention similar to one they might design. This allows the seminar leader to demonstrate how the literature review helps inform the intervention, the collection of data, and the assessment of student progress. Prior to submitting the IRB to the university committee, pre-service SETs meet individually with the seminar leader and submit drafts for feedback. Working through these issues and designing an IRB protocol

provides an opportunity for the seminar leader to support the development of the pre-service SETs’ adaptive expertise, as designing the protocols requires a careful balance between maintaining fidelity to treatment while also considering the constraints of the classroom. This also aligns well with the Advanced Professional Special Educators by CEC, which expects these individuals to be involved in the research process (Standard 4).

Also part of the installation process, the pre-service SETs often need additional training on their intervention, and may also need to provide training to others who will implement the intervention within the classroom. For instance, a pre-service SET using a self-monitoring strategy might need to train the identified student, the cooperating teacher, and any paraprofessionals involved in the classroom on the research-based methods for this intervention. The pre-service SETs look to resources available online (such as the IRIS Center, <http://iris.peabody.vanderbilt.edu/>) and in journals and trade books to assist them with this process. Other sources of potential training might include participation in professional development offered by districts and professional organizations. Expecting the pre-service SETs to take on this responsibility aligns well with the framework of adaptive expertise and the CEC Standards at both the Initial and Advanced Levels (Initial Level, Standards 5 and 6; Advanced Level, Standards 3 and 5).

During seminar, the focus shifts more to the experience of student teaching as the pre-service SETs wait for decisions from the IRB committee and then consent from parents or guardians and student assent. One meeting, however, focuses on fidelity to treatment and single-case research designs. As the pre-service SETs have an intervention plan worked out, discussion of fidelity to treatment can be much more concrete than in previous coursework. In addition, many of the pre-service SETs must implement scripted instructional programs, making the discussion even more tangible. The pre-service SETs brainstorm ways to monitor and assess fidelity to treatment in their settings, identifying times the cooperating teacher or an instructional



aide may be available to provide feedback. This provides an additional way to collaborate with others (Standard 7 from the Initial and Advanced CEC Standards) and adds to the rigor of their interventions (Advanced Level, Standard 4).

The introduction to single-case research design helps the pre-service SETs to better understand some of the research studies included in their literature review. This provides many of them ideas for strengthening their intervention if given more time. In their final paper, the pre-service SETs are often able to identify correctly design limitations in the studies they reviewed. Moreover, many identify their research design as a limitation of their intervention (most conduct an A-B design), suggesting stronger designs for future research. The pre-service SETs' ability to identify and speak of researcher control and the functional relationship between the intervention and the behavior not only aligns well with Standard 4 of the Advanced Level CEC Standards, it provides an opportunity for them to demonstrate adaptive expertise as they offer suggestions for adjusting and strengthening their interventions.

### **Stage 3, Initial Implementation: Piloting the Practice**

During the third stage, actual implementation of the intervention occurs. Now, "staff are attempting to use newly learned skills in the context of an organization that is just learning how to change to accommodate and support the ways of work" (Fixsen et al., 2013, p. 223). Although fidelity to treatment should remain a priority, professional judgment, and practical knowledge should not be ignored when implementing research-based practices (Cook & Cook, 2011; Cook, Tankersley, & Landrum, 2009). Data collected through the process should be used to drive changes to the intervention and help with problem solving (AI Hub, n.d.).

After gaining IRB approval, consent from parents/guardians, and assent from identified students, the pre-service SETs move from

Installation to Initial Implementation. As they begin implementation, the intervention plans often need to be adjusted based on analysis of initial student data and feedback from cooperating teachers and other colleagues and stakeholders. Adjusting instruction based on reflection of teaching practice is a key component in developing adaptive expertise (Bransford et al., 2005; De Arment et al., 2013). The relative ability of the pre-service SETs to do this becomes apparent at this point, as some can make adjustments to their plans more readily than others. This is not unlike the "growing pains" large systems encounter when implementing significant changes to policies and practices. As Fixsen and colleagues (2013) note, there is an "awkwardness associated with trying new things and the difficulties associated with changing old ways of work are strong motivations for giving up and going back to education as usual" (p. 223). During seminar, the pre-service SETs convey this sentiment. For instance, the students often feel confident in their ability to collect data. During student teaching, however, data collection poses significant challenges. Although they practiced data collection during coursework and fieldwork prior to student teaching, balancing daily instruction with the demands of implementation while collecting and analyzing data often proves to be much more challenging than anticipated for many of the pre-service SETs. At the same time, this expectation may provide researchers with ideas for more efficient means and schedules of data collection (thereby offering PBE) and aligns well with the CEC Professional Standards for data collection and analysis (Initial Level Standard 4; Advanced Level Standard 1).

