Personnel Development Practices in Early Childhood Intervention

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Introduction

This country is currently experiencing an unprecedented expansion of government-sponsored early learning programs for infants, toddlers, and preschool-age children (Allen & Kelly, 2015b; Kagan & Kauerz, 2012b; National Governor's Association, 2010; Shonkoff, 2010; U.S. Department of Education, 2015; World Health Organization, 2012). Research identifying the conditions necessary to support optimal brain development during the early years of life (see Sameroff, 2010; Shonkoff, 2010; Yoshikawa et al., 2013) has created an urgency to begin or expand federal early childhood (EC) initiatives such as Head Start, home visiting programs, Early Learning Challenge grants, and Preschool Expansion grants (Gomez, Kagan, & Fox, 2015). In addition, early childhood intervention (ECI) programs for children with disabilities continue to grow at a rapid rate as more children are identified as eligible for services under the Individuals with Disabilities Education Improvement Act (IDEA): Part C for infants and toddlers or Part B

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(619) for preschoolers (Brown & Woods, 2011). Over the past years there have been documented increases in the numbers of children being identified with established or acquired risks to development such as autism spectrum disorder (ASD) (289.5 % increase in incidence over 12 years) or those living in poverty (25 % of children under 5) (Boyle et al., 2011; www.childstats.gov).

As EC programs continue to grow and serve larger numbers of diverse infants, young children, and families, attention has focused on the qualifications, knowledge, and skills of the workforce who staff these programs (Allen & Kelly, 2015a). For preschool-age children under IDEA (Part B 619), this includes special educators and related service personnel; infants and toddlers (Part C) have many of the same categories of service providers with a major distinction from Part B being the absence of a required special educator. For example, personnel categories for both programs include audiologists, deaf and hard of hearing specialists, EC educators, EC special educators (ECSE), family therapists, infant mental health specialists, nurses, occupational therapists, orientation and mobility specialist, paraprofessionals, physical therapists, psychologists, registered dietitians, social workers, speech and language pathologists, and vision specialists. States can also determine additional personnel categories that can provide services under IDEA, and these have included service coordinators, board-certified behavior analysts, infant mental

health specialists, developmental specialists, ECI para-educator, and other categories unique to infants, toddlers, and preschoolers. While a team approach to service delivery under an Individualized Education Plan (IEP) for preschoolers, or Individualized Family Service Plan (IFSP), is implicit for both the preschool and infant-toddler program under IDEA, Part C explicitly states that the role of the early interventionist is to participate on a team to develop the IFSP and to train the family and others in the provision of early intervention services.

It has been reported that approximately 41,203 teachers and 46,138 para-educators are providing preschool special education services under IDEA (U.S. Department of Education Office of Special Education & Rehabilitative Services Office of Special Education Programs, 2014). While there are no personnel data collected about those providing services under Part C of IDEA, a sample state such as CT (population of birth to 3 year olds = 110,000) employed 1100 practitioners to serve approximately 5034 eligible infants and toddlers in 2013–2014 (www.birth23.org/aboutb23/AnnualData.html). While numbers of related service personnel under Part B of IDEA are available (U.S. Department of Education Office of Special Education & Rehabilitative Services Office of Special Education Programs, 2014), there is no breakdown of types of personnel by age served (e.g., preschoolers). One estimate on speech and language pathologists suggests that approximately 71,000 provide service to children under age 5 (Prelock & Deppe, 2015). In addition to the numbers of personnel serving children under the IDEA, the US Bureau of Labor Statistics reports that there were 438,000 preschool teaching jobs in 2012 and 1,312,700 child care jobs to provide care to children from birth to age 5. The qualifications for these teachers vary by state, though 30 states require at least a bachelor's degree for those teaching in a state funded program, 45 states require specialized training for teachers in pre-K, and 43 states require 15 h of in-service a year (Barnett, Carolan, Squires, Brown, & Horowitz, 2015). It is very likely that these early care and education teachers have taught at least one child who would qualify

for IDEA services and many more who demonstrate one or more risk conditions. The distinction between those children who qualify under a state's eligibility criteria for IDEA and those children who do not varies, both within and across state EC programs.

This heterogeneous composition of children attending EC programs has emphasized the need for an increasingly versatile and competent workforce that can address a range of children's abilities and needs. Unfortunately, recent examinations of the status of the EC workforce have identified a number of issues that have impacted the quality and effectiveness of EC practices, services, and programs (cf. Allen & Kelly, 2015b; Boe, 2014; Bruder, 2010; Bruder, Mogro-Wilson, Stayton, & Dietrich, 2009; Gomez et al., 2015; Woods & Snyder, 2009; Zaslow, 2009). These include: shortages of personnel; inequities in wages and compensation for personnel across EC programs; shortages of preservice EC programs of study, coursework, and practicum opportunities; limited funding for EC continuing education; the absence of integrated and comprehensive personnel development systems that meet national personnel standards and adult learning guidelines; and limited experimental evidence about the effects of preservice preparation and/or in-service continuing education on EC improvements in program quality and child and family learning. While the issues seem daunting, they must be addressed as we continue to build integrated and effective comprehensive state and local systems of EC education for all infants, young children, and families. This charge has been most recently been reinforced by the Institute of Medicine (IOM) and National Research Council (NRC), (Allen & Kelly, 2015b).

The purpose of this chapter is to provide an overview of the evidence that is informing and guiding personnel preparation (preservice) and continuing education (in-service) practices for those providing early intervention (children aged 0–3) or preschool special education (children aged 3–5) to eligible infants and young children and their families under the IDEA. The term professional development (PD) will be used in addition to preservice and in-service, primarily when

used by authors' whose work is cited. The term early childhood intervention (ECI) will be used to refer to the system of specialized services and interventions provided to a child as delineated on his IFSP or IEP. These services and interventions are delivered in a variety of places, including inclusive early childhood community settings such child care and other toddler and preschool programs that meet the IDEA requirements of least restrictive settings or natural environment, as listed on a child's IFSP/IEP which is developed in collaboration with family members and delivered by personnel who meet state requirements to provide services under IDEA.

The focus of this chapter does not negate the acknowledgment of the multitude of other personnel that constitute the EC workforce and are also involved in planning, implementing, and evaluating prescribed curriculum adaptations or specific interventions within the general education curriculum for an eligible infant, toddler, or preschool child under IDEA. Indeed, the focus on personnel development in early childhood has embraced a cross-sector focus (see Allen & Kelly, 2015a); however, the scope of this chapter precludes a widespread examination of EC personnel development practices across the range of personnel categories, including those from related services under IDEA. It should also be acknowledged that the evidence that supports professional development methods and strategies for those providing ECI services under IDEA has been generated, in part, within the field of EC education (Zaslow, Tout, Halle, Whittaker, & Lavelle, 2010), special education (Sindelar, McCray, Brownell, & Lignugaris/Kraft, 2014), general education (Darling-Hammond & McLaughlin, 1995; Guskey, 2014), and adult education (Knowles, 1980). The exclusion of critical work from these fields is not intentional but reflective of the structure of this chapter.

The chapter will first provide a historical perspective of the foundations of ECI personnel practice: legislation, theoretical and conceptual frameworks, and pedagogy. The chapter will then present evidence used to guide ECI preservice and in-service practices that result in positive change with infants, young children, and families. A summary will be followed by recommendations to support the growth of evidence-based ECI personnel practices.

Most importantly, the chapter is written with the perspective that the ultimate goal of any personnel intervention is to improve students' learning by enhancing teachers' use of evidence-based approaches to instruction (Diamond & Powell, 2011, p. 76). This has been represented in the literature as both a conceptual framework and theory of change (see Desimone, 2011; Dunst, 2015; Snyder, Denney, Pasia, Rakap, & Crowe, 2011) as illustrated in Fig. 16.1.

Fig. 16.1 Theory of change for early childhood personnel development
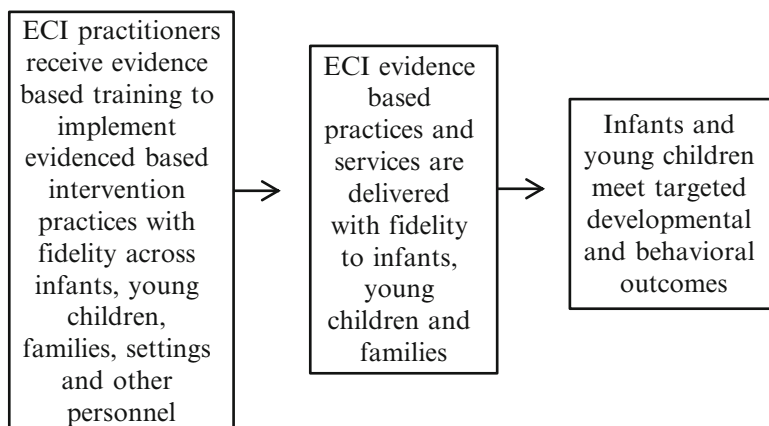
Historical Foundations of Personnel Development Practices

Legislation

An overview of the history of legislation related to early childhood special education is contained in Chap. 1 of (McLean et al., this volume). The current legislation for early childhood special education was passed in 2004 as the Individuals with Disabilities Education Improvement Act ((P.L. 108–446), which deferred to and adopted many of the provisions for general education students passed in 2001 as P.L. 107–110, the Amendments to the ESEA (referred to as the No Child Left Behind Act or NCLB). For example, the IDEA amendments required that special education services be based on scientifically based research findings as defined under NCLB: research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs. To guarantee this provision, IDEA required that special education teachers meet the NCLB standards for a highly qualified teacher. It also required that all other personnel are appropriately and adequately prepared and trained to have the content knowledge and skills to serve children with disabilities and meet qualifications consistent with any state-approved or state-recognized certification, licensing, registration, or other comparable requirements that apply to the area in which such personnel are providing either special education and related services (Part B) or early intervention (Part C) services.

The 2004 amendments of IDEA also added Part E to establish the National Center for Special Education Research (NCSER) within the Institute of Education Sciences (IES). The NCSER's mission was to sponsor research to expand knowledge and understanding of the needs of infants, toddlers, and children with disabilities in order to improve their developmental, educational, and transitional outcomes, sponsor research to improve and support the implementation of IDEA, and evaluate the implementation and effectiveness of IDEA (36th Annual Report to Congress on the Implementation of IDEA, 2014, p. 201). Studies under both the educational

research program and the special educational research program under IES follow the same conceptual progression beginning with development studies that use an iterative participatory approach to develop interventions, to research that studies the efficacy of an intervention under ideal conditions, and to trials that examine the impact of scaled up efficacy studies implemented in authentic settings under routine conditions. While studies can be funded without progressing through this sequence, the progression unfolds over 13 years if the research focus was funded continuously. Other IES competitions include exploratory research, secondary data analysis, and measurement, as well as training and research programs for doctoral, postdoctoral, and early career professionals. IES also funds the National Center for Research on Early Childhood Education. During the fiscal year of 2013, 18 research grants were funded under NCSER, representing 5 % of those that were submitted. Five of these awards were in the area of ECI, and three explicitly include the training of teachers.

While IDEA has always contained provisions for both preservice and in-service learning for those in ECI through the award of discretionary grants to Institutions of Higher Education (IHE) and state systems of special education and early intervention, the development of statewide comprehensive systems of personnel development (CSPD) which had been required from the inception of IDEA in 1975 is no longer required in Part B. The current statute contains provisions under Part D for competitive grants to be awarded to IHEs for preservice training that addresses scientifically based knowledge and skills. In-service funds are available for states to increase and improve the knowledge and skills of special education and regular education teachers, principals, and para-educators to plan, develop, and implement effective and appropriate IEPs and in the use of effective instructional strategies, methods, and skills.

All IDEA training funds are awarded under the PD guidelines established under NCLB: PD is high quality, sustained, intensive and content focused to advance teacher understanding of effective   scientifically   based   instructional

strategies; it is aligned with state academic and student performance standards; it provides follow-up training to teachers to ensure that knowledge and skills are applied in the classroom; and it is developed with extensive participation of teachers, principals, parents, and administrators of schools. Most important is the requirement that PD is continuously evaluated for impact on teacher effectiveness and student achievement.

Theories and Frameworks

Adult Learning

Guidance on adult learning and teacher PD was produced by the Commission on Behavioral and Social Sciences and Education of the National Research Council (NRC) after a 2-year study conducted by the Committee on Developments in the Science of Learning (Bransford, Brown, & Cocking, 1999). The findings of the study produced recommendations for effective adult learning activities, and a second book produced by the study applied the findings to education (see Bransford, Brown, Cocking, Donovan, & Pellegrino, 2000). In particular, the use of inquiry, experimentation, and research to guide learning was emphasized, along with job-embedded PD that was sustained, intensive, and supported by modeling, coaching, feedback, and problem-solving around student-specific needs.

This work on adult learning was preceded 40 years earlier by Malcolm Knowles (1962) and others who studied the learning processes of adults. Knowles defined an adult educator as one who has responsibility for helping adults to learn and, as such, has a mission to meet the needs and goals of the individual, the needs and goals of institutions, and the needs and goals of society (Knowles, 1980, p. 27). Knowles felt that these tasks should be guided by theory, which he defined as a comprehensive, coherent, and internally consistent system of ideas about a set of phenomena (Knowles, 1973, p. 6). Knowles' theory, andragogy, stressed self-directed learning and was based on thorough reviews of the literature and research on learning theory (Knowles, 1962). Other assumptions that formed the basis of Knowles' theoretical framework included the adults' need to know why they needed to learn something (motivation), the need to have learning be experientially referenced to prior learning, and the need to have immediacy of the learning to application and problem-solving (Knowles, 1984, p. 12). He also stressed the importance of the adult educator to the learning process and provided guidelines which are on Table 16.1.

Knowles' theory on self-directed learning was expanded and applied to research on teachers (Wood & Thompson, 1980). They recommended that PD focus on job-related tasks that were important, with opportunities for teachers to practice what they were learning. Additionally, they suggested the use of small group learning where teachers could learn from each other by sharing feedback in areas needing improvement (p. 337). Lastly, they suggested that PD should provide learning choices to accommodate different adult learning styles.

Joyce and Showers (Joyce & Showers, 1980) reviewed over 200 studies on PD and categorized them according to their impact on student learning.

