

FUTURE DIRECTIONS AND CONSIDERATIONS IN THE CONTINUED EVOLUTION OF EARLY CHILDHOOD INTERVENTION

CARL J. DUNST

Although the origins of early childhood intervention can be traced to the early 1900s (see Dunst, 1996), heightened interest in intervention with infants, toddlers, and preschoolers with identified disabilities, developmental delays, and at-risk conditions first occurred in the late 1960s and early 1970s (Caldwell, 1970). The sources of evidence for claims about the benefits of early childhood intervention, to some practitioners' surprise, included studies of young children reared in institutions (e.g., Casler, 1965; Skeels & Dye, 1939) and studies of animals provided supplemental experiences (e.g., Beach & Jaynes, 1954; Thompson & Heron, 1954; Wilson, Warren, & Abbott, 1965). In retrospect, to say that the foundations for early childhood intervention were built on shaky grounds is an understatement.

In the half century since Caldwell (1970) published her paper building a case for early childhood intervention, there has been exponential knowledge growth about early childhood intervention (Dunst, 2018a). During the 10-year period between 1960 and 1970, there were fewer than 100 publications pertaining to early childhood intervention, whereas for the 10-year period ending in 2017, there are between 40,000 and 50,000 publications on the topic found in searches on Google Scholar and ProQuest Central. This knowledge growth is shown in Figure 1 for 12 five-year periods beginning in 1960. The exponential shape of the curve is almost identical to that of knowledge growth in general (e.g., Meige & Schmitt, 2015) and knowledge growth in specific fields of inquiry and science (e.g., Densen, 2011; Fernandez-Moure, 2016; Milicevic, 2015). Keeping pace with knowledge explosion in any field, including early childhood intervention, can be especially challenging, if not impossible, in the absence of explicit knowledge management as described in this chapter.

The exponential knowledge growth in early childhood intervention has resulted from research and lessons learned over the past 50 years. The knowledge base about early childhood intervention is so much more extensive and informative than what was known at the beginning of heightened interest in early childhood intervention. The knowledge growth, however, has not occurred without challenges. Knowledge management (Rehman, 2016) in early childhood intervention is almost nonexistent (see Rabinowicz & Ray, 2018, for an exception). Searches in Google Scholar, ProQuest Central, PubMed, ERIC, and PsychInfo for early intervention or early childhood intervention, and knowledge management or information management, finds no explicit guidance about how to coalesce ever-expanding amounts of information in ways that improve our understanding and ability to identify evidence-based and evidence-informed early childhood intervention practices.

Dunst, C.J. (2018). Orientaciones y consideraciones futuras en la continua evolución de la Atención Temprana en la Infancia. In C. Escorcía & L. Rodríguez (Eds.), *Prácticas de Atención temprana centradas en la familia y entornos naturales* (pp.). Madrid: UNED Publisher.