In addition, there may be circumstances beyond the pre-service SET's control that inhibit implementation of the intervention, including lengthy absences, snow days, assemblies, and early dismissals. Such changes to the schedule can affect implementation, data collection, and fidelity to treatment, and may require them to spend additional time reviewing intervention procedures and catching students up, rather than

moving forward as planned. Such circumstances, and the lessons learned by the pre-service SETs as they handle these situations, can play a vital role in contributing PBE to the research community. Moreover, these everyday realities of a classroom teacher pose opportunities for the pre-service SETs to demonstrate their developing adaptive expertise as these situations often require creative solutions.

Difficulties collaborating with colleagues may also challenge the pre-service SETs. For instance, some colleagues may not “buy-in” to the intervention and try to dismiss it. Similarly, some may participate, but not maintain fidelity to the treatment. Within the structure of the CIP, the pre-service SET must take on a leadership role in the implementation of the intervention, making sure cooperating teachers, instructional staff, and related service providers commit to the intervention. This process provides an opportunity to discuss the role and challenges of collaboration, and the need for special educators to be informed advocates. Although not one of the stated purposes of the CIP, collaboration and advocacy are goals of the university’s special education program and align with several of the CEC Standards at both the Initial and Advanced Levels (Initial Level, Standards 2, 6, and 7; Advanced Level, Standards 5 and 7). During seminar, pre-service SETs often ask for suggestions and advice regarding how to maneuver through these tricky situations while still focusing on the unique needs of their student(s). These challenges support the pre-service SETs developing adaptive expertise as they must construct the intervention to meet the needs of the student(s) involved, while also building collaborative relationships.

Throughout these weeks, the pre-service SETs begin working on their research poster (i.e., PowerPoint slides) and must bring draft slides to share with their colleagues during seminar. Using the slides, they describe their intervention to a peer who provides suggestions and feedback about the design and presentation. Although only midway through the intervention, they must bring their preliminary data along with a graph. This serves two

purposes. First, it holds the pre-service SETs accountable for collecting the data on an ongoing basis. Second, this forces the pre-service SETs to reflect on the effectiveness of the intervention thus far and identify whether the intervention is making the expected changes. This powerful lesson affirms what they hear in their coursework about the value of ongoing data collection, but with a concrete example. Moreover, it aligns well with the CEC Initial Level Standards 4 and 5.

In anticipation of the unique challenges of the CIP and student teaching, the seminar leader meets individually with pre-service SETs to discuss progress on the CIP during the implementation stage. At the meeting, pre-service SETs bring raw data, graphs, and other materials for review and discussion. Although time-consuming, these meetings provide opportunities to offer suggestions that support the student’s developing ability to use adaptive expertise.

As the placement draws to a close, seminar often includes conversations about an intervention “not working” or discussing the frustration felt when an intervention does not “fix” a student or make the desired change in behavior. These discussions lead to reflection on the role of data collection, the provision of FAPE to students with disabilities, and the reflection on next steps if there appears to be no change. Discussions of the critical decisions teachers make, the value of evaluating progress, and the need to problem solve plays a pivotal role in supporting the pre-service SETs’ development of adaptive expertise (Bransford et al., 2005; De Arment et al. 2013). According to anecdotal feedback from the student teachers, this firsthand experience with data-based decision making and the power of data to improve instruction may be some of the most valuable lessons from the CIP process. This component of the CIP also aligns well with the CEC standards that emphasize the role a special educator must play in not only implementing interventions but also evaluating the successfulness of the intervention (Initial Level, Standards 4 and 5; Advanced Level, Standards 1 and 3).

## Stage 4, Full Implementation: Cultivating PBE

Once an individual or system reaches the last stage of the Intervention Framework, a significant transformation should occur that affects all levels of the system (Fixsen et al., 2005, 2013). At this stage, systems must adopt “new ways of providing implementation supports to districts, schools, and teachers will be standard ways of work, where teachers and staff routinely provide high-quality services to exceptional children” (Fixsen et al., 2013, p. 223). At the school level, teachers can apply the new intervention effectively and with fidelity allowing students to meet the desired outcomes (AI Hub, n.d.).

The Full Implementation stage aligns closely with Standard 4 of the Advanced Standards for Special Educators, which expects special educators to “design and implement research and evaluation activities to evaluate progress toward the organizational vision, mission, and goal, and the effectiveness of programs, services, and supports for individuals with exceptionalities” (CEC, n.d.-a). Furthermore, as pre-service SETs reflect on the findings of their CIP, their role in advocating for policies and effective practices (Standard 5) becomes evident. Although the brevity of the student teaching semester may limit meeting established goals, many of the pre-service SETs do see significant changes in the student’s target behavior due to their intervention. Without the pre-service SET available to continue to implement the intervention, however, limited resources and lack of buy-in may lead to discontinuation of the intervention. This knowledge often leaves pre-service SETs frustrated. During seminar meetings, the pre-service SETs discuss this frustration and brainstorm other possibilities and potential solutions.