Table 16.1 Functions of the adult educator

• Motivating the learner by creating an environment and conditions that will be conducive to facilitate learning
• Diagnosing the learner's needs within the scope of the given situation
• Planning a sequence of objectives and experiences with the learner to produce the desired learning and outcomes
• Selecting the most effective methods and techniques for producing the desired learning
• Providing the human and material resources necessary to produce the desired learning
• Evaluating the learning outcomes and helping the learner self-evaluate and measure their experiences to re-diagnose additional learning needs

Knowles, M. S. (1980). *The modern practice of adult education*: *From pedagogy to andragogy*. Englewood Cliffs: Prentice Hall/Cambridge p. 26–27

The result was a framework to guide teacher learning. The features of their framework included:

1. Description of the theory underlying the target skill
2. Model or demonstration of the skill
3. Practice of the skill in simulated and classroom settings
4. Feedback on performance of the skills
5. Coaching for application: hands-on, in-classroom assistance with the transfer of learning, skills and strategies to the classroom (Joyce & Showers, 1980, p. 380)

The authors concluded that student change occurred only after the last feature was achieved.

A series of investigations to identify practices that facilitate learning transfer resulted in the peer coaching model (Showers, 1984). Peer coaches supported each other through the change process, practiced and used new skills they learned, and collected data about the implementation process and the effects of a new teaching skill on students (Showers & Joyce, 1996, pp. 10–11). A unique component of this coaching model was the absence of verbal feedback within the coaching dyad. Research suggested that feedback was not related to the effectiveness of the model and was costly to teach and monitor teachers' implementation of appropriate feedback (Joyce & Showers, 1995). This coaching model also differed in other ways from others, as the one teaching with students was designated as the coach, and the one observing the teacher was the recipient of the coaching. Most importantly, effective coaching required teachers to implement all coaching components: regular meetings to plan instruction and learning activities, observations of each other while teaching students, and joint reflection on students' learning (Joyce & Showers, 2002). This latter component led to the conclusion that teaching was cognitive in nature and that the behaviors of teachers were driven by their thoughts about the effects of their teaching on student outcomes.

Tom Guskey (1982) also focused on the effects on student learning on teacher behaviors. His initial work focused on teachers' beliefs and attitudes and their relationship to student outcomes. He proposed that teachers' attitudes toward the value of a practice only changed after they saw positive student effects as a result of using the practice. These attitudes became beliefs, which led to increased self-efficacy and problem-solving, and resulted in teachers assuming more responsibility for improving student learning. Guskey (2000) documented this process through an evaluation framework for teacher PD that focused on training content, training context (climate and culture), and training quality. The framework was composed of five levels of evidence for effective PD: The trainees' reaction to new knowledge and skills would influence their learning of new knowledge and skills, resulting in their use of knowledge and skills, as supported by organizational resources, to achieve student learning (Guskey, 2000, 2002).

A reversal to this sequence has been recently proposed for PD planning and implementation (Guskey, 2014). As such, it forms a theory of change that begins with the identification of student learning outcomes. The outcomes then determine the teacher practices and organizational supports needed to achieve them. These lead to the articulation of the teacher knowledge and skills necessary to implement the practices and the optimal professional learning activities to teach the acquisition off the knowledge and skills.

Additional refinements in PD evaluation have been proposed by Wayne, Yoon, Zhu, Cronen, and Garet (2008) and Desimone (2009, 2011). Both attributed their framework to research findings on effective PD: effective PD is intense, sustained, job embedded, and focused on relevant subject matter (Garet, Porter, Desimone, Birman, & Yoon, 2001; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). Both also focused on the identification and analysis of PD variables and possible mediators and moderators to subsequent student improvement. For example, Wayne et al. (2008) proposed a twofold framework that differentiates and analyzes the differences between the activities used to teach an instructional practice to a teacher (theory of teacher change) and the effectiveness of the instructional practice to improve student outcomes (theory of instruction).

Desimone (2009) built her framework around the following PD features:

1. Content consisting of what the students should learn
2. Active and participatory learning by the teacher
3. PD coherence to other professional development, teachers' knowledge and beliefs, and school policy
4. PD implemented for at least 20 h of time dispersed over a semester
5. Collective participation by teachers from the same school and grade level

The interactions that occur among these PD features allow for the analysis of teacher and student outcomes. She proposed that as teachers experienced effective PD, they improved their knowledge and skills, and changed their beliefs and attitudes, which resulted in improved instruction and student learning (Desimone, 2011). Most importantly, she recommended using the outcomes of past studies to guide future inquiry into how to best effect student learning (Desimone, 2009, p. 192).

EC and ECI Applications

While many of these adult learning theories and frameworks have explicitly guided the implementation and evaluation of ECI-specific PD (see Bruder & Nikitas, 1992; Dunst, 2015; Snyder, Denney et al., 2011), there have also been PD frameworks developed specifically for EC (Gomez et al., 2015; Kagan & Kauerz, 2012a; Kagan, Kauerz, & Tarrant, 2008; Zaslow, 2009) and ECI (see Striffler & Fire, 1999; Trohanis, 1994; Winton, 1990; Winton & McCollum, 1997; Winton, McCollum, & Catlett, 2008). For example, Zaslow et al. (2010) conducted a review of the PD literature in EC for the US DoED and concluded with the identification of core features of EC PD. These included features similar to others identified in other education frameworks (e.g., Desimone, 2011), with the addition of the ongoing assessment of child progress to inform and monitor the effects of the PD.

The National Professional Development Center on Inclusion used an iterative process to define a framework for EC PD (Buysse, Winton, & Rous, 2009) They define PD as facilitated teaching and learning experiences that are transactional and designed to support the acquisition of professional knowledge, skills, and dispositions as well as the application of this knowledge and practice (p. 3). Key components of their framework include: (1) the characteristics and contexts of the learners and children and families they serve, (2) the content of PD which refers to what professionals should know and be able to do as defined by professional competency standards and credentials, and (3) the learning experiences or the methods used to support self-directed experiential learning that is relevant to practice. The framework also includes a number of other factors that were identified as contributing to effective PD. These include access and incentives for the workforce to participate in PD and having organizational structures, policies, and resources in place to support the PD. Lastly, evaluation is described as an integral component of the framework.

Most recently, the Institute of Medicine, National Research Council, proposed a professional learning framework for EC through their report on the early care and education workforce (Allen & Kelly, 2015b). Each of the 13 recommendations contained in the report is supported by a thorough analysis of need, as well as strategies to remedy the need. Among the multiple layers of this report are recommendations for quality ongoing learning for those in the EC workforce. These recommendations form a conceptual framework to guide PD in EC, and they are comprised of features similar to those found in previous adult learning frameworks with the addition of the use of PD portfolios that build on the entire range of learning activities and training mechanisms, cover the full scope of knowledge and competencies to be supported, and are linked to incentives and career advancement (Allen & Kelly, 2015a, p. 13).

There are adult learning and training frameworks focused on those who work with infants and young children with disabilities. As an example, Walker McCollum (1982) proposed a framework to guide the preparation of ECSE teachers. The framework had three core elements: (1) the content or objectives of what the trainees are expected to learn, do, and feel at the completion of the program, (2) the sequence of training activities from simple to complex and designed to teach the content, and (3) the evaluation of whether the activities resulted in trainees meeting the training objectives. She also stressed that there should be a match between the three elements.

Walker McCollum cited work on in-service conducted by Harris and his colleagues (Harris, Bessent, & McIntyre, 1969) which informed the implementation of her framework. She identified a hierarchy of training activities and linked these levels to different levels of trainee impact. The hierarchy for learning activities began with lectures, proceeding to demonstration, role-play, and guided practice. Trainee impact ranged from awareness to knowledge acquisition to skill development and, lastly, to attitude change. It was recommended the more complex the learning, the more the learner must practice the required behaviors across a variety of situations (Walker McCollum, 1982, p. 53). Lastly, Walker McCollum proposed that training must address the learner's motivation to learn new skills, the adoption of behaviors by the learner to meet these skills, and ways for the learner to self-evaluate the acquisition of these skills.

More recently, Dunst and Trivette (2009) proposed an adult learning framework for ECI after completing a meta-analysis and research syntheses of adult learning strategies. The research synthesis identified active learner involvement as being key to the mastery of new knowledge and skills, along with bidirectional instructor/learner interactions (see Trivette, Dunst, Hamby, & O'Herin, 2009). The resulting framework was termed the Participatory Adult Learning Strategy (PALS), and it was composed of four learning phases: (1) introduction of knowledge and skills, (2) application of knowledge and skills, (3) informed understanding of the learning process using knowledge and skills, and (4) repetition of the learning process. Instructor practices that were identified as being most effective in each phase are on Table 16.2.

This framework also included the incremental presentation of new information to learners in order to facilitate the integration of new learning into the learner's existing knowledge base. Other recommendations included the use of multiple opportunities to foster learning and observations to evaluate the learner's knowledge and skills as measured to a performance standard. In addition, Dunst and his colleagues emphasized the importance of adhering to each PALS feature to assure effectiveness, including the measurement of fidelity to the features of the teaching of intervention practices to the adults and the subsequent delivery of the intervention practice by the adults to the target children (Dunst, Trivette, & Raab, 2013).

Dunst enhanced the PALS framework through a metasynthesis of PD studies that documented changes in student and child learning as a result of PD (Dunst, Bruder, & Hamby, 2015). The

Table 16.2 Trainer roles in the different phases of PALS

PALS phases	Trainer roles
Introduction	Preview learning topic
	Describe key elements
	Provide examples
	Include trainee input
	Illustrate application
	Demonstrate application
Application	Facilitate application
	Observe trainee application
	Provide in vivo feedback/guidance
	Facilitate learner assessment of options
Informed understanding	Establish learning standards
	Engage learners in self-assessment
	Provide guidance to learners
	Provide behavioral suggestions
Repeat learning process	Joint planning
	Trainer guidance
	Trainer/trainee mentoring

metasynthesis found changes in child and family outcomes occurred only when specific features of PD were used. These features are consistent with other PD frameworks in adult learning and have been recommended for the conceptualization, design, and implementation of high-quality PD in ECI (Dunst, 2015). These features include:

1. Explicit explanations and illustrations of the content or practice to be learned
2. Active and authentic job-embedded opportunities to learn the new practice
3. Performance feedback on the implementation of the practice
4. Opportunities for reflective understanding and self-monitoring of the practice implementation
5. Ongoing follow-up supports
6. Sufficient duration and intensity of training to provide multiple opportunities to become proficient in the use of a practice

The analysis of studies found that the more practices that were implemented, the more effective the training as measured by both trainee and student outcomes. Lastly, PD activities were described as implementation practices, and the instructional skills that professionals learned to use were referred to as intervention practices (Dunst, 2015, p. 211).

Implementation Capacity Building

ECI personnel are also responsible for the implementation of effective and evidence-based student/child/family practices into program and system applications to improve service delivery on a larger scale. One of the original frameworks proposed to accomplish this consisted of a three-level framework to scale up intervention research findings into effective service delivery models (see also Paine & Bellamy, 1982; Paine, Bellamy, & Wilcox, 1984). The framework resulted from a study of implementation features found across successfully scaled up EPB innovations into effective service delivery models in human services programs for children, youth, and adults with special needs. These features included assistance in program adoptions and adaptations and ongoing training and support to

enable staff to meet performance standards linked to positive client outcomes. This latter feature was necessary to maintain the integrity and consistency of the intervention features of the model and prevent program drift across sites. Explicit performance criteria was delineated at each level of implementation to insure the reliability of evidence across sites, populations in need of the service, and individuals implementing the services (see Fig. 16.2). The success of this process was attributed to the adherence to operational definitions, measurable outcomes, and well-documented interventions that could be replicated with fidelity. The implementation process was illustrated with examples of effective service models that were scaled up across agencies, age groups, and service sectors. These included teacher PD (Carnine & Engelmann, 1984) ECI (Cochran & Shearer, 1984), and community and school interventions (e.g., Blase, Fixsen, & Phillips, 1984; Walker, Hops, & Greenwood, 1984).

The process of scaling up EBP into effective service delivery models has been refined, improved, and referred to as implementation science (IS) (see Fixsen, Blase, Horner, & Sugai, 2008; Fixsen, Blase, Metz, & Van Dyke, 2013; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005; Halle, Metz, & Martinez-Beck, 2013; Metz & Bartley, 2012; Tout, Metz, & Bartley, 2013). A recent research synthesis of 25 different community-based IS frameworks documented the expansion and application of this work over the years (Meyers, Durlak, & Wandersman, 2012). The synthesis focused on the identification of the specific procedures and strategies used to achieve an innovation's desired outcomes and the subsequent actions and strategies used to transfer the innovation practice(s) to new settings. Among the authors' findings was that effective implementation was a systemic process composed of a coordinated series of related elements. These findings led to a proposed four-phase framework that includes: (1) considerations about the host setting, (2) creating the structure for implementation, (3) supporting the structure, and (4) improving future applications. These phases are comprised of 14 sequential and detailed steps which move the process from an evidence-based

Level of Development	Criteria and Standards for Development	Dissemination Purposes
MODELS — DEMONSTRATIONS — PRACTICES	1. Functional relationship between intervention and a behavior 2. Operational definition and reliable measurement of the behavior 3. Definition and reliable use of the intervention	a. Information for adaption of intervention to fit user's purpose
	4. Consistency of effect across service consumers 5. Social significance of behavior change 6. Socially acceptable intervention methods	b. Generation of support for a service objective of method
	7. Socially valid relationship between intervention and behavioral result 8. Consistency of effects across users 9. Advantage over alternative service delivery 10. Fidelity of implementation	c. Dissemination for replication or adoption

(Paine, Bellamy, & Wilcox, 1984)

Fig. 16.2 Relationship between program development criteria and standards, dissemination purposes, and levels of development of innovative practices

practice to a community-based model. Staff recruitment, training, ongoing support, and maintenance are critical across all phases.

Most recently, Metz and colleagues (Metz, Naoom, Halle, & Bartley, 2015) proposed an integrated stage-based implementation science framework for specific to EC programs and systems. This framework is comprised of four distinct stages and three core implementation elements within each of these stages. The four stages begin with exploration followed by installation, followed by initial implementation, and finally full implementation of the full program or system. The three core elements embedded within each of the four stages are implementation teams, data-based decision making for progress monitoring and improvement, and sustainable infrastructures for capacity building.