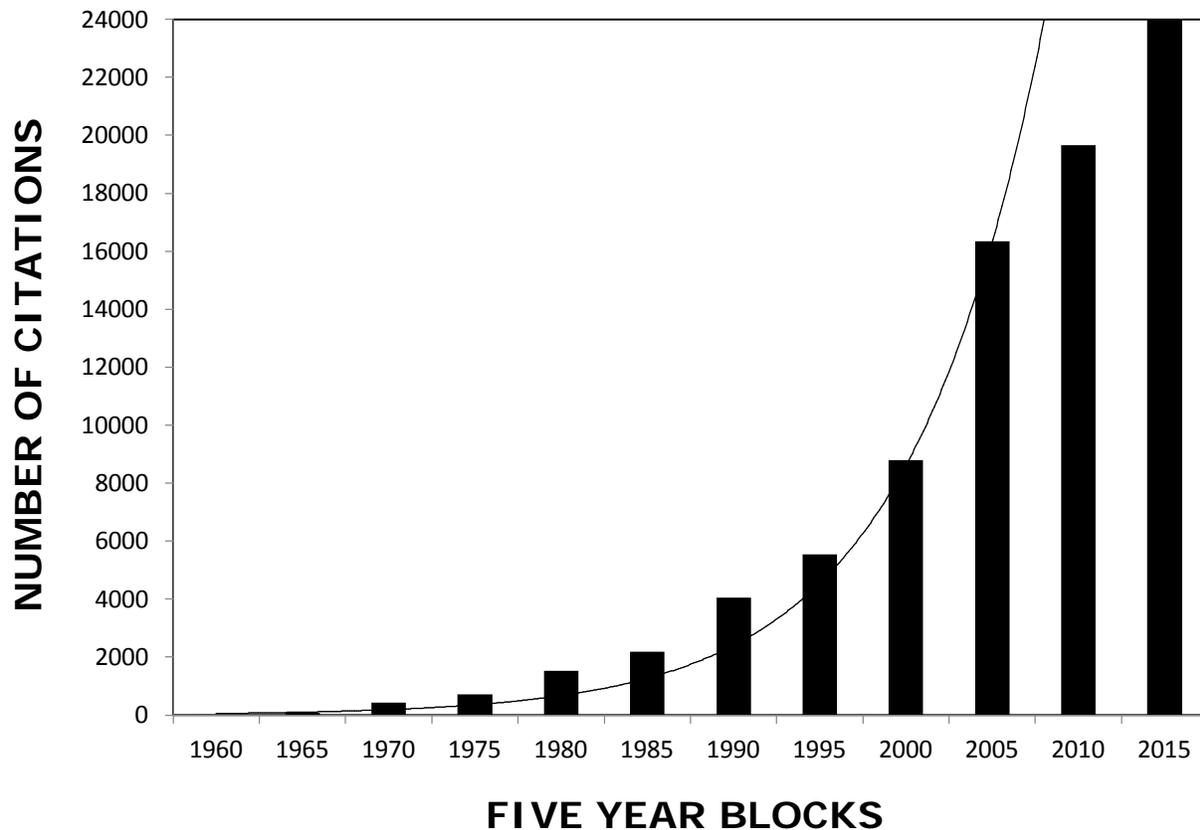


Figure 1. Knowledge growth curve for the number of Google Scholar search results for early intervention and early childhood intervention citations for twelve 5-year blocks between 1960 and 2019. (NOTE. The 2015 to 2019 block was estimated based on the 2010 to 2017 trends in citations.) Reprinted from Dunst (2018a) pursuant to an open access Creative Commons Attribution license.

This chapter includes the author's thoughts about future directions in early childhood intervention based on nearly 50 years of experience as a student, practitioner, and researcher in the field. This includes lessons learned from the author's research and practice and that of countless others also interested in improving early childhood intervention practices. I organize my comments around five themes: (1) the better use of terminology to describe early childhood intervention practices, (2) the use of the "less is more" principle for improving practice implementation, (3) the need for practice-based research evidence about effective practices, (4) the need to challenge use of non-evidence-based, controversial practices, and (5) the use of knowledge management methods in early childhood intervention. My comments are directed primarily to practitioners and students but are also applicable to faculty members, researchers, and other professionals interested in promoting the use of evidence-informed early childhood intervention practices in a manner consistent with the aims and purposes of this volume (Escorcía & Rodrigues, personal communication).

The better use of terminology is described in terms of the need for consistent use of terminology for describing particular types of practices and the need for operational definitions of those practices. The less is more principle refers to practices that include the smallest number of key characteristics or active ingredients that have been found to be

empirically related to optimal child, family, and practitioner benefits and outcomes. The need for practice-based research evidence has to do with research findings that directly inform improvements in everyday practices. The need to challenge the use of non-evidence-based practices has to do with theories and contentions that sound like good ideas but which are not supported by research findings. The use of systematic knowledge management practices pertains to the use of better knowledge management and sharing methods, and the dissemination of information that influences the adoption and use of evidence-informed early childhood intervention practices. Careful attention to core elements of each of these issues are needed, in my opinion, if early childhood intervention is to continue to evolve in a manner that results in improved practices and better outcomes for children, families, and practitioners. Throughout the chapter, I use evidence-informed early childhood intervention performance checklists for different early childhood intervention practices to illustrate one way of improving our understanding and use of child-level and family-level interventions (Dunst, 2017a, 2017b; Dunst, Hamby, Wilson, Espe-Sherwindt, & Nelson, 2017).