Proud of their accomplishments, many of the pre-service SETs find ways to share their findings with colleagues, such as during professional development opportunities or at staff meetings at their placements. These

opportunities bring a significant feeling of pride for the students and align well with the CEC Advanced Standards (Standards 3, 5, and 6). Moreover, these opportunities provide a way to share information about research- and evidence-based practices along with the PBE they gathered during the implementation of the CIP.

At the end of the semester, program faculty members evaluate the pre-service SETs’ performance on the CIPs in two ways: a research paper and a research poster session (presented during a “Research Forum”). Both the paper and the poster provide opportunities for the students to reflect on the effectiveness of the intervention, their ability to implement it, and the extent to which they maintained fidelity to the treatment, all important components in reaching the Full Implementation stage. The research paper includes a description of their intervention, the findings, and a discussion of the results. Presenting the results as a formal research paper provides another opportunity to provide feedback to the pre-service SETs regarding how to interpret and communicate assessment data, a significant responsibility for special educators during the functional behavioral assessment/behavior intervention planning (FBA/BIP) process and at IEP meetings. Moreover, writing a paper in this style mimics the experience of a researcher presenting research findings in a manuscript. During seminar, the leader reviews relevant example manuscripts with them to prepare the pre-service SETs for this expectation. Similar to the poster experience, we hope this exercise will encourage the pre-service SETs to see how their CIP findings can contribute PBE to the field of special education.

Held on campus, the faculty members structure the Research Forum similar to a research conference poster session. Originally, the faculty designed the event as an efficient way to evaluate the CIPs. Discussions with the pre-service SETs provided an opportunity for the student to demonstrate both routine and adaptive expertise, as the students shared details regarding the specific

intervention and the research supporting it, while also reflecting on how they adapted the intervention to meet the needs of the student or class within the context of a classroom and school. By conducting it as a poster session, the pre-service SETs can discuss with faculty members what worked, what they would do differently, and what should be the next steps.

Over time, the Research Forum has grown. Students and faculty members from other preparation programs often attend and ask questions, allowing the pre-service SETs to share information about their intervention (demonstrating routine expertise) and their findings, including some of the ways they used adaptive expertise to make the intervention work in their setting. In this capacity, the event now provides an opportunity for the pre-service SETs to engage in an activity that meets CEC's Standards for Advanced Professionals (Standards 3 and 5). As a faculty, we hope this experience will make them more likely to participate in local, state, and national conferences. Last, it provides an opportunity to share information about research- and evidence-based practices with the faculty and students from other programs, and family and friends are invited to attend.

### **Pre-Service SET Outcomes**

Completing the CIP provides the pre-service SETs with a dynamic, authentic means for demonstrating routine expertise while supporting their growth as an adaptive expert. Many experts in teacher preparation hold adaptive expertise as a gold standard for professionals in teaching, urging preparation programs to create experiences that allow pre-service teachers to develop the skills needed to reach this standard (Bransford et al., 2005). To demonstrate how the CIP meets this goal, we used the Implementation Stages framework, illustrating how the CIP provides pre-service SETs experience with identifying, implementing, and evaluating the effectiveness of research-based interventions.

Requiring the pre-service SETs to submit an IRB proposal has led to unintentional, positive outcomes. In spite of the short time span before the due date to submit a proposal (typically 3-4 weeks), the due date forces the pre-service SETs to make a decision quickly on which intervention to pursue, to develop a plan, and to research the intervention sufficiently to write a literature review for the IRB protocol. Prior to adding this requirement to the CIP process, the pre-service SETs typically did the literature review after completing the intervention, as they finished their CIP poster and paper. Anecdotal evidence on end of semester narrative evaluations collected from the pre-service SETs over three semesters provides evidence of the value of the IRB process. Although they indicated that the IRB is time-consuming and labor-intensive, most felt the process advanced their understanding of the literature associated with their chosen interventions and the procedures to implement it. In addition, several suggested that completing the IRB protocol helped them define the usable intervention plan more clearly and forced them to learn about the intervention beyond simply reading a paragraph or two in a textbook or hearing about it in coursework.

The CIP also provides an opportunity to develop the pre-service SETs' research skills, including locating research- and evidence-based practices, designing an intervention to implement within a classroom, and evaluating the effectiveness of an intervention. On the narrative evaluation, almost all of the pre-service SETs reported feeling more likely to use research to identify and implement future interventions. Moreover, the CIP provides an opportunity for the students to share their results and may help the pre-service SETs to see how their own classroom-based interventions can provide PBE, information the special education research community needs to make interventions more effective and efficient (Smith et al., 2013). This is important as being a consumer and participant in the research process mirrors many of the standards for the Initial and Advanced Level Special Educators.