Pedagogy

Pedagogy has been defined as the theory and practice of teaching: the function or work of a teacher. Pedagogy in ECI refers to the knowledge and skills a practitioner needs to know and do in order to facilitate learning in infants and young children with disabilities and their families. The theory and practices of ECI pedagogy have evolved over the past 50 years of service provision, research about the behavioral and learning needs of infants and young children and their families, and the growing evidence base to support both the content and the practices that make up the work of the EC interventionist.

The Federal US Department of Education (DoED) has also helped define the pedagogy of ECI personnel preparation through funding priorities under IDEA. For example, one of the first federally funded early intervention personnel preparation programs was described in the literature by Geik, Gilkerson, and Sponseller in 1982. The program was a graduate competency-based training program focused on five essential roles the authors identified for those that worked with infants: infant specialist, facilitator/consultant, parent educator, team collaborator, and program developer. Each role had assigned competencies, and these were implemented and measured through coursework and intensive practicum experiences.

This program and 39 other ECI preservice program descriptions were reviewed and analyzed for content and requirements (Bruder & McLean, 1988). Thirty of the programs included a training philosophy as their framework, and all 40 provided training to a variety of disciplines. The programs' coursework included the areas of assessment, families, intervention, infancy, and medical issues. Competencies also included teamwork, program administration, and program planning. Research was notably absent in both coursework and competencies. On average, a third of the total program hours were spent in practice, though no information was reported about the supervision of the students during practicum.

These findings contributed to other survey findings about the training needs of preschool or infant intervention (McCollum, 1987). As a result, recommendations for specialized pedagogy for those serving children with disabilities from birth to age five and their families were proposed (McCollum, McCartan, McLean, & Kaiser, 1989). The pedagogy included content and practices for both typical and atypical infant and child development; characteristics of all types of exceptionalities; curriculum and methods; physical, medical, and behavior management; interdisciplinary and interagency teaming; and program management.

ECI pedagogy was further refined by Bailey and his colleagues at the US DoED-funded Carolina Institute for Research on Infant Personnel Preparation. This group defined the core intervention competencies and responsibilities assigned to each discipline providing services under the IDEA through work groups of leaders representing each discipline (Bailey, Palsha, & Huntington, 1990) The ECSE group identified the following to describe their mission: To ensure that environments for infants and toddlers (with disabilities) facilitate children's development in social, motor, communication, self-help cognitive, and behavioral skills and enhance children's self-concept, sense of competence, and control on independence. They also identified 12 ECSE competencies that became the foundation of the CEC EC personnel specialty standards which continue to guide ECI pedagogy today.

National Standards

Personnel standards assist states in developing knowledge and skill requirements for teachers and other personnel. Nationally, professional organizations delineate discipline-specific practice standards to assure the competence of professionals who provide services under the discipline title (e.g., American Speech-Language-Hearing Association for speech and language pathologists providing speech therapy). These standards are used to accredit IHE programs of study (or state recognized alternative programs of preparation) to prepare and graduate students who are then eligible for state licensure or certification to practice under their discipline. To be accredited, IHE programs must match curricula and educational activities to the national standards and best practices in the discipline.

Most disciplines are licensed to serve clientele across the life span (e.g., nurse, occupational therapist, physical therapist, speech, and language pathologist) (cf. Catalino, Chiarello, Long, & Weaver, 2015; Muhlenhaupt, Pizur-Barnekow, Schefkind, Chandler, & Harvison, 2015; Prelock & Deppe, 2015), requiring a broad curricula and practicum requirements in IHE preparation programs. Education has recognized that age levels and content areas (e.g., in ECSE) require specific competencies, therefore encouraging IHEs to offer focused programs of study.

One resulting challenge in early childhood in particular has been the multiple standards developed by national organizations (Allen & Kelly, 2015b). A few examples include the EC Generalist Standards from the National Board for Professional Teaching Standards (NBPTS) that apply to teachers of children from ages 3 to 8 (National Board for Professional Teaching Standards, 2012), the Model Core Teaching Standards, Interstate Teacher Assessment and Support Consortium (InTASC) of the Council of Chief State School Officers (CCSSO) for K-12 teachers (Council of Chief State School Officers, 2011), the EC Professional Preparation Standards from the National Association for the Education of Young Children (NAEYC) for teachers from birth to age 8 (National Association for the Education of Young Children (NAEYC) (NAEYC), 2011), the Initial and Advanced

Preparation Standards from the Council for Exceptional Children (CEC), and the Initial and Advanced Specialty Standards from the Division of Early Childhood (DEC) of the CEC (Stayton, 2015). The CEC, DEC, and NAEYC standards are most relevant to teachers in ECI.

The governing body of CEC created a professional standards and practices committee to develop national standards for special education teachers in 1982. These standards were approved in 1992 and have been continually refined through research reviews and consensus from the field. The current standards were approved in 2012 and include seven initial standards under four areas of focus for entry-level professionals and seven advanced standards for continuing education or leadership program graduates (Council for Exceptional Children, 2014). The CEC initial practice standards and focus areas are listed in Table 16.3.

As one of the 17 subdivisions in CEC, the DEC developed specialty standards to guide the content of ECSE preservice personnel preparation programs and state certification requirements in 1993 (Stayton, 2015). The standards were organized into a set of 93 knowledge and skill statements that aligned with the CEC standards. These were revised and revalidated in 2001 and 2007 (see Lifter et al., 2011), realigned

with the language and descriptions used by CEC, and aligned with the six standards and 22 elements used by NAEYC for early childhood teacher preparation programs in IHEs (Chandler et al., 2012; Stayton, 2015). National accreditation under the Council for the Accreditation of Educator Preparation (CAEP, formerly the National Council for Accreditation of Teacher Education) requires IHE preparation programs in ECSE to meet the CEC personnel standards as informed by the DEC specialty set of knowledge and skills statements. When a blended ECSE/EC program applies for accreditation from CAEP, it must meet the DEC and the NAEYC personnel standards. They are also listed in Table 16.3. It should also be noted that ECI has been long recognized for its interdisciplinary focus of intervention (Bricker & Widerstrom, 1996; Bruder & Bologna, 1993; Kilgo & Bruder, 1997; Stayton & Bruder, 1999), yet there are no personal practice standards to guide or accredit interdisciplinary preparation programs (Stayton, 2015).

State Certification/Licensure

Certifications, licenses, or credentials have been used by states to guarantee that teachers have met a standard that qualifies them to provide services to children based on their discipline focus. These are awarded by a state or jurisdiction to individuals

Table 16.3 Early childhood personnel standards and DEC recommended practice areas

CEC focus areas	CEC/DEC initial standards	NAEYC initial standards	DEC recommended practices
Learner and Learning	Learner development and individual learning differences	Building family and community relationships	Environment
	Learning environments		Family
Content knowledge and foundations	Curricular content knowledge	Using content knowledge to build meaningful curriculum	
Instructional pedagogy	Assessment	Observing, documenting, and assessing to support young children and families	Assessment
	Instructional planning and strategies	Using developmentally effective approaches	Interaction
		Promoting child development and learning	Instruction
Professionalism and collaborations	Professional learning and ethical practice	Becoming a professional	Leadership
	Collaboration		Teaming and collaboration
			Transitions

who have completed state-established, minimum requirements usually through approved programs of preparation and specialized examinations (e.g., Praxis) or portfolio review processes (e.g., edTPA). Though states use many names for this credentialing process, they are usually categorized as licensure, certification, endorsement, or a combination.

In 1980 only four states had a specific teacher license for children under the age of 5 (Trohanis, 1985). When the EC provisions of EHA were passed in 1986, specific pedagogy for ECSE teachers was defined to assure a competent and confident workforce. As a result, the DEC published recommendations for teacher competencies for state certification offices and IHE preparation programs (McCollum et al., 1989). The recommendations were specific and supported a professional certification structure that was comprised of an entry-level generalist, and an advanced level focused on either infant-toddler or preschool-age children. The authors stressed the need for a hierarchy of competence recognizing the unique child- and family-focused knowledge and skills required by ECI teachers.

Currently, all states require certification and licensure for those disciplines that provide ECI services under IDEA. Recent reviews of requirements across the 50 states found that in comparison to all other disciplines, the EC and ECSE credentials presented the most variability (C. Chen & Mickelson, 2015; Stayton et al., 2009). There were 23 different age levels addressed by EC and ECSE teacher certifications across states, and there was little congruence between states in regard the exact name of ESCE licensures/certifications. The ECSE titles ranged from infant-toddler family specialist credential, special education preschool certificate, preschool special needs, special education preschool/EC endorsement, and teacher of children with disabilities 0–5 to preliminary education specialist instruction credential with an EC special education specialty. Lastly, while the majority of licensures/certifications required an exam, only 41 % required specific curriculum/coursework, and 55 % required specific field/clinical work requirements (i.e., specified number of hours, populations, age ranges, experiences). Of most concern was the lack of congruence between state certification requirements and national personnel standards in ECSE (Stayton, Smith, Dietrich, & Bruder, 2012).

Recommended Practices

In 1992 the DEC developed a set of ECI-recommended practices that was based on literature on effective practices for young children with disabilities and their families, as well as the knowledge and experiences of researchers and other stakeholders (DEC, 1993; 2014; McLean, Snyder, Smith, & Sandall, 2002; O'Connor, Notari-Syverson, & Vadasy, 1996; Odom, McLean, Johnson, & LaMontagne, 1995; Sandall, Hemmeter, Smith, & McLean, 2005; Sandall, McLean, & Smith, 2000; Smith et al., 2002). The recommended practices began as an initiative to develop guidelines for service delivery in early intervention and ECSE. The first set of practices were published in 1993, and they were developed through an iterative process that included focus groups and surveys of those in the field. The purpose of the practices were to guide families, program personnel, and those in personnel preparation to implement evidence-based services and supports for infants and young children with disabilities and their families. The DEC-recommended practices have recently been revised into seven critical practice areas, under which 66 indicators are delineated (DEC, 2014). The practice areas are also listed in Table 16.3.

Evidence Based ECI Personnel Development Practices

Over the past 35 years, there has been much written and many recommendations offered about the preparation, support, and continuing education of the ECI workforce (Bricker & Widerstrom, 1996; Bruder, 2010; Buysse & Wesley, 1993; Catlett & Winton, 1997; McCollum & Stayton, 1985; Stayton & Bruder, 1999; Striffler & Fire, 1999; Thorp & McCollum, 1988; Trohanis, 1994; Winton, 1990; Winton, McCollum, & Catlett, 1997). The majority of the recommendations were not based on rigorous research, nor did they often result in experimental investigations to test

their validity. Recently, however, there has been a marked increase in both the quantity and quality of empirical studies being conducted on personnel practices in ECI (Snyder, Hemmeter, & McLaughlin, 2011). This seems to be a result of a number of factors including the relatively recent emphasis on EBP under the NCLB and IDEA (Bruder, 2010; Snyder, Denney et al., 2011), the infusion of research funding under the IES (Diamond, Justice, Siegler, & Snyder, 2013), the accountability requirements of publically funded EC and ECI programs (Kagan & Kauerz, 2012a), and the growing need for increased research and rigor to better meet the needs of the ECI workforce (Bruder, 2010; Dunst et al., 2013; Gomez et al., 2015; Horm, Hyson, & Winton, 2013; Kagan & Kauerz, 2012b; Sheridan, Edwards, Marvin, & Knoche, 2009; Snyder, Hemmeter, et al., 2011; Zaslow et al., 2010). Chapter 7, (Reichow, this volume), contains an overview of current thinking around the relation between ECI and EBP and is consistent with the conceptualization of EBP used in the remainder of this chapter.

Though many of the studies on personnel practices address EC at risk populations (Artman-Meeker, Hemmeter, & Snyder, 2014; Buysse, Castro, & Peisner-Feinberg, 2010; Buzhardt et al., 2011; Hemmeter, Snyder, Kinder, & Artman, 2011; Hsieh, Hemmeter, McCollum, & Ostrosky, 2009; Landry, Anthony, Swank, & Monseque-Bailey, 2009; McCollum, Hemmeter, & Hseih, 2013; Moreno, Green, & Koehn, 2015; Pianta et al., 2014; Pianta, Mashburn, Downer, Hamre, & Justice, 2008; Piasta et al., 2012; Powell, Steed, & Diamond, 2010), their findings inform the delivery and evaluation of preservice and in-service for those serving infants and young children with disabilities. Likewise, studies conducted in special education also inform the design and delivery of training to ECI practitioners (Brock & Carter, 2015; Harry & Lipskey, 2014; Ploessl & Rock, 2014; Rock et al., 2009, 2012; Scheeler, McKinnon, & Stout, 2012; Vernon-Dotson, Floyd, Dukes, & Darling, 2013; Westling, Salzberg, Collins, Morgan, & Knight, 2014). As a result, there has been an infusion of knowledge about personnel research and practice that directly applies to ECI and the development and scaling up of effective personnel EBP.

Survey Data

The US DoED, Office of Special Education Programs (OSEP), funded the Center to Inform Personnel Preparation Policy and Practice in Early Intervention and Preschool Education (CIPP) (http://uconnucedd.org/projects/per_prep/resources.html) to collect, synthesize, and analyze information related to the preparation and continuing education of professionals representing all disciplines providing both early intervention (EI) and ECSE services under IDEA. Surveys collected information on the status of a number of personnel issues. For example, one line of inquiry examined the supply and demand for ECI personnel (Bruder, 2010; Campbell, Chiarelo, Wilcox, & Milbourne, 2009). All state Part C and Part B (619) coordinators were interviewed and reported concerns about the limited number of professionals who had specialized training in ECI: Less than half of the state coordinators reported having a qualified work force in any discipline category. These data led to other examinations of the status of preservice, in-service, and practitioner perceptions.

Preservice

Surveys about program content and methods classes related to ECI were completed by 1131 IHE programs across 17 professional disciplines in all 50 states (Bruder, 2010). IHE programs reported as much variability within a discipline as there was across disciplines in regard to hours devoted to specific course content. Of more concern was that many aspects of EI/ECSE service delivery under IDEA were not addressed. The most critical finding was that the majority of personnel programs prepared students for a life span license or certification, and this was represented in their program content.