Clarifying Our Terminology

The terminology used in any field, on the one hand, should have the same meaning to persons in that field, and on the other hand, should not be confused with the use of the same terms in other fields. Terms include words, compound words, or multi-word expressions “that have precise meaning in some uses or in particular...[fields] or professions” (Merriam-Webster, 2016) . Ramey and Ramey (1998) noted, however, that “The terminology of early intervention is far from precise or standardized” (p. 110).

The terms *early intervention*, *natural environments*, and *family-centered*, germane to this volume and used widely in the published literature, are often misunderstood and confused with the use of the same terms in other fields. This is especially the case for the term *early intervention* which is used in the healthcare and mental health fields to mean intervention practices that have nothing to do with young children and their families (e.g., Corwin, 1996; Haahtela, Selroos, & O'Byrne, 2015). There is, in fact, a journal titled *Early Intervention in Psychiatry* (Wiley) that has not published a single paper about infants, toddlers, or preschoolers since the inception of the journal.

The term *natural environment* as well is also used in other fields to mean something completely different from how it is used in early childhood intervention (e.g., Goudie, 2019; Hansen, 2018). The same is the case for the term *family-centered* where there have been different interpretations of the term (e.g., Friesen & Koroloff, 1990; Hutchinson & Nelson, 1985; Roberts & Magrab, 1991). Advances in what we do as a field will more likely occur by the use of more precise terminology to describe different kinds of intervention practices.

Since the beginning of contemporary interest in early childhood intervention, the terms infant stimulation (Bronfenbrenner, 1968), infant education (Painter, 1968), early stimulation (Caldwell, Bradley, & Elardo, 1975), early enrichment (Weikart & Lambie, 1970), and early intervention (Bronfenbrenner, 1974) have been used interchangeably to refer to interventions with young children with identified disabilities or children at-risk due to environmental or biological factors. The term early intervention became the preferred descriptor in the mid-1970s as evidenced by Google Scholar and ProQuest Central citation search results, but for the reasons given above, can be confused with how the term is used in other fields. It would be more precise if we used the more descriptive term *early childhood intervention* (ECI) rather than early intervention to describe interventions with young children and their families. The term also should be qualified with language such as ECI with birth to 6-year-old children with disabilities or developmental delays and their

families. This makes it much more clear what our work is all about, and especially when communicating with practitioners in other fields also working with young children and their families who use the term early intervention to refer to other types of practices.

Although the term *natural environment* first appeared in the ECI literature in the 1970s (e.g., Kaiser & Hayden, 1977; Uzgiris, 1977), the term began to be widely used following the inclusion of the term in Part H of the Education of the Handicapped Act (1986). The term, however, has long been used to mean all living and nonliving things occurring naturally on earth (Natural Environment Research Council, 1971), and the interactions and impact inhabitants have on the environment and the impacts natural environments have on inhabitants (e.g., Calogiuri & Chroni, 2014; Goudie, 2019).

A better term is *natural learning environments* and the settings and activities in those environments where young children acquire everyday, functional behavior (Dunst & Raab, 2004). There is, however, a need to distinguish between everyday activities where child learning occurs and implementing ECI in those settings (Dunst, Bruder, Trivette, & Hamby, 2005; Fjortoft, 2001). This is the case because the use of everyday activities as sources of child learning opportunities, rather than settings where ECI is practiced, is associated with better child and family outcomes (Dunst, Bruder, Trivette, & Hamby, 2006; Dunst, Trivette, Hamby, & Bruder, 2006).

The term *family-centered*, despite its widespread use in the ECI literature, continues to be poorly understood and used (see e.g., Allen & Petr, 1998; King & Chiarello, 2014). Epley et al. (2010) noted that “exactly what *family-centered* practice means...remains unclear” (p. 269). Our field would be better served by explicit use of qualifiers whenever the term is used (e.g., family-centered capacity-building practices) together with a definition or description of the meaning of the term (see Espe-Sherwindt, this volume). The particular types of family-centered practices that are the focus of intervention ought to be ones where research findings indicate that specific kinds of practices are related to child, parent, and family outcomes (Dempsey & Keen, 2008; Dunst & Espe-Sherwindt, 2016; Dunst, Trivette, & Hamby, 2007, 2008; Rosenbaum, King, Law, King, & Evans, 1998). This should be the case for other ECI practices as well (e.g., Blauw-Hospers & Hadders-Algra, 2007; Dunst, 2016; Dunst, 2017b; S. L. Ramey & Ramey, 1999).