## Additional Considerations and Implications

Pre-service SETs in our program have completed the CIP for approximately four semesters. Each semester, the projects increase in rigor and sophistication. This may be due to some of the changes faculty members have made to their courses in light of the CIP. For instance, faculty members now include research papers or annotated bibliographies in their courses. This has helped strengthen the students' abilities to locate peer-reviewed, relevant research. Also, the faculty members who teach courses in assessment and positive behavior interventions convey directly to the students the relevance of their material to the CIP process.

A number of challenges make it difficult to support all of the pre-service SETs adequately as they complete the CIP. For instance, as each student chooses an intervention to implement based on the needs of their placement, the faculty seminar leader must be prepared to provide guidance on a wide range of research-based practices. Although faculty discussed the possibility of requiring a single type of intervention (such as strategy instruction) to be used by all pre-service SETs, the wide range of placements, student needs, and resources available made this option unsuitable. Moreover, the variety of placement options (including resource rooms, self-contained classrooms, and co-teaching arrangements) poses significant challenges, and there is no way to forecast the interventions the pre-service SETs will need to be prepared to implement.

At the same time, the wide range of placements and intervention choices may not align with the research agendas of faculty at a university. For instance, each semester, at least one pre-service SET designs a CIP focused on social narratives for students with autism. Although these projects could add to the PBE, no faculty in our program currently focuses on this line of research. Without a faculty mentor to guide the process, there is reluctance on the part of pre-service SETs to disseminate the information beyond hallway conversations and professional development opportunities

in their school. Opportunities for the pre-service SETs to find researchers from other institutions, whether through online collaborative websites or by making connections at local and national conventions, may need to be designed and promoted as a way to effectively build PBE. Otherwise, valuable lessons learned and data collected may be lost.

To understand the influence of the CIP on outcomes, additional research must be conducted. Currently, pre-service SETs complete a narrative evaluation of their experience at the end of the semester. This information, along with journals maintained throughout the semester and interviews conducted with the pre-service SETs and their cooperating teachers, could provide evidence of the usefulness of the Implementation Stages framework and whether the CIP supports their development of adaptive expertise. In addition, now that the CIP has been in place for multiple semesters, research with the now in-service SETs could help understand whether it made them more likely to use research- and evidence-based interventions, how it affected their development of adaptive expertise, and whether they now participate in the research process.

Armed with necessary research skills and adaptive expertise, SETs can be an invaluable source of PBE, providing information to researchers about the fit and feasibility of implementing research- and evidence-based practices. Although interventions conducted by SETs may not meet researcher standards for treatment integrity, harnessing PBE about the implementation of a strategy or intervention under "normal circumstances"—that is, without the researcher present, can enhance the implementation and dissemination of research- and evidence-based practices (Kratohwill et al., 2012; Smith et al., 2013). This requires SETs to possess both routine and adaptive expertise, as they determine where they must maintain fidelity to treatment and where they can make adjustments to meet the needs of their students and the setting. The CIP and projects similar to it provide opportunities for pre-service SETs to meet these aims, while also demonstrating the CEC Standards for Professional Special Educators.

## Appendix

### Example Seminar Schedule

Week	Topic/activity	Tasks
Prior to semester	Orientation: Overview of student teaching and standards for teachers (New York State & CEC)	IRB/human subjects training certificate (online module)
Prior to semester	Orientation: Overview of the CIP, the IRB process, and the role of research in classroom teaching	
Student teaching begins		
1	Preparing for instruction and data collection: How special educators use data to inform IEPs, FBA/BIPs, and how these could relate to the CIP	
2	Focus on the CIP and IRB: Finding appropriate interventions and preparing a literature review	Intervention summary and literature review worksheets
3	Collecting data to evaluate student performance; Peer-editing and sharing: CIP plan and IRB forms	IRB draft due prior to class meeting; Students bring hard copy of IRB draft to share with peers
4	Submitting to the IRB	Students submit IRB through online portal during seminar
5	Fidelity to treatment and research designs	
6	Meetings with supervisors about student teaching placements	
7	Intervention and literature review sharing	Overview/summary of your CIP intervention and supporting research in 6 PowerPoint slides
8	Video night	10-min video clip of teaching
9	Presenting data and sharing results; review of APA format and directions for the CIP poster	Bring 3 PowerPoint slides that summarize data collection methods and any collected CIP data and graphs
10	Pulling it all together: The CIP article and more information about APA	
11	No class meeting	Individual meetings with seminar leader about CIP
Student teaching ends		
12	Are we ready?	Submit drafts of research paper and poster for feedback and review by seminar leader
13	Special Education Program Research Forum	Research paper and poster due!
14	Career night: Administrator panel presentation and mock interview night	

Note. CEC = Council for Exceptional Children; IRB = institutional review board; IEP = Individualized Education Program; CIP = Capstone Intervention Project; APA = American Psychological Association.

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