Other surveys of IHE coursework on disability-related pedagogy also reported limitations in content offered for ECI practitioners, including lack of coursework and practical experiences involving children with disabilities (Chang, Early, & Winton, 2005; Ray, Bowman, & Robbins, 2006) and a lack of pedagogical content related to ECI (e.g., family-centered practices, child-focused practices, natural environments, team processes, and service coordination) (Bailey,

Buysse, & Palsha, 1990; Dunst & Bruder, 2005)). Concerns have also been raised by data collected on the quality of blended programs (Dunne, 2002; Miller & Stayton, 1998), the availability of content about children with challenging behavior in 2-year EC programs (Hemmeter, Santos, & Ostrosky, 2008), and the availability of content about inclusion within early childhood 4-year programs (La Paro et al., 2014). Finally, to assess the future capacity of IHE preparation programs, CIPP conducted a survey with OSEP-funded doctoral programs specific to ECSE (see Woods & Snyder, 2009). Less than half of the 60 programs addressed ECSE, and 23 participated in the survey. Only six doctoral programs were interdisciplinary, having two or more disciplines enrolled, and none of the 23 programs mandated any emphasis in children from birth to age 3.

In-Service

State training and technical assistance systems for EI/ECSE providers across the country were examined through interviews and document reviews for the presence of components which contributed to a systematic, sustainable approach to professional development (Bruder et al., 2009). Defined components included:

1. Dedicated resources such as an agency budget line item
2. Staffing
3. A dedicated agency responsible for the provision of the training
4. Policies or procedures for determining professional development needs
5. Training content related to identified need or state standards
6. Quality assurance systems
7. A process for evaluating outcomes
8. Ongoing training that is provided over time
9. A formal structure for the delivery of content (training modules etc.)
10. Workplace applicability

Only 20 of the Part C systems and 23 of the Part B (619) components met the criteria as having a majority of components. Part C states with systems reported that training was most often delivered through workshops ($n=19$) or the Web ($n=16$), followed by presentations ($n=9$) and conferences ($n=8$). A majority of states provided CEUs for training ($n=15$) and five linked training to a credential and two to a certificate. Training content was most often identified through administrative and consultant input ($n=19$), and the most popular training areas were service delivery ($n=19$), policies and procedures ($n=18$), families ($n=11$), and disability-specific information ($n=10$). Training was evaluated by trainee feedback forms (18), and five states used compliance monitoring to further assess training. These findings were similar for Part B (619) programs.

Recent data collected by Cox, Hollingsworth, and Buysee (2015) had similar findings in regard to type of PD offered in states. They surveyed 831 PD providers from Iowa, Minnesota, Oregon, and Virginia using the *Landscape Survey*, created by the National Professional Development Center on Inclusion (NPDCI). Almost all who received PD were practitioners with less than a BA degree, though administrators and family members also participated. The majority of PD focused on children's development and learning, classroom practices, and family communication, with less than half of the PD addressing inclusion and learning for children with disabilities or children from culturally and linguistically diverse backgrounds. Over half of the PD was reported to be based upon NAEYC developmentally appropriate practice, state early learning standards, and state professional competencies, while a quarter reported the use of NAEYC personnel standards, and less than 5 % used DEC personnel standards. Half of the PD consisted of one-time events, with almost a third reporting multiple PD sessions over time, and a few providing PD the equivalent of one semester. PD providers who provided follow-up activities to training had more years of experience in EC and more advanced degrees. Significant predictors of the level of training intensity offered by PD providers were the employer, the provider, or the state where the provider worked.

Self-Efficacy

Part C and 619 service providers ($N=1800$) reported on their feelings of self-efficacy and experience in preservice and in-service activities (Bruder, Dunst, & Mogro-Wilson, 2011; Bruder, Dunst, Mogro-Wilson, & Stayton, 2013). The preservice variables were type of degree (discipline), years of formal postsecondary education, licensure, and participants' judgment of how well their preservice training prepared them to work with young children and their families. The in-service variables were type of state training/technical assistance available to the participants, whether participants were required to have continuing education, and the amount of in-service training the participants received. Self-efficacy was measured in terms of the participants' perceived confidence and competence to statements about recommended practices in the following areas: early literacy, natural learning environments, instructional practices, IFSP/IEP, assessment and evaluation, and family-centered practice.

Half of the practitioners had been working in the field of early intervention or early childhood special education over 10 years and represented the disciplines of special education, early childhood education, early childhood special education, speech and language pathology, occupational therapy, and physical therapy. The sample reported low levels of competence and confidence working with children and families in all practice areas, though they judged themselves as more confident than competent in all areas.

Preservice preparedness and in-service intensity were related to all competence and confidence measures: the more the participants indicated that their preservice training prepared them to work with young children and their families, and the more in-service training the participants received, the higher their ratings of their competence and confidence beliefs. Participants with more years of experience reported higher procedural and intervention competence compared to participants with fewer years of experience. Less than a third of the sample reported that their preservice education program had prepared them very well to work with young children.

Teachers from this sample (early childhood special education, early childhood education, and special education) were partialed out for a more refined analysis of their competence and confidence in inclusive settings and natural environments. Neither the type of teaching degree nor having an advanced degree was found to be related to self-efficacy beliefs; the teachers' feelings of preparedness proved the best predictor of teacher self-efficacy beliefs (Dunst & Bruder, 2014).

There have been few studies that have examined the influence of personnel preparation and experience on ECI practitioner confidence and competence. Lamorey and Wilcox (2005) administered a 15-item early interventionist self-efficacy scale to evaluate interventionist training, practices, and child and program outcomes. There were significant positive correlations between EI practitioners' overall self-efficacy and years of intervention experience and personal self-efficacy and years of experience. Moore and Wilcox (2006) also found that years of experience in ECI related to higher efficacy belief appraisals.

Other data that contribute to the understanding of the self-efficacy of ECI practitioners was derived from follow-up evaluations of IHE program graduates about their perceived feeling of competence. Though not focused on self-efficacy as a construct, the data reveal graduates perceptions of their own abilities to implement the practices they learned. For example, Crais et al. (2004) surveyed 44 interdisciplinary graduates of two interdisciplinary preservice masters programs. The survey contained questions about the graduates' opportunities to implement interdisciplinary and family-centered practices in the areas of assessment, instruction, and collaborative consultation and their perceived competence in these areas. On all items, graduates rated themselves between somewhat and very competent. The survey also asked graduates to rate 15 interdisciplinary and family-centered practices according to the amount of training they received within their own discipline program compared to their interdisciplinary program. All graduates reported only receiving training in the practices in their interdisciplinary program.

Two other follow-up studies with graduates of ECSE/EC programs found less positive perceptions of competence on ECI practices. Murray and Mandell (2006) interviewed 19 graduates of their ECSE program who were working in ECSE programs across six states. The majority identified significant barriers to using the family-centered practices they had been taught. Recchia and Beck (2014) investigated the perceptions of 13 preservice teachers after their first year of teaching. The students had completed a master's degree program in an integrated early childhood program for children from birth to age 8 and were teaching in early childhood settings, seven including children with disabilities. The teachers felt less prepared in specific curricula that aligned with their particular teaching settings, though they felt prepared in broad-based skills they could apply across a variety of classrooms. The teachers also felt challenged in contexts where it was difficult to use the practices they had learned in their program.

Program Descriptions

Many program descriptions have evolved from projects funded by the Handicapped Childrens Early Education Program (HCEEP) demonstration, outreach, or research program which focused on either child intervention, parent intervention, or in-service education. With the exception of research institutes, these projects were not designed as research studies, though a requirement for each project was the collection and evaluation of impact evidence on children and, when appropriate, families and practitioners. Demonstration and outreach projects provided descriptions about the targeted intervention and detailed information about the training content and methodology used to enable the ECI staff to perform the intervention to improve child outcomes (see Dunlap, Robbins, Morelli, & Dollman, 1988; Rogers, Lewis, & Reis, 1987). Many of these project descriptions included detail about the training and fidelity measures they used to outreach and replication of effective program practices and achievement of outcomes could and did

occur (Bruder, Anderson, Schutz, & Caldera, 1991; Cochran & Shearer, 1984). In-service projects funded under this program also demonstrated a systematic focus and documentation of both adult and child impact using multiple sources of evidence. Such projects were required to adhere to best practices in adult learning, which included a guiding philosophy, training objectives, relevant and job-embedded content, rigorous methodology, performance standards, and practicum applications, including follow-up and the collection of outcome data (Bruder & Nikitas, 1992).

Preservice

There are many descriptions of preservice preparation practices in ECI (cf. Gallagher, Steed, & Green, 2014; Kilgo & Bruder, 1997; Macy, Squires, & Barton, 2009; Miller & Stayton, 1998; Stayton & McCollum, 2002; Stayton & Miller, 1993; Winton, 1996), as well as descriptions of program features such as the case study method of instruction and online course applications (cf. Lifter et al., 2005; Snyder & McWilliam, 1999). Most preservice program descriptions include details about philosophy, coursework, practicum requirements, methodology, and, less common, student outcomes. Though implemented 20 years apart, two ECI preservice programs will be briefly described.

Bruder, Brinkerhoff, and Spence (1991) designed, implemented, and evaluated a 1-year graduate interdisciplinary certificate program for students representing different disciplines who were enrolled in different IHEs in CT or were at the postmaster's level. The nine credit institutes at the University of Connecticut included a 6-week summer session composed of didactic classes and supervised practicum applications with a follow-up year of practicum supervision (at their IHE or job site) and monthly research seminars. The coursework was divided into six modules that addressed families, medical issues, physical management, educational and instructional management, teaming, and service delivery. The most important measure of student outcome was the successful completion of 32 competency-based tasks representing ECI pedagogy and practice. Evidence of the program's

effectiveness was demonstrated with 32 students which included statistically significant pre-/posttest gains of students' knowledge acquisition and completion of performance measures for all competencies.

An interdisciplinary preservice program in ECI at the University of Oregon was described by Barton, Moore, and Squires (2012). The program was offered as an add-on of specialized courses and practice to speech and language pathology students (SLP) completing their graduate degree. Students took ECI classes in collaboration with the ECSE graduate program in areas such as foundations of ECI, assessment, family-guided practice, curriculum, developmentally appropriate practice, communication interventions, collaborative consultation, EBP, and parent support groups. The first four courses were taught by the ECI faculty; the latter courses were team taught by ECI faculty and SLP faculty. Students completed practicum in a variety of natural and inclusive settings; seven were university affiliated and two in the community. Principles of adult learning were used to teach and to supervise the students, and this included the use of frequent performance feedback to the students on their intervention with young children (in person or by electronic mail). The students also had to meet competencies and rate themselves and self-reflect on their practicum experiences. Other measures of effectiveness included course grades, caregiver satisfaction, parent and child outcomes, and job placement after graduation. All 26 graduates mastered both their program competencies and their SLP competencies, and 22 were employed in ECI settings upon program completion.

In-Service

There have been many program descriptions of various in-service components and continuing education opportunities for the ECI workforce (Blasco, Falco, & Munson, 2006; Dinnebeil, Buysse, Rush, & Eggbeer, 2008; Girolametto, Weitzman, & Greenberg, 2006; Ludlow, 2002; Malone, Stratka, & Logan, 2000; Ridgley, Snyder, McWilliam, & Davis, 2011; Snyder & Wolfe, 2008). In-service programs usually contain descriptions of the participants, content, methodology, and outcomes. While most are

conducted face-to-face with trainees, online programs are appearing in the literature (Brown & Woods, 2012; D. Chen, Klein, & Minor, 2008). Additionally, there have been in-service descriptions with documented child or program outcome data reported with child care audiences (see Bruder, 1998; Campbell, Milbourne, Silverman, & Feller, 2005) and IHE faculty (Bruder, Lippman, & Bologna, 1994; Winton, 1996). As examples, two in-service studies having different content, methodologies, and evaluation will be described.

Boavida, Aguiar, and McWilliam (2014) developed and implemented a training program to teach 284 ECI practitioners in Portugal to use the Routines-Based Interview (RBI) (McWilliam, Casey, & Sims, 2009) to develop functional IFSP/IEP goals and objectives for infants and young children with disabilities. Training was planned using adult learning practices, and a pilot training program was administered to 18 ECI staff, to test and refine the training. The training consisted of five sessions totaling 22 h of small group meetings of 10–20 participants representing 14 early intervention teams. After the first five sessions, a 3-month application phase occurred during which time the participants were given weekly electronic prompts while they implemented the training content to develop a functional IFSP/IEP and submit it as evidence of their learning. An optional sixth training session then occurred to provide feedback to the participants on their reported experience developing the functional IFSP/IEP after the RBI interview. Of the 284 participants who began the training, 201 completed it, though only 80 provided both pre- and posttraining IFSP/IEPs after completing the training. The pre-training IFSP/IEP was compared to the participants in posttraining IFSP/IEP using rating scale to score the IFSP/IEP goals and objectives. After training, the IFSP/IEPs contained fewer goals and objectives, and those that were on the IFSP/IEP were scored higher on the rating scale for functionality. Both of these variables were statistically significant, with large effect sizes.

Campbell and Sawyer (2009) conducted a PD program with ECI providers on the implementation of participatory home visiting practices

which focused on embedding adaptations and interventions into family routines. Participatory practice emphasizes the use of natural materials and the collaborative role of the caregiver and the provider during the home visit, compared to traditional home visiting practices which focused on teaching the child (Campbell & Sawyer, 2007). The primary outcome measure for the study were home visit behaviors as scored on pre- and postvideos using a scale that consisted of categories of home visiting practices. The training consisted of small group face-to-face sessions of 3 h each, held 3 months apart. The training enrolled 147 providers, and though this training was mandatory for continued employment, 126 completed both sessions and 96 submitted viable video tapes of the home visits. The baseline videotapes showed that the majority of providers (66 %) used traditional practices. After the training, 43 % of the tapes demonstrated traditional practice, suggesting that a majority of providers (57 %) were using participatory practices. Additional analyses of the data documented three groups of providers based on the practices they used: those who were participatory and stayed participatory, those that were traditional and stayed traditional, and those that began as traditional and moved to participatory. Those that were rated as participatory and remained that way, and those who changed to participatory, had beliefs measured in the Q-sort that aligned with recommended practices in early intervention. Those who stayed traditional continued to hold beliefs about the importance of direct services to the child rather than participation-focused providers who believed in family involvement. The findings of the study suggested that these differences in provider practices were related more to providers' prior beliefs and perceptions than to the professional development they received.