In addition to more precise use of terminology in ECI, there is also a need for consistent use of the same terms in our field to refer to the same type of practice. As part of a content analysis of the DEC recommended practices (Division for Early Childhood, 2014), I found that different terminology was used to (presumably) describe similar practices and practice characteristics (Dunst, 2018a). For example, the terms *natural consequences*; *explicit feedback and consequences*; and *respond contingently*; seemed to be used interchangeably (but inconsistently) to refer to reinforcement of child behavior. The terms *respond contingently* and *respond intentionally* as well seemed to be used interchangeably to refer to reinforcement provided in response to child production of specific kinds of child responses. The use of different terms to refer to the same practices serves to confuse rather than facilitate common understanding and use of the terms (Cabr e, 1999).

There is also a need to be more specific when new terminology is introduced to ECI. Two such terms are *mindfulness* (Castellano, this volume) and *mindful parenting* (Townshend, Jordan, Stephenson, & Tsey, 2016). As part of a review of the evidence base for parent-child interaction practices, I found, for example, that the term *mindful parenting* is used in quite different ways, which again can only be confusing to practitioners and can likely lead to misuse of the practice.

Another term that is often used to describe different practices is *coaching* (see e.g., Elek & Page, 2018; Kemp & Turnbull, 2014). McWilliam (2015) noted that coaching “has become so popular that many variations in the definition [of the term] have arisen. ‘Coaching’ is now like ‘family-centered’ and ‘evidence-based.’ Something everyone says they do” (p. 35). This is the case, to a large degree, by the fact that we have not been more specific in terms of expecting what constitutes coaching practices in ECI and which practice characteristics are supported by research evidence.

Better terminology is, however, only a first step. Different ECI terms need operational definitions or descriptions. A practice-based operational definition is a statement of the procedures or steps a practitioner uses to implement a practice in a consistent manner. There is a need for better operational definitions of ECI practices so that practitioners know exactly what a term means when used to describe a practice. As part of the development of evidence-informed ECI performance checklists, for example, different practices were operationalized in terms of behavior indicators that have been found to be empirically related to outcomes of interest, where the indicators on a checklist, taken together, operationally define a particular kind of ECI practice (Dunst, 2017a).

Less is More Principle

Elmore (1979-1980) once noted that “one can demonstrate without much trouble that any policy will fail, simply by counting the number of discrete clearances and decisions, assigning a probability to each, and multiplying them seriatum” (p. 608). Similarly, Carroll et al. (2007) stated that “There is evidence that it is easier to achieve high fidelity of simple rather than complex interventions...because there are fewer response barriers when [an intervention] is simple” (p. 5). Both of these statements “call for” the less is more principle (Halpern & Hakel, 2003; Hertwig & Todd, 2003), and the contention that the likelihood of any intervention practice being used as intended is dependent on the fewest number of steps, components, or elements that have empirically been found to have intended outcomes.

As ECI knowledge continues to grow, there will be an increased need to discern from that knowledge the practice characteristics that matter most in terms of obtaining desired outcomes. As noted by Bronfenbrenner (1992, 1999), any experience, learning opportunity, or intervention, whether planned or naturally occurring, can be investigated in terms of pivotal features, core elements, key characteristics, or active ingredients, where certain characteristics prove more important than others as correlates or determinants of behavior and development. The characteristics that prove most important then become the intervention practices that are used to affect desired change. But how many characteristics are too many?

Research on memory and information processing indicates that most individuals can retain between 5 and 9 bits of information about a particular activity or episode (Crowder, 2015; Miller, 1956; Riccio, Rabinowitz, & Axelrod, 1994), and that when one is asked to remember more information, it is best to organize (chunk) it around common themes (Gobet et al., 2001; Mathy & Feldman, 2012). This has been found to be especially important in terms of the everyday, real-world use of information as part of knowledge application (e.g., Peters, Dieckmann, Dixon, Hibbard, & Mertz, 2007; Schwartz, 2014). The less is more principle, for example, was used to develop the ECI performance checklists described above (Dunst, 2017a), where a checklist includes an operational statement about the purpose of a practice, and between 6 and 9 behavior indicators of the practice.