Experimental Studies

Most of ECI personnel practice studies that meet EBP standards and demonstrate experimental control utilized single-case designs. Single-subject studies must be able document a defensible functional relationship between the independent and dependent variable as represented by a visual inspection of graphed data (Kratochwill et al., 2013). This includes the examination and analysis of multiple features of the data display, such as the consistency of behavior change within and across levels of baseline, intervention, and any other condition, the trend of the data within and across conditions, and variability of data in each condition. Other data features to inspect include the immediacy of any change between conditions, overlap of data points across and between conditions, the projected pattern of the data, and any anomalies within the data. Other statistical manipulations of the data may also be used (e.g., effect sizes) to support the visual inspection.

While EC studies also use single-subject designs, a majority implement randomized group comparison designs to demonstrate experimental control of the independent variable. The implementation of group designs must also meet research standards (Cook et al., 2015). These includes the random assignment of subjects to comparison groups, the equivalency of the groups on measures of interest prior to intervention, the minimal attrition of participants, and the use of statistical tests of power and effect size to measure the impact of the independent variable. Both types of designs require operational definitions of the independent and dependent variables, the use of internal control procedures such as fidelity measures to insure the treatment is being implemented as intended, and reliability measures to insure the validity of results. Both types also require replication of findings to ensure external validity of both the treatment and the outcomes. Examples of studies addressing differing populations and dependent variables follow. All have met standards for experimental designs.

Preservice

Experimental studies in preservice preparation are sparse, and single-subject methodology is used by the few that have been published. Barton et al. (2012) provided intervention to five student teachers who were at the conclusion of their preservice program. A multiple-baseline single-case research design across participants was used to examine the effects of coaching on the implementation of an intervention package to

increase children's dramatic play behaviors. The five target children had IEPs, were between 3 and 5 years of age, and were enrolled in a university-based preschool program. Two training conditions were compared in this design: didactic training and didactic training plus coaching. Observational data (event recording) were collected on the teacher's use of practices during a 5 min videotaped play routine which occurred two or three times per day.

The intervention package consisted of a number of practices that were evidence based including contingent imitation, a system of least prompts, and specific praise after the child used a target play behavior (Barton & Wolery, 2010). A 1 h didactic session on the intervention package was presented to the teachers after baseline concluded. It consisted of videos, a manual and role-playing. Data were collected on the teacher's use of practices after the didactic session. Coaching was then introduced as an intervention. Four coaches who were supervisors of the student teachers provided the intervention. The coaches were doctoral students and all had degrees in early childhood special education. They were provided a manual detailing the intervention and data forms to record the teacher's responses and suggestions for improvement. The coaches provided feedback to the teacher on her use of the intervention package before, during, and after sessions.

Visual analysis of the data showed that the coaching added to the effectiveness of the intervention. That is, four of the five teachers improved beyond baseline only after coaching was introduced, thus providing evidence for experimental control and the effectiveness of the coaching intervention. Interrater reliability, social validity, and fidelity measures also documented adherence to research standards.

An extension of this study (Barton et al., 2012) examined the effect of this training package on children's behavior. This study also used a multiple-baseline design across four teachers and replicated procedures from the first study with additions: all teachers received the 1 h didactic training prior to baseline; the coaches received more explicit training and direction as to the frequency with which they provided

prompts and feedback to the teachers during the session; fidelity data on the coach training and implementation was collected; and observational data on child pretend play behaviors were collected across four children aged 3–5 with IEPs. Again, there was a functional effect demonstrated across the teachers as a result of coaching and with the target child's use of play behaviors.

Coogle, Rahn, and Ottley (2015) used a single-subject multiple-probe single-case design to examine the effectiveness of using bug-in-ear coaching on teachers' use of specific communication interventions. The addition of a bug in ear (BIE) allows coaching to occur simultaneously while interventions are being conducted in classrooms (Rock et al., 2009, 2012; Scheeler et al., 2012). Coogle et al. implemented BIE with three ECI student teachers who were completing their final semester of an undergraduate licensure program and participating in a student teaching internship. They were teaching in separate preschool public school inclusionary classrooms, each of which contained 16 children without disabilities and four with disabilities. The intervention consisted of a brief training via a narrated PowerPoint presentation that provided information related to four communication strategies with the students: wait time, sabotage, choice making, and in sight out of reach.

When in the classroom, the teachers received prompting and immediate feedback from a supervisor (through the BIE) on their use of the communication strategies during a 10 min play routine. The supervisor was remotely watching and listening to the teacher on Skype via an iPad that swiveled to follow the teacher. After baseline, the supervisor provided feedback through the BIE two times per day for 10 min each over four days, attempting to provide one directive prompt a minute as needed. The results showed the intervention was successful for all three teachers using visual inspection of graphed data that documented changes in level, trend, and variability. The patterns across the teachers were similar, except for variability of unprompted use of strategies, during the generalization and maintenance phases of the study.

In-Service

A number of single-subject studies have been conducted with ECI populations in inclusive EC or Head Start classrooms across a range of adult and student populations using a number of strategies to effect change across a number of specific adult and child outcomes (Casey & McWilliam, 2011; Friedman & Woods, 2015). The following are sample illustrations of experimental designs that provide data to support EBP strategies. Though they varied in methodology, reliability, and fidelity, data were collected as was data on the social validity of all of the interventions presented in these studies.

Hemmeter, Hardy, Schnitz, Adams, and Kinder (2015) conducted a study to examine a professional development intervention on three teachers' use of social-emotional practices as delineated in the Pyramid Model. The Pyramid Model for Promoting Social-Emotional Competence in Young Children (Fox, Dunlap, Hemmeter, Joseph, & Strain, 2003) is a comprehensive three-tiered model for promoting young children's social-emotional development and addressing children's challenging behavior. The setting for the study was three classrooms in three elementary schools staffed by a teacher and assistant teacher, and each of the three teachers was certified in ECSE, two had master's degrees, and the third was in a master's program. The dependent variables for the study were the teachers' use of specific pyramid practices as measured by pyramid checklists, a global measure of pyramid practices, and a global measure of classroom behavior. A multiple-probe design across practices and replicated across teachers was used to measure experimental control.

Intervention began with a meeting between the coach and the teachers to refine an action plan and timeline for the implementation for the first set of practices. Training was then provided over 30–60 min and included Power Point, video examples, and discussions on the practices. The coach also used implementation guides for the practices, the coach and the teacher developed steps to implement each practice and identified resources to help the teacher. After initial intervention, booster sessions were also implemented

with teachers as needed. All observations were followed by coaching feedback three times per week. Most of the feedback occurred in meetings and a third were done by email. The feedback sessions followed a specific procedure which included discussions about any challenges the teacher was having with implementing the practice and the provision of needed resources to help the teacher with implementation challenges. Each teacher demonstrated acquisition of the specific practices after coaching was provided. Generalization probes showed mixed results. One teacher met criterion for generalization, one had inconsistent demonstration of practices across activities, and the third used practices but did not meet criteria levels. In regard to maintenance, one teacher demonstrated maintenance for all behaviors while the other two needed prompting to use practices. In regard to the presence of challenging behavior within the classroom, two teachers demonstrated a decrease in these challenging behaviors after intervention while one did not.

BIE technology has also been used as a method to deliver in-service PD. Ottley and Hanline (2014) provided intervention to four teachers who taught in three inclusive early childhood centers. A multiple-baseline single-case study documented the effects of coaching through the BIE. The BIE technology consisted of a Bluetooth wireless earpiece and two cell phones, the intervention was recorded by a camcorder, and a smart pen was used to scribe anecdotal notes. The focus of the intervention was on increasing the teachers' use of communication strategies, in particular ten specific strategies which were operationally defined. The teachers were not trained in ECSE, and one held a bachelor's degree, two had an associate's degree, and one had a CDA degree. The children who were the targets of the intervention all had disabilities which included autism and communication delays. Observations of the teachers occurred during indoor play routines.

After a stable baseline was demonstrated, each educator was given feedback on their use of communication strategies, and the researcher chose low-frequency practices as observed during

baseline as each teacher's intervention targets. The three practices were then randomly sequenced for intervention which began with a description and a rational for the use of the practice by the coach to the teacher. Examples of the practice were demonstrated, and the teacher used the practice until she did it correctly. The teacher then implemented the practice with the target child during a play routine while the supervisor used the BIE to provide immediate feedback to them. This was either a prompt to use the practice or positive verbal reinforcement after the practice was used. The intervention was delivered over 6–9 weeks, and the teachers participated in 27–37 of the 20-min coaching sessions. A functional relationship both within and across phases was demonstrated between the BIE coaching and the use of communication practices for each teacher. Maintenance data suggested a decrease in the use of communication strategies over time. Strategies with the largest effect were maintained by the educators at a higher rate than those with moderate to small effect sizes. Two of the four children demonstrated more communication as a result of the training.

Lastly, a multiple-baseline design across three home visitors and three caregiver child dyads was conducted by Krick Oborn and Johnson (2015). The study examined a multicomponent PD package to facilitate the delivery of family-guided routine-based intervention (FGRBI) to families and their children receiving Part C home visiting services (Woods, Kashinath, & Goldstein, 2004). The PD focus was on the effectiveness of coaching using electronic feedback to increase the home visitor's use of FGRBI as a strategy during home visits. The home visitors had a master's degrees and ECSE teaching licenses. The caregivers who participated included a step grandmother, a mother, and a father. All home visits were videotaped across baseline and intervention phases and coded for the percentage of intervals that the home visitors used any of seven specific FGRBI caregiver coaching strategies.

After baseline, the intervention phase began with a workshop that included two individualized 2-h sessions focused on FGRBI and caregiver coaching strategies. Adult learning strategies were used which consisted of PowerPoint, handouts, video examples, discussion modeling, and practice. If the home visitor did not demonstrate the criterion of more than 70 % use of home visiting strategies after 3 weeks, the coaching intervention began. During coaching each home visitor submitted their videotape of the weekly home visit, and they received an email with graphic and written performance feedback following the implementation of a five-step coaching protocol from their coach.

The workshop did not result in any of the home visitors reaching the preset 70 % criterion on home visiting behaviors, so all participated in individualized coaching. After 6 weeks of email feedback from the coaches after reviews of the home visiting tapes, all three home visitors demonstrated an increase on the use of target coaching strategies during home visits. Only one of the home visitors demonstrated the target behaviors during the maintenance probe, and none of the three acknowledged receipt of all 6 weeks of electronic feedback. Only one also provided reflective responses back to the coaches. There were minor changes in how home visitors used family routines during their home visits, and 25–55 % of the observed time didn't involve the child with the caregiver or with them.

Targeted Adult Learning for Child Intervention

While most of the literature focused on in-service and preservice personnel practice identify adult behavior as the dependent variable, studies that deliver intervention to children identify them as the dependent variable; yet these intervention studies also have an impact on the adults who deliver the intervention. As such, these studies contribute to the efficacy literature on ECI personnel practice, though this is not the primary outcome interest (see Barton, 2015).

As an illustration, Strain and Bovey's (2011) implementation of training strategies in their randomized control trial on the effects of a classroom-based model for young children with ASD warrants attention. This study used a clustered randomized design to examine the effects of a packaged intervention on 177 young children

who had ASD in 27 classrooms in comparison to 117 young children also with ASD across 23 classrooms. The intervention children participated in the learning experiences and alternative program for preschoolers and their parents (LEAP), which was originally developed in 1982. The teaching staff received intensive training to implement the model practices with fidelity. This consisted of a total time commitment of 23 days of on-site training, modeling, and feedback over 2 years. The LEAP model was composed of a number of program features including high intensity of learning opportunities, inclusive classrooms with a 1–5 adult/child ratio, positive behavioral guidance, sound instructional interventions, promotion of social and communication skills, use of peer mediated learning, and family involvement.

The training of the teaching staff included detailed protocols for each of the core features of the LEAP model, including fidelity measures with quality indicators to insure the integrity of the intervention delivery. Training methodology consisted of:

(a) Presentation of skill area to be learned in written/presentation format
(b) Discussion of skill area between trainee(s) and trainer(s)
(c) Demonstration of skill by LEAP trainer with simultaneous observation by trainee(s)
(d) In vivo practice by trainee(s) with observation and feedback provided by trainer
(e) Evaluation of trainee competency based on direct observation or permanent product
(f) Training of on-site supervisor to support direct-line replication staff
(g) Follow-up training and maintenance checks on a 6–8 week basis

The comparison classrooms were equivalent in regard to classroom structure, and the teaching staff received manuals and PowerPoint presentations about the core LEAP intervention features. Efficacy was measured through a battery of measures of general and domain-specific child development, as well as measures of quality for classroom features. After 2 years, the LEAP classrooms demonstrated a high level of implementation using the observational protocol. The comparison classrooms also made gains bringing their average to 38 % of program components over 2 years in comparison to the 87 % of implementation for the intervention classes. This was the only metric that allowed a pre/post comparison of teacher impact. Most importantly, children in the LEAP intervention group made statistically significant gains on all child measures compared to the children in the comparison groups. Teachers rated their experience with the LEAP replication process very highly.

Reviews of Evidence Based ECI Personnel Development Practices

Systematic Reviews

There have been an increasing number of reviews conducted on studies in both EC and ECI personnel preparation and continuing education. Common features of reviews include a thorough identification and categorization of studies that contain the feature of interest and an analysis of the features in each study. Systematic reviews begin with a process to identify the universe of studies that meet predefined criteria for inclusion. This is usually accomplished by searching a number of databases using terms describing the features of interest. Studies that are identified are then screened by titles and abstract to exclude irrelevant studies. Criteria can be revised to narrow or expand the search before each study is analyzed and categorized for final inclusion in the review. All of the following report their methodology and reliability measures within their article, and they are not included in depth below.