Findings from a number of studies indicate that the less is more principle has special relevance for ECI. Dauch et al. (2018) compared toddlers' play with 4 or 6 toys, and found that play with four toys was associated with a greater variety and duration of play. Björklund (2014), in a study of infant and toddler use of material differing in size and manipulative features, found that material with fewer features was associated with more teacher-afforded child learning opportunities. The strongest evidence for the less is more principle comes from a research synthesis of intervention studies of caregiver sensitivity and child attachment (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003). The investigators examined the effects of seven different practices or combinations of practices and found that interventions that focused specifically on enhancing caregiver sensitivity were more effective than those focusing on other practices and especially combinations of practices.

I paraphrase Elmore (1979-1980) by concluding that one can demonstrate without much trouble that any ECI practice will not be implemented with fidelity if the number of steps that make up the practice surpasses the amount of information that needs to be remembered. I also note that complex interventions, and those including an excessive number of steps, need to be organized into different subsets of practices if they are going to be implemented as intended. Gawande (2009), in his book, *The Checklist Manifesto: How to Get Things Right*, stated that as any field accumulates more and more knowledge about effective practices, "the volume and complexity of what we know exceeds an individual's ability to deliver its benefits correctly, safely, or reliably" (p. 13).

Need for Practice-Based Research Evidence

There have been increased calls for practice-based research evidence in a number of fields (e.g., Barkham & Mellor-Clark, 2003; Crooke & Olswang, 2015; L. W. Green, 2008) including early childhood intervention (Strain, 2018). The term is used to refer to research findings that can be used to inform improvements in day-to-day practices where the practices have been found to be empirically related to outcomes of interest (Dunst, 2016). There are also calls for research syntheses of practice-based evidence "to determine which research-based practices are supported by a sufficient number of research studies...that merit [practitioners'] trust that the practice works" (Cook, Smith, & Tankersley, 2012, p. 497).

Some years ago at the Research and Training Center on Early Childhood Development, my staff and I engaged in an advanced program of applied research to identify ECI practices to improve child and family outcomes. One major activity of the Center was to conduct research syntheses to identify evidence-based practices. At the time the activities at the Center were initiated, the Cochrane Collaborative (1999) called for "preparing, maintaining, and ensuring the accessibility of systematic reviews of the effects of health care interventions" (p. 3). Systematic reviews of randomized clinical trials were considered the best sources of research evidence for determining if Practice A was more effective than Business as Usual or was more effective than Practice B for claiming a practice was an evidence-based practice. We conducted a few Cochrane-type reviews of ECI practices and determined that these types of reviews did not yield results that informed improvements in everyday practice. This was the case because these types of reviews did not result in evidence about which characteristics or active ingredients of a practice should be used to improve everyday ECI practices.

After considering a number of different approaches to analyzing research evidence in terms of implications for practice, we proposed an operational definition of evidence-based practices where different characteristics of intervention practices are related to the

outcomes of interventions (Dunst, Trivette, & Cutspec, 2007), and where practice-based research syntheses are the means for establishing characteristics-consequence relationships where these relationships have been replicated in different studies by different investigators (Francis, 2012; Jasny, Chin, Chong, & Vignieri, 2011). Practice-based research syntheses differ from other types of research reviews by a focus on *unpacking* and *disentangling* an intervention practice to identify the particular practice characteristics that matter most in terms of explaining outcomes of interest (Dunst, 2016). Those characteristics in turn are used to inform the adoption and use of evidence-based and evidence-informed ECI practices.

At about the same time we were developing the methodology for conducting practice-based research syntheses, a number of other investigators were calling for similar approaches to practice-based research (e.g., Barkham & Mellor-Clark, 2003; Crooke & Olswang, 2015; L. W. Green, 2008). The ECI field would be better served in terms of identifying evidence-based and evidence-informed practices by using practice-based research synthesis methods for synthesizing research findings. Strain (2018) recently stated that “We desperately need practice-based evidence...to obliterate the gulf between what we know to be efficacious practices and everyday practices” (p. 108). Practice-based research syntheses are at least one way in which research evidence can be used to identify, among a host of possible active ingredients, those key characteristics that ought to be emphasized as part of everyday ECI practices.

Questioning the Use of Non-Evidenced-Based Practices

Complementary, alternative, and controversial practices and therapies are increasingly used with young children with disabilities and developmental delays (Dunn, 2008; McWilliam, 1999). McWilliam (1999) noted that practices such as patterning, craniosacral therapy, and neurodevelopmental therapy, to mention just a few, are controversial because they have no sound evidence for their effectiveness (see e.g., Humphries, 2007; Masiello & Pace, 2007; Rolandelli & Dunst, 2007) and because proponents often include claims of curing a child’s condition. I add to these practices “glitz theories” and why they should be questioned and therefore avoided. Glitz theories have enticing appeal but include both untenable assertions and untested claims.

When I was a director of an ECI program, more often than I would have liked, my staff would attend a conference presentation or workshop and get introduced to a practice that they found seductive and argued that we should be using the practice with the children or families in our program despite the fact that there was no evidence for the practice and that claims about the practice sounded too good to be true. Perhaps even more problematic was the fact that staff were so convinced by the presenters and instructors that the practice worked that it often distracted from having staff adhere to our strengths-based, family-centered approach to working with children and their parents. I came to call these distractions glitz theories because they heightened staff’s attraction and excitement about the practices.

One such practice was Reiki therapy (e.g., J. Green, 2018). According to proponents of this practice, practitioners place their hands just above a person’s body or lightly on the body to extract harmful energies or to instill positive energies, which is purported to have healing benefits. Staff wanted to use the practice on children with cerebral palsy as a means to loosen tight muscles and on children who were (presumably) overly active to relax them. On the one hand, the premises of Reiki therapy sound like pseudoscience, and on the other hand, this practice has not been systematically investigated with young children with or without disabilities or delays.

There are many reasons why parents choose to use controversial practices with their children, or practitioners are able to convince parents to use the practices (see Dunn, 2008). As noted by McWilliam (1999), "A parent's job is to have hope and [controversial] practices offer hope" (p. 185). In my own experience, when a practice isn't or doesn't seem to be working with a child, parents want to or are willing to try something else. Practitioners, and especially professionals new to ECI, need to have a working knowledge of practices that are supported and not supported by research evidence in order to be able to provide parents with practice-based research information so they can make informed choices about which practices they use or want practitioners to use with their children.

Knowledge Management in Early Childhood Intervention

There is a growing need for methods and procedures to manage the exponential explosion of information about ECI. As noted earlier, with the exception of a paper by Robinowicz and Ray (2018), there are few systematic efforts in ECI to manage knowledge growth, and the field has reached the point where keeping pace with ever expanding ECI information is almost impossible for any ECI practitioner.

As part of efforts to develop evidence-informed ECI performance checklists and practice guides, I borrowed and adapted concepts and practices from a discipline called knowledge management and sharing (Asrar-ul-Haq & Anwar, 2016; Huysman & de Wit, 2002) in order to take large amounts of ECI research evidence and use that evidence to inform selection or development of performance checklist indicators (Dunst, 2018c). This open-access monograph includes a description of one way that knowledge management concepts and practices can be used to examine research evidence for ECI practices (Dunst, 2017b) and use practice-based research knowledge to inform performance checklist and practice guide development.

Terminology in the knowledge management field includes terms such as knowledge capturing (Janus, 2016), knowledge harvesting (Berwick, 1996), knowledge translation (Bennett & Jessani, 2011), knowledge packaging (Ardimento, Baldassarre, Cimitile, & Visaggio, 2009), and knowledge sharing (Huysman & de Wit, 2002), where each of these terms have been operationally defined (see e.g., Graham et al., 2006; Janus, 2016). Both Graham et al. (2006) and Janus (2016) also describe models for how different knowledge management and sharing practices are related. These models, as well as others (e.g., Bennett & Jessani, 2011; Sudsawad, 2007), were found helpful for developing a framework for use in ECI (Dunst, 2018b).