Two recent narrative reviews on EC PD were conducted under the auspices of the US DoED. Zaslow et al. (2010) conducted a review of effective features of early childhood PD. She organized the review into four areas: (1) improving the human and social capital of early childhood educators, (2) strengthening the institutions or organizations providing the PD, (3) improving children's outcomes in specific developmental domains, and (4) improving the overall quality of children's experiences in early childhood settings (Zaslow et al., 2010, p. 4). The literature review addressed children under 5 and included studies

on early educators who were defined as preschool teachers, prekindergarten teachers, kindergarten teachers, and child care staff. Her review included databases, curricula, and a variety of studies that were published in peer-reviewed journals, volumes, or government reports of evaluation. The inclusion criteria identified 37 studies in the literacy area, 7 in math, 14 in social skills, 10 on comprehensive curricula, and 11 on comprehensive approaches. She categorized and described these studies by type of design and impact. Her conclusion called for additional research on specific features of teacher PD such as the inclusion of audiences of those who work outside of preschool classroom, with infants or with children with cultural and linguistic backgrounds. She also recommended more rigor in studies to target PD approaches such as timing and setting. Lastly, she recommended more emphasis on the integration of learning across content areas for children.

A thorough review of research in early intervention and early childhood education funded by the IES was conducted by Diamond, Justice, Siegler, and Snyder in 2013 (Diamond et al., 2013). They reviewed research that focused on environment and instructional practices, instruction designed to impact academic and social outcomes, child skills and learning, and PD in early education. They categorize PD interventions as directed at helping teachers implement new curriculum, improve instructional practices, or improve instruction within a specific domain (Diamond et al., 2013, p. 32). The assumption being that effective PD practices result in improved academic and social outcomes for young children. The authors cite studies funded by IES that demonstrate teachers' behaviors can be influenced by training, that children's behavior can then be impacted by new teacher behavior, and technology can be an effective tool for PD. The authors conclude their review on IES-funded PD studies with a number of recommendations to increase studies to improve overall teaching practices.

Snyder et al. (2012) conducted a systematic review of the key features of the PD literature in EC using a framework from the National Professional Development Center on Inclusion [NPDCI] (National Professional Development Center on Inclusion, 2008) The review provided descriptions of the participant characteristics, content focus, and type of PD addressed in the reviewed studies, but it did not evaluate the effectiveness of any. An in-depth description of a subset of studies focused on instructional practices and was highlighted in the review. The research team used the NPDCI framework to develop working categories and definitions focused on the who, the what, and the how of PD. The development of the working categories and associated definitions for the how of PD was informed by the literature, research, and an iterative process. The result was operationalized definitions for nine working categories of types of facilitated teaching and learning experiences and 16 categories and definitions of forms of follow-up.

The review included 256 studies for which descriptive statistics were generated for each coding category, and comparative descriptive analysis was conducted for several subsets of studies including the characteristics of all studies included in the review and the subset of studies in which instructional practices were identified as a content focus for the PD ($n=63$). With respect to the who of PD, the reported settings for all studies were equally split among preschool/early childhood education, Head Start, and child care. PD participants were reported to interact with young children with disabilities or children at risk for disabilities or delays in 44 % in the larger group of studies and 77 % of the instructional practices studies. In regard to the what of PD, the most frequently reported content areas for the larger group of studies included social-emotional topics (27 %) and pre-academic (25 %) and instructional practices (25 %). With respect to the how of PD, only 68 % of the larger group of studies included a description of the PD strategies used to help learners in comparison to 98.8 % of studies focused on instructional practices. The most frequently occurring categories of PD were in-service training (34 % of all studies, 27 % of instructional practices studies) and staff development (28 % of all studies, 44 %% of instructional practices studies).

Some type of follow-up after PD was reported more frequently in the instructional practices studies (91 %) compared with the larger set of studies (84 %), with coaching or performance feedback as the most frequent form of follow-up (52 % of all studies, 65 % of instructional practices studies). Research staff was reported to be the most frequent providers of follow-up (49 % of all studies, 55 % of instructional practices studies), followed by consultants (28 % of all studies, 23 % of instructional practices studies). Single-subject experimental design was most frequently reported in the instructional practice studies versus the larger set of studies (55 % versus 26 %). Additionally, the instructional practice studies were more likely than the larger group of studies to report outcome measures for the practitioner (92 % versus 81 %), as well as the child (57 % versus 50 %).

Another systematic review of PD research in EC was conducted by Snell, Doswell-Forston, Stanton-Chapman, and Walker (2013). They analyzed 20 years of research on professional development delivered to those teaching preschoolers, primarily in classroom settings. They identified 891 potential articles that fit their criteria. After systematically reducing this pool, a total of 69 studies were identified as the final sample. The review focused on the characteristics of professional development presented in these studies: the study samples, the training topics and methods, and the research characteristics and outcomes of the studies.

Of the total sample, 57 studied included an average of 39 participants (range 1–500). The majority of these were female with an average age of 37 years and an average of 9 years of experience. The majority of classroom settings in which the professional development occurred was in Head Start. Forty-nine of the studies also reported on the child participants, and in 36 studies the children were typically developing. The majority of these studies focused on child interventions in the areas of communication and social skills (37 studies). Sixty-one of the studies reported using lecture-based classes or workshops to deliver the professional development, and 45 included applications of the content

through demonstrations of practice. Only 15 studies reported any follow-up contact or support after the training was conducted. Most often (49 studies), the professional intervention was delivered by experimenters, consultants, or both. The studies were equally split between single-subject experimental designs, experimental treatment control group designs, experimental no treatment control group designs, and quasi-experimental designs. Direct observation measures were the most frequently used in 34 studies, followed by interviews, surveys, and self-rating scales. Less than half of the studies (31) reported social validity measures. Of the 30 studies that measured fidelity, only 18 of the measures were reported as acceptable. Nine studies measured generalization across settings or skills and only six reported positive effects. Maintenance of the adult behavior or skills was measured in four of the studies.

Casey and McWilliam (2011) conducted a systematic review of the use of feedback interventions used in early childhood classrooms (infant to grade 4). Seventeen studies were identified that met criteria, and all used single-subject methodology. The 86 adults in the studies were distributed across preservice students (17), paraprofessionals (29), and teachers (40) within a range of classrooms from Head Start, public schools, and child care. All classrooms had either children with disabilities or risk conditions. The feedback was delivered in all but two of the studies by a researcher, and in all studies it was delivered in private to the target teachers. All but one study used verbal feedback, one used graphing alone, eight used verbal and graphing, eight used written, two used written, and six used a combination. Feedback was provided prior to intervention in six studies and in combination with consequence (praise) in seven studies. Goal setting was used in two studies, one of which used antecedents and consequence in combination with goal setting.

The studies were analyzed for effectiveness using visual analysis, and five met criteria for having consistent positive effects using standards for single-case analysis. The authors expressed concerns over the insufficient baselines, lack of

information about outcomes, and the small evidence base for performance feedback in ECI. Nonetheless, a recent systematic review of the performance feedback literature with school-age students concluded performance feedback as studied in the single-case studies they reviewed could meet the guidelines established by the WWC for an EBP (Fallon, Collier-Meek, Maggin, Sanetti, & Johnson, 2015).

By far the most common terminology for performance feedback used in ECI has been coaching. Artman-Meeker et al. (2014) conducted a systematic review of the use of coaching in EC that included 49 studies. The specific variables reported for each of the studies included: teacher-child characteristics, settings, dependent variables, independent variables, initial training, coaching components and strategies, measurement of implementation and intervention fidelity, overall outcomes, social validity, preparation and supports provided to coaching, and study rigor using adapted WWC procedures and standards.; not all studies reported data in these categories.

Across all 49 the studies, the teachers ranged in age from 20 to 44, across education level from high school to master's degree, and had between 0 and 25 years' experience. Thirty-five studies reported on the children in the studies, and 26 studies reported their ages which ranged from birth to age 7, the majority being between 3 and 5. Twenty-two of the studies included children with, or at risk for, disability, and 18 of these 22 studies included children with identified disabilities; nine included children with autism, and two included children who were dual-language learners. The primary setting for the coaching was reported in 48 studies, and almost half of these were in an inclusive preschool class. Fifteen of the studies focused in the language and literacy domain, five on language only and five on literacy only, nine on instructional strategies, and eight in social-emotional development.

Twenty-one of the studies reported that the coaches had at least a bachelor's degree; 13 reported the coach had a master's degree. Only seven reported that the coaches had experiences as a coach or mentor. The role of the coach was reported in 44 of the studies. Most reported that

coaches were primary research staff. Thirty-nine of the studies reported that the coaching happened in the teacher's classroom with the teacher. Four studies provided coaching at a distance, and in six studies a combination of face-to-face and distance was used. In 20 studies debriefing or feedback from the coach occurred immediately after an observation had occurred; in 13 studies, this occurred on the same day of the observation; and in 14 studies it occurred one or more days after the observation. Twenty-six of the studies reported the time spent in coaching, and in these studies, teachers participated in 3–32 coaching sessions and which varied from 2 min to 5 h per session, over 4.5 months, on average. Almost all of the studies expected coaches to provide feedback to teachers, yet only 10 of the 49 studies described any training or support to help the coaches learn how to provide feedback.

Twelve coaching practices were identified by the authors and used to categorize the coaching that occurred. The 12 strategies were then reduced to five features: a focus on partnerships, action planning, focused observation, reflection and feedback, and action in the work setting. Only two of the studies reported using all of the features, and 26 studies reported all features except for a focus on partnership. The most frequently used strategy across the 49 studies was performance feedback which included a range of practices.

Thirty-two of the studies used a group experimental design methodology, and a number of standards from WWC were used to assess the soundness of the studies: random assignment across conditions, equivalency of baselines across groups, sample comparability, and a description of sample attrition. Thirteen of the studies met all four of the adapted standards and 19 did not meet any. Seventeen studies utilized a single-subject research design, and these were also analyzed against WWC standards. Four of the 17 studies met the standards and also demonstrated strong evidence of a functional relationship.

Research Syntheses

Dunst and Trivette (2009) conducted a meta-analysis and research syntheses on the following

adult learning methods: (1) accelerated learning, (2) coaching, (3) guided design, and (4) just-in-time training. Results demonstrate that all four adult learning methods were associated with more positive learner outcomes as measured by the average effect sizes and 95 % CIs across all studies and outcomes combined. This study is described by Dunst in this volume.

Dunst et al. (2015) conducted a metasynthesis of 15 research reviews of in-service PD. The purpose of the metasynthesis was to determine the extent to which studies of in-service PD that included key characteristics and core features of in-service training were associated with changes and improvements in educator and student outcomes. A multiple-case design was used to analyze the research syntheses in the metasynthesis. This design is grounded in a conceptual framework for testing hypothesized relationships between independent and dependent variables in order to establish causal inferences. Each research synthesis was considered a separate case, and the focus of the analysis was the extent to which the relationships between in-service PD and teacher and student outcomes were similar in the research syntheses.

Research syntheses were located using search terms, and follow-up searches were conducted using controlled vocabulary, key word, and natural language searches as alternative terms were identified from retrieved publications and reports. The reference sections of retrieved journal articles, book chapters, books, dissertations, and other published and unpublished reports and papers were examined to identify additional reviews. Research syntheses were included if in-service PD was the main focus of a literature review, there was an explicit attempt to identify the characteristics of and conditions under which in-service training was effective, and sufficient information was included in the reports to code and conduct secondary analyses of the relationships between the key characteristics of in-service PD and research findings. More than 25,000 abstracts (including duplicate abstracts in different databases) were generated from searches. These were reviewed and reduced to 36 reviews that were then examined to determine if

they met the inclusion criteria. Fifteen reviews formed the final group for analysis.

PD features were coded within five sets of characteristics which included (a) the focus of in-service training, (b) the in-service setting, (c) the in-service characteristics, (d) the research synthesis findings, and (e) the metasynthesis findings. Two of the investigators independently abstracted and coded information for the 15 in-service features as well as background information about the studies in the research syntheses (e.g., type of synthesis, research designs, number of studies). The 15 research syntheses included 550 studies of more than 50,000 early intervention, preschool, elementary, secondary education teachers, educators, and practitioners. Seven syntheses included only group design studies (e.g., experimental, quasi-experimental, and pre-experimental investigations or program evaluations), and six syntheses included a mixture of group design studies and either descriptive case studies or single-subject studies. The investigators of two research syntheses did not include information in their reports about the types of studies in their reviews. The participants included pre-K or K to grade 12 teachers ($N=8$ reviews); K to grade 5, 6, or 8 teachers ($N=3$ reviews); early childhood practitioners ($N=3$ reviews); or both pre-K to grade 12 teachers and other non-educators ($N=1$ review). Eleven research syntheses included studies of in-service PD to promote the use of different types of instructional or behavioral practices, two research syntheses included studies to promote teacher understanding and use of content knowledge or skills, and two research syntheses included studies of in-service training to promote teacher or practitioner use of different job-related practices or to support teacher confidence in their teaching practices. The content areas of in-service training included mathematics or science ($N=5$ reviews), teacher-child interactions ($N=1$ review), teacher praise ($N=1$ review), teacher confidence ($N=1$ review), or a mixture of different content knowledge and practice ($N=7$ reviews).

Eleven of the research syntheses included studies that provided in-service PD in both contextual and noncontextual settings, and four

Table 16.4 Types of trainer and learner activities included identified in effective in-service for teachers

	Trainer/coach roles		Active learning		Trainer supports	
Study	Introduction	Illustration	Authentic learning	Learner reflection	Coaching/ mentoring	Performance feedback
Blank and De las Alas (2009)	✓	✓	✓✓	✓	✓✓	NR
Blank et al. (2008)	✓✓	✓✓	✓	✓	✓	NR
Capps et al. (2012)	✓	✓✓	✓	✓	✓	✓
Cavanaugh (2013)	✓	✓	✓✓	NR	✓	✓✓
Dunst, Trivette, and Hamby (2010) and Dunst and Trivette (2012)	✓✓	✓	✓✓	✓	✓	✓
Fukkink and Lont (2007)	✓✓	✓✓	✓✓	✓	✓	✓
Ingersoll and Kralik (2004)	✓	NR	✓✓	✓	✓✓	NR
Ingersoll and Strong (2011)	✓	NR	✓✓	✓	✓✓	NR
Isner et al. (2011)	✓	NR	✓✓	✓	✓✓	✓
Joyce and Showers (1995) and Showers et al. (1987)	✓✓	✓✓	✓✓	✓	✓✓	✓
Kretlow and Bartholomew (2010)	✓	✓✓	✓✓	✓	✓✓	✓
Saylor and Johnson (2014)	✓	✓✓	✓✓	✓✓	NR	✓
Snow-Renner and Lauer (2005)	✓	✓	✓	✓	NR	✓
Yoon et al. (2007) and Guskey and Yoon (2009)	✓	✓✓	✓	NR	✓	NR
Zaslow et al. (2010)	✓✓	✓✓	✓✓	✓✓	✓✓	✓

Note: ✓✓ = Primary focus of the inservice professional development in the studies in the research syntheses, ✓ = Secondary or minor focus of the inservice professional development, and NR indicates that the research synthesists did not describe or include information in their reports to infer that the professional development included the inservice practice characteristic

syntheses provided in-service training entirely in teachers' classrooms or schools, child care or preschool settings, or other work environments. All of the research syntheses included descriptions of the focus of the in-service training, and some type of authentic teacher learning opportunities. Most of the research syntheses included the majority of key characteristics and features considered necessary for in-service PD to be effective as displayed in Table 16.4.

Acquisition or improvements in teacher instructional or behavior practices were the primary outcomes in 14 research syntheses. Nine research syntheses included student academic performance, knowledge acquisition, or skill development as the primary outcome measures, four included student or child behavioral outcome measures, and three included both types of child outcomes. Twelve research syntheses included both teacher instructional practices and student or child outcome measures. Five included both teacher content knowledge, instructional practice outcomes, and student or child outcome measures. Five included only teacher outcome measures, and one research synthesis included only student outcome measures.

Fourteen of the research syntheses included information about the duration or amount of in-service training provided. The number of hours of in-service training associated with positive effects ranged between 15 and 80+, and in a number of reviews, it was stated that multiple in-service sessions distributed over weeks or months of PD were a factor contributing to positive and significant effects. All of the research synthesis included information about the nature and extent of follow-up supports provided to teachers after the completion of the initial in-service PD. Ten investigators explicitly stated that ongoing follow-up supports were a factor that reinforced

in-service training, whereas three investigators made statements, or it could be surmised that follow-up supports contributed to positive outcomes. Investigators of all 15 research syntheses reported or described the characteristics of and conditions under which in-service PD was most effective. These included trainer introduction, demonstration, and explanation of the benefits of mastering content knowledge or practice, active and authentic teacher learning experiences, opportunities for teachers to reflect on their learning experiences, coach or mentor supports and feedback during the in-service training, extended follow-up supports to reinforce in-service learning, and in-service training and follow-up supports of sufficient duration and intensity. The patterns of results, taken together, provide strong evidence for the relationships between specific in-service PD characteristics and core features and teacher and student outcomes. Results that were the same or similar in the different types of research syntheses for different types of practices bolster contentions about the necessary, but not sufficient, conditions, for in-service training.

Summary

This chapter documented the need for increasing the quantity and quality of ECI practitioners who can meet the growing numbers of those infants, young children, and their families who qualify for services under IDEA. An overview of the evidence supporting preservice preparation and continuing education in-service for ECI personnel was presented, beginning with the foundation from which this evidence evolved. This foundation reflects the long and strong history of ECI, as illustrated through the preparation and ongoing training of high-quality and interdisciplinary personnel who can facilitate growth and development with infants, young children, and their families.

The history of ECI personnel development through preservice and in-service activities is supported by a number of interrelated elements that have continuously driven the field forward. Among these are the legislative and statutory mandates under IDEA for ECI service delivery

and personnel development activities, the latter area to assure the competence of those providing ECI services. The field of ECI personnel practice is also supported by theoretical frameworks about adult learning as applied to the training and ongoing preparation of those ECI practitioners. Research has driven the evolution and validation of early theories about how people learn, and current evidence-based recommendations for personnel practice and policy are consistent with early work in this area. The challenge remains, though, on how to apply the components of these evidence-based frameworks into standard practice. We cannot ignore the research base on the unique learning needs of adults, and the skills needed by those who teach them. An additional caution to the field is warranted in regard to the use or recommendation of complex frameworks such as implementation science to guide the scaling up of EBP: For example, such framework requires a viable infrastructure to support the necessary sequence of activities associated with the effective demonstration of a system change.

The last foundational support for ECI personnel practice is pedagogy. The roots of ECI pedagogy continue to drive the content of IHE programs, state certification requirements, national standards, and recommended practice. The need to operationalize and align these core components of ECI pedagogy is an obvious next step in the research agenda for personnel practice. It is also a necessary direction for quality assurance of ECI personnel, including personnel from related services and other occupational categories.

The data that were presented in this chapter as evidence to guide personnel practice in ECI emanate from a variety of sources including surveys, nonexperimental demonstrations, experimental studies, and research reviews and syntheses. Survey data describe the lack of a systematic approach in both preservice and in-service programs in ECI as reflected by descriptions of IHE program offerings, state in-service and PD program offerings, and perceptions of those in ECI practice. This information provides needs assessment data for the field and, as such, can be viewed as a baseline for the future change.

In addition, descriptions of ECI interdisciplinary preservice personnel programs that were implemented 20 years apart remain consistent across a number of program features. Yet, inadequacies in preservice training continue to be identified through observations of baseline skills of teachers about to graduate and surveys on the self-perceptions of program graduates. This is another obvious research need in ECI.

The descriptions of in-service programs included in this chapter are typical of what is being offered through state and local ECI systems. The data from the two examples document interventions that were focused, coherent, part of a state, regional or local system, aligned with incentives or program expectations, and reflective of personnel practices that could can result in child and family change. As such, they provide insight into mechanisms that support or inhibit the acquisition of new knowledge and skills within the ECI workforce.

The evidence that was provided through experimental studies of preservice and in-service practices represented a sample of the available evidence. Though there are a number of experimental group studies that have demonstrated the effects of training and PD activities on teacher behavior, they have focused on teachers and children who are in preschools, Head Start programs, or child care. While the results of such studies inform ECI personnel practice, there have been few group designs either implemented or replicated with ECI practitioners who work with infants and young children who are receiving services under IDEA. The examples of research studies that documented experimental control over ECI personnel practices and personnel outcomes consisted of single-case studies and one example of a random group design focused on child impact. Less consistently demonstrated across studies was the impact of interventions on measures of child skills or on measures of generalization and maintenance of the trainee skills.
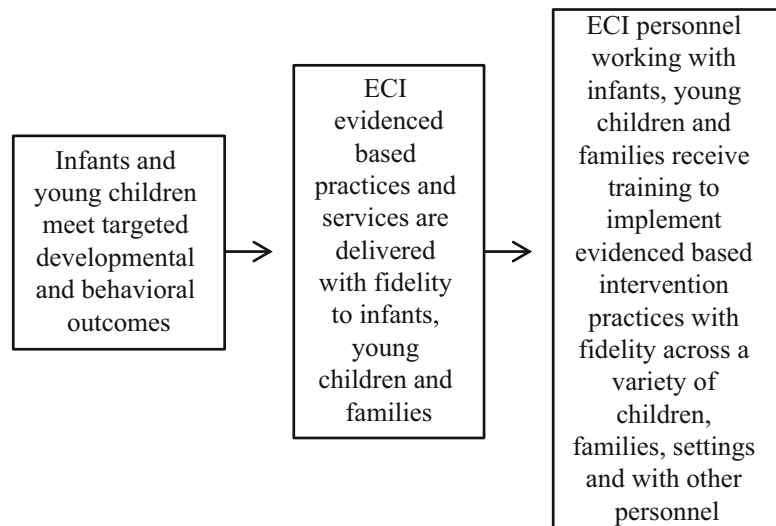
Finally, research reviews that were included in the chapter suggested a high level of variability across studies that met inclusion criteria for general research on personnel practices, as well as on targeted practices such as instruction, perfor-

mance feedback, and coaching. The studies that used coaching were especially problematic because of the conflicting, changeable, and non-empirically based definitions used to describe this popular feature of personnel practice. Potential measurement confounds across studies were illuminated, as were issues related to the replication of such varying applications of the coaching construct. Across other reviews, variation across features such as strategies to teach to generalization and maintenance was also identified, as was the fact that most research studies relied on research staff to implement the interventions under study. However, research syntheses provided evidence for key features of personnel preservice and in-service interventions that have consistently resulted in adult learning and student impact and change.

Recommendations

The studies and reviews that were presented in this chapter are ripe with recommendations for future research on the preservice and in-service needs of ECI personnel. These recommendations were made in the context of the growing numbers and diversity of the ECI workforce and the complexity of competencies needed by them to meet the growing and diverse needs of ECI population. This complexity is compounded by a lack of infrastructure within state and local personnel development systems and the resulting reliance of such systems on ineffective training mechanisms (e.g., conferences, once offered workshops without follow-up) because of funding and logistical constraints. Such systems are also demonstrating challenges in identifying, training, and supporting qualified instructors and other personnel development specialists to deliver evidence-based education and training to ECI practitioners. Yet, it is clear that the federal and state focus on EC and resulting increases in EC programs will continue. What is less clear is how ECI systems will meet the current and future need for well-trained personnel, representing different disciplines, educational backgrounds, and learning styles, to deliver EBP to eligible infants and

Fig. 16.3 Reverse model of change for personnel development

Infants and young children meet targeted developmental and behavioral outcomes

→

ECI evidenced based practices and services are delivered with fidelity to infants, young children and families

→

ECI personnel working with infants, young children and families receive training to implement evidenced based intervention practices with fidelity across a variety of children, families, settings and with other personnel

young children under IDEA, across a variety of EC settings, and, in collaboration with EC staff.

In 1960, the US Navy required a paradigm shift to accommodate the increasing complexity of their work in the era of growing and different (e.g., nuclear threats, collaboration with other armed forces demands). As a result the Navy coined the KISS principle to address the factors that governed their new world order. This principle proposed that most systems work best if they are kept simple rather than made complicated; therefore simplicity should be the key goal in systems design, and unnecessary complexity should be avoided. In the spirit of this principle, the following recommendations will attempt to simplify and clarify the direction needed for future ECI preserve and in-service practice.

Focus on the "Right" Variable for Sustainable Change

The job of personnel in ECI is to facilitate child and family change through the delivery of measurable interventions and outcomes. Therefore, the focus of all preservice and in-service activities should be on the child and family, and measures of effectiveness should reflect this. Guskey (2014) has recently recommended this shift for PD planning, and this has been reinforced for ECI by Dunst (2015). If all training activities

focus on the achievement of child and family outcomes and change, preservice and in-service curriculum, activities, and outcome measures should then be guided by the theory of change reflected in Fig. 16.3.

Operationalize and Align All ECI Personnel Knowledge, Skills, and Recommended Practices

ECI has national personnel standards (Stayton, 2015) that are used to accredit IHE preparation programs in ECSE. Personnel standards from NAEYC are also used for those IHE programs with blended programs (e.g., EC and ECSPED). ECI-recommended practices are also available (DEC, 2014) to guide interdisciplinary preservice and in-service training. These standards and practices are not currently operationalized nor aligned with each other. This must be done as a first step to clarify the expectations and competencies for all who provide ECI services. These standards and practices are research based, grounded in inclusionary service delivery, and include competencies that can be implemented across service delivery sites and with other personnel (e.g., collaborative consultation). Once this first alignment is complete, personnel standards across related disciplines can be added to a personnel standards matrix to identify and differentiate similar and
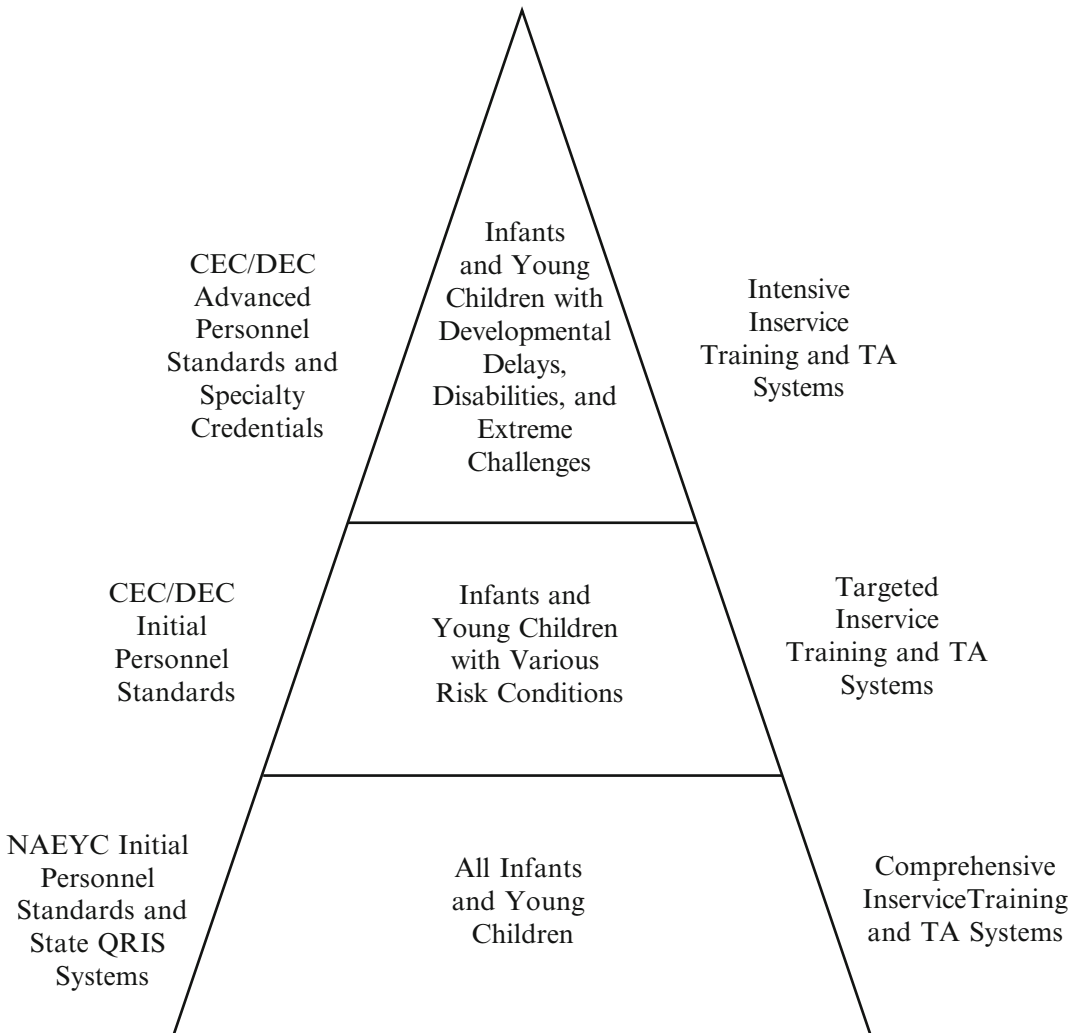
Fig. 16.4 Personnel hierarchy of knowledge and skill

differing practices aligned by discipline and child need. Figure 16.4 contains a scheme using the a pyramid graphic to illustrate as a first step, the CEC-DEC, NAEYC personnel standards, and DEC practices aligned with child need.