Figure 2 shows the model that was used as part of the development of evidence-informed performance checklists and practice guides, and the flow of activity between the core elements in the model. Knowledge harvesting was done in terms of identification of practice-based research syntheses of ECI and related practices. Knowledge synthesis was done in terms of which systematic reviews and meta-analyses included studies of evidence-based characteristics-consequence relationships. Knowledge translation was done in terms of using evidence about the most important active ingredients and key characteristics of different kinds of ECI practices to identify or develop evidence-informed checklist indicators. Knowledge packaging was done in terms of how the checklists and practice guides were written and formatted. Knowledge sharing was and is being done in terms of broad-based dissemination of the checklists and practice guides by taking advantage of the World Wide Web as a knowledge sharing platform. Each of these are briefly described to illustrate one approach to knowledge management in ECI. Note that the core elements in the Figure 2 model are interrelated and overlap rather than being independent activities.

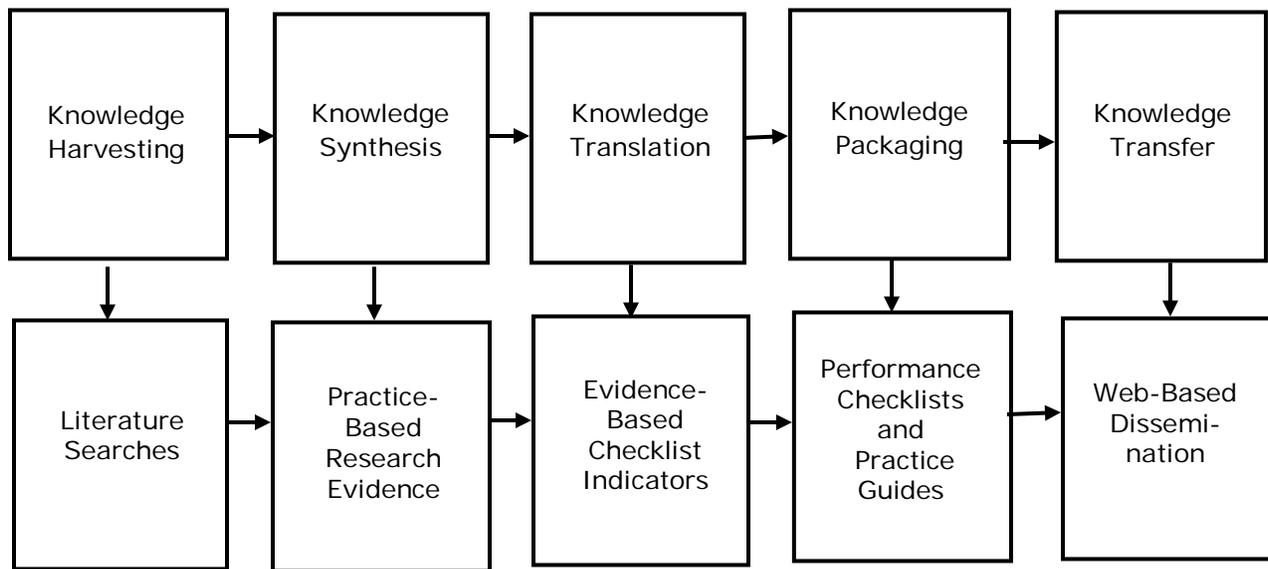


Figure 2. Model and framework for knowledge management and sharing of evidence-informed early childhood intervention performance checklists and practice guides.

Knowledge harvesting involved the systematic identification of different kinds of research syntheses of particular types of ECI practices, and if not available for any one practice, research studies of the practices. This included literature searches, searches of an EndNote library maintained by my Institute, and the pursuit of other sources of evidence. Located reviews were examined for practice-outcome data, and those including relevant practice-based evidence were examined to identify which key characteristics of the practices were related to which outcomes. Graham et al. (2006) described this process as knowledge funneling, and noted that “As knowledge moves through the funnel, it becomes more distilled and refined and presumably more useful to [practitioners].... Another analogy would be to think of the research being sifted through filters at each phase so that, in the end, only the most valid and useful knowledge is left” (p. 18).

The key characteristics of practices that “stood out” as most important were used to identify or develop performance checklist indicators. Checklist indicators are behavioral statements about one key characteristic or active ingredient of a practice, and taken together, operationally define particular types of practices which can be expected to have intended benefits and outcomes. The indicators, in turn, were used as the basis for preparing practice guides where the practice guides “bring to life” the checklist indicators using everyday, real-life examples.