Create Infrastructure Support for a CSPD

The need for high-quality preservice and in-service training opportunities for those who serve infants and young children with disabilities and their families must be addressed through systems thinking. All systems are comprised of interrelated components, and each component must use EBP for administration, leadership, resource allocation, implementation, and evaluation. Personnel systems under IDEA evolved using such a system: the CSPD. The components and indicators of a proposed CSPD structure for ECI personnel as conceptualized by the Early Childhood Personnel Center, in collaboration with other national centers, are in Table 16.5. Such an infrastructure will support the identification, implementation, and evaluation of EBPs in the areas of personnel standards, recruitment and retention

Table 16.5 CSPD framework

Subcomponent 1: Leadership, coordination, and sustainability
Quality indicator PN1: A cross sector leadership team is in place that can set priorities and make policy, governance, and financial decisions related to the personnel system
Quality indicator PN2: There is a written multi-year plan in place to address all sub-components of the CSPD
Subcomponent 2: State personnel standards
Quality indicator PN3: State personnel standards across disciplines are aligned to national professional organization personnel standards
Quality indicator PN4: The criteria for state certification, licensure, credentialing and/or endorsement are aligned to state personnel standards and national professional organization personnel standards across disciplines
Subcomponent 3: Preservice personnel development
Quality indicator PN5: Institution of higher education (IHE) programs and curricula across disciplines are aligned with both national professional organization personnel standards and state personnel standards
Quality indicator PN6: Institution of higher education programs and curricula address early childhood development and discipline specific pedagogy
Subcomponent 4: Inservice personnel development
Quality indicator PN7: A statewide system for inservice personnel development and technical assistance is in place for personnel across disciplines
Quality indicator PN8: A statewide system for inservice personnel development and technical assistance is aligned and coordinated with higher education program and curricula across disciplines
Subcomponent 5: Recruitment and retention
Quality indicator PN9: Comprehensive recruitment and retention strategies are based on multiple data sources, and revised as necessary
Quality indicator PN10: Comprehensive recruitment and retention strategies are being implemented across disciplines
Subcomponent 6: Recruitment and retention
Quality indicator PN11: The evaluation plan for the CSPD includes processes and mechanisms to collect, store, and analyze data across all subcomponents
Quality indicator PN12: The evaluation plan is implemented, continuously monitored, and revised as necessary based on multiple data sources

strategies, preservice and in-service activities, evaluation, and leadership, coordination, and sustainability. A viable CSPD allows for the design and integration of research and practice across all EC personnel systems.

Acknowledge and Address the Complexity of Variables Inherent in ECI Personnel Research and Practice

ECI systems are complex, as are the children and families within such systems. The characteristics of personnel who are providing services contribute to the complexity under which research is implemented. Additionally, research designs have to be contextually referenced to the local, regional, and state culture and systems in which ECI operates. This requires the creation of theories of change (Figs. 16.1 and 16.3) that

can be delineated into logic models to guide systematic examinations of independent variables, dependent variables, and mediators and moderators to the outcomes of interest, including system impact. Figure 16.5 contains such a logic model developed to accompany Table 16.5.

Create a Repository of Research Findings to Inform Current and Future Personnel Policy and Practice

Almost 20 years ago, Guralnick (1997) proposed an expansion of ECI EBP through the design and implementation of precise, rigorous, and targeted studies that would result in a rich repository of findings to inform policy and practice. Three sets of variables (program features, child and family characteristics, and outcomes) were delineated as integral to such research designs.
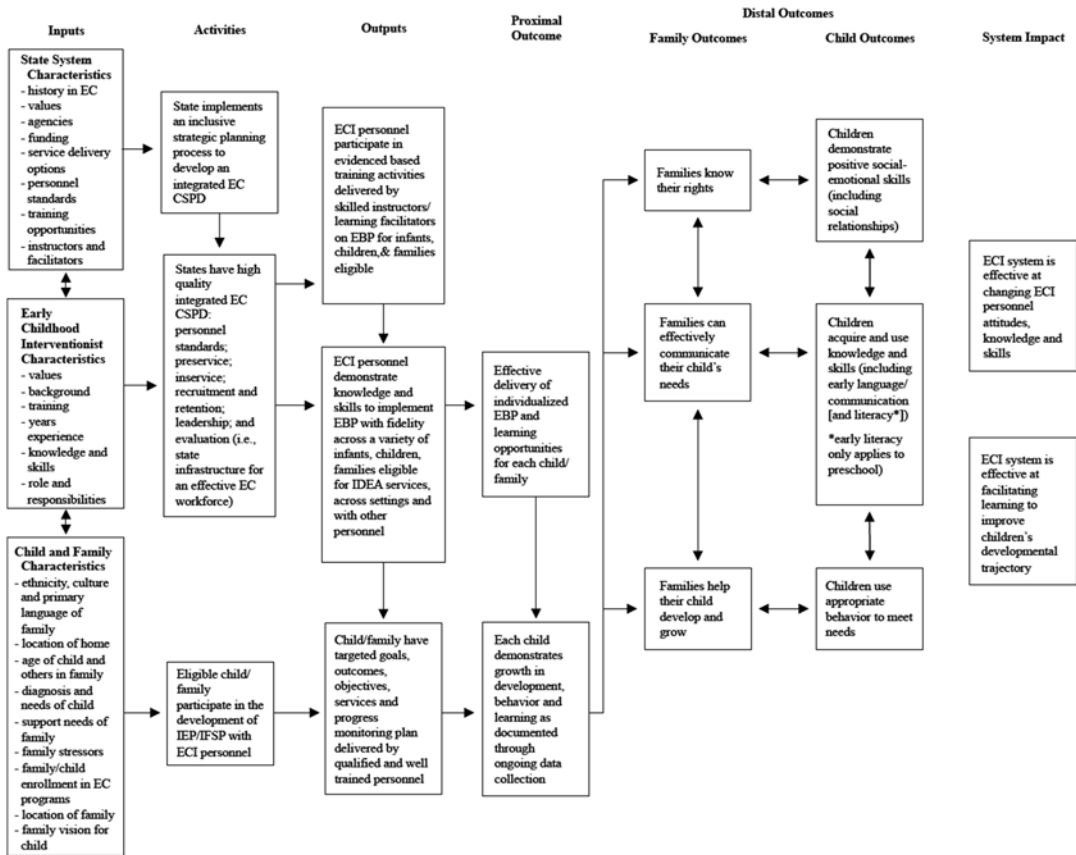
Fig. 16.5 Logic model for ECI personnel practice

Referred to as second-generation research, these designs could facilitate the examination of specificity within and across variables and the interactions among them, to identify evidence of effectiveness. Such designs could also include variations within program features and population characteristics such as systems and persons who provide preservice and in-service activities. Research designed in this way provides a mechanism to systematically build a shared repository of EBP across content areas, personnel practices, and target populations and outcomes. Figure 16.6 contains an illustration of second-generation design components using personnel development features that have been identified as effective across preservice and in-service personnel studies (Dunst et al., 2015).

Build and Sustain the ECI Workforce by Conducting Research on Individualized Learning Needs

Differences in adult learning styles have been demonstrated through measures of adult learning impact as a result of either preservice or in-service activities. Experimental studies also continue to demonstrate failures when trying to change adult behavior through the teaching of more than a targeted and small set of skills to practitioners, or when measuring the generalization and maintenance of those skills, or when moving an EBP from a controlled condition to a real-world situation on a larger scale. These failures will only increase if we do not conduct research on effective learning methods for the future ECI workforce: those who have grown up
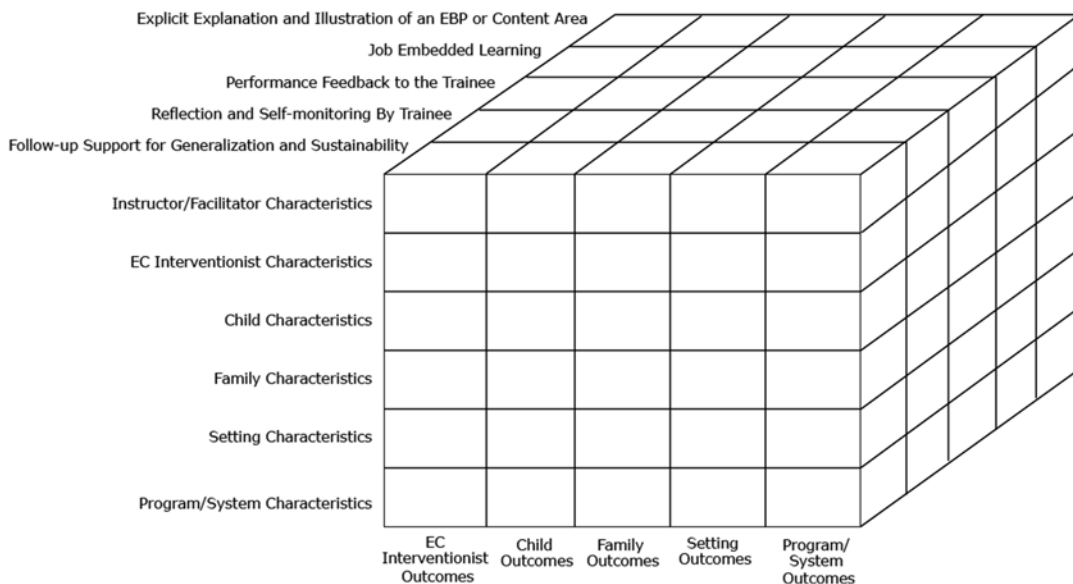
Fig. 16.6 Second-generation applications for personnel practice

learning very differently than any before them. For example, the current generation has been taught through media-directed instruction using tablets or phones, personal learning plans, immediate feedback loops on learning acquisition and progress through online personal teaching and record-keeping systems (e.g., PowerSchool), access to concrete video exemplars when needed (e.g., Kahn Academy), and instant messaging systems driven by pictures (e.g., Instagram and Snapchat). In fact, the College Board is recognizing the needs of current learners by teaming with Kahn Academy to redesign all college and graduate school preparation courses for 2016.

Individualized intervention, progress monitoring, and the acquisition of outcome-based standards have long been the cornerstone of service delivery to infants, children, and families under IDEA. We must begin to use similar methodology in the delivery of training to the personnel who deliver these services. The creation of individualized and effective learning systems for ECI personnel will require a commitment to participatory planning for both research studies and the translation of research findings into policy and practice. Responsive and personalized learning systems that are aligned with standards and com-

petencies must be designed and studied to insure their effectiveness along with individuals' ability to self-direct, manage, and monitor their own learning over time as job requirements change (including the discovery of new EBP). This will require the exploration and use of learning mechanisms such as competency-based evaluation systems and registries, learning menus, and measurement systems. ECI must be prepared for the future learning of those who are, or will become, members of the workforce by identifying and applying innovative EBP in adult learning, so that we may focus the workforce on achieving child and family outcomes.

Embrace a Culture of Research Collaboration to Build and Sustain the ECI Workforce

This last recommendation is the most important and the most difficult to achieve. Very rarely has research on personnel practices been done collaboratively across multiple investigators who represent different philosophies or methodologies. Indeed, funding mechanisms create competition, and, as a result, methodologies are rarely shared, especially when external research funds are limited. This has created gaps between

research findings and applications to practice, practice gaps when interventions are not implemented with fidelity, and outcome gaps when EBP with infants, young children, and families cannot be replicated because of problems with the interpretation, application, and implementation of intervention features (e.g., coaching). These gaps will continue until they are collectively addressed by the ECI research community.

The ECI research community has a responsibility to implement research studies to identify effective interventions to use with infants, young children, and families, and effective interventions to facilitate the implementation of these interventions by the ECI workforce. Until this community agrees to collaborate on a collective and iterative research agenda on personnel practice, we will not be able to move beyond the current status of multiple and various interpretations and applications of features of personnel practice. This could be accomplished by agreeing to a common nomenclature, or agreeing to share methodologies to add value to the knowledge base. Most importantly, the ECI field has a responsibility to infants, young children, and families to implement EBP in all interventions, most importantly as described in this chapter, when teaching of ECI personnel.

their arteries did better than those that did not use such practices. Additionally, the higher the number of the practices used, the faster the patients were being treated, and the better the cardiac outcomes. These findings were published in a peer-reviewed journal in 2006 and presented at major cardiology meetings. The field of cardiology embraced these six EBPs, and hospitals (by definition being complex systems) implemented them. Evaluations documented that many more lives were saved than were under previous treatment protocols (Kolata, 2015, June 19).

The field of ECI also has the need and the opportunity to facilitate a sea change in how evidence-based personnel practices are applied to teach practitioners to implement child and family interventions with fidelity to achieve targeted learning outcomes. Syntheses of reviews of personnel practice methods related to positive outcomes have identified six EBPs (Dunst et al., 2015), and these are on Table 16.4 and Fig. 16.6. I hope the field of ECI will demonstrate the same sense of urgency as cardiologists, and use these practices to frame all future research endeavors on personnel practice, so that we may realize better outcomes in ECI with the infants and young children we serve.

Conclusion

"Perfection of means and confusion of goals seem, in my opinion, to characterize our age". This quote has been attributed to Albert Einstein and applies to many challenges we have today. One model for meeting such a challenge was demonstrated by the field of cardiology to address coronary heart disease. Death rates from this disease decreased by 38 % between 2003 and 2013 according to the CDC. This was due to the findings of one researcher who noted differing rates of heart disease mortality, by hospital, that could not be attributed to state, regional, or resource differences. He and a group of his colleagues then surveyed a random sample of 365 hospitals and discovered that those that used one or more of six specific practices to cut down on the time it took to get patients from the ER into an OR treatment room to open

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