The ways in which knowledge is packaged matter a great deal if products are to be useful to practitioners and other end-users. Both the checklists and practice guides were prepared in the same formats to facilitate understanding, learning, memory, recall, and performance (Crowder, 2015; Schwartz, 2014). Product design research and principles were also used to inform the preparation of the checklists and practice guides (e.g., Lohr & Gall, 2008). As noted by Lidwell, Holden and Butler (2003), the usability of any product, including written text, is more ‘learnable when similar parts are expressed in similar ways. Consistency enables people to efficiently transfer knowledge to new contexts [and] learn new things quickly’ (p. 56).

The final core component is knowledge sharing which is done primarily through web-based dissemination but also through more conventional channels (presentations, publications, etc.). Both the checklists and practice guides were prepared at the Early Childhood Technical Assistance Center and are freely available at <http://ectacenter.org>. There are both practitioner and family practice guides. There is also a *Selection Tool for the Performance Checklists and Practice Guides* that uses a decision-making process to help practitioners identify both checklists and practices for specific needs and purposes.

Conclusion

This chapter included the author's thoughts about future directions and considerations in ECI. The five themes I described are by no means the only issues that need to be considered if future advances are to be made in our field. Others as well have called for attention to other ECI issues as part of making continued advances in research and practice (Bruder, 2010; Groark, Eidelman, Maude, & Kaczmarek, 2011; Guralnick, 2005; Hamilton, Roach, & Riley, 2003; McWilliam, 2015; Moore, 2012). The reader is referred to Giné, Gracia, Vilaseca, and Garcia-Die (2006; 2004) and Serrano, Mas, Canadas, and Giné (2017) for discussions of considerations specific to Portugal and Spain.

Taking stock of our theories, models, and practices at different times is not only needed but necessary if improvements in ECI are to continue. As once noted by Foster, Berger, and McLean, (1981) "Good ideas should be commended and if they work should be adopted. Even exceptional ideas, however, should be reviewed periodically to see whether the premises under which they were adopted still hold true and their influence is still positive" (p. 55). Forty years later, this is still sage advice.

Reflecting on my own thoughts and advice, I can summarize what I have suggested by saying that we should base our interventions on practice-based evidence and that we need to use better knowledge management of that evidence if we seriously want to bridge the knowledge gap. We also need to avoid the trap that it takes 10 to 20 years to put research into practice. The research foundations for evidence-informed ECI practices is extensive and highly informative (Dunst, 2017b). We need to do a better job of translating that evidence into usable and effective practices.

References

- Allen, R. I., & Petr, C. G. (1998). Rethinking family-centered practice. *American Journal of Orthopsychiatry*, 68, 4-15. doi:10.1037/h0080265
- Ardimento, P., Baldassarre, T., Cimitile, M., & Visaggio, G. (2009). Empirical validation of knowledge packages as facilitators for knowledge transfer. *Journal of Information & Knowledge Management*, 8(3), 229-240. doi:10.1142/S021964920900235X
- Asrar-ul-Haq, M., & Anwar, S. (2016). A systematic review of knowledge management and knowledge sharing: Trends, issues, and challenges. *Cogent Business & Management*, 3. Retrieved from <https://www.cogentoa.com/article/10.1080/23311975.2015.1127744.pdf> doi:10.1080/23311975.2015.1127744
- Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., & Juffer, F. (2003). Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin*, 129, 195-215.

- Barkham, M., & Mellor-Clark, J. (2003). Bridging evidence-based practice and practice-based evidence: Developing a rigorous and relevant knowledge for the psychological therapies. *Clinical Psychology and Psychotherapy*, *10*, 319-327. doi:10.1002/cpp.379
- Beach, F., & Jaynes, J. (1954). Effects of early experiences upon the behavior of animals. *Psychological Bulletin*, *51*, 239-263. doi:10.1037/h0061176
- Bennett, G., & Jessani, N. (Eds.). (2011). *The knowledge translation toolkit: Bridging the know-do gap: A resource for researchers*. Los Angeles: SAGE. Retrieved from <https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/46152/IDL-46152.pdf>
- Berwick, D. M. (1996). Harvesting knowledge from improvement. *JAMA: The Journal of the American Medical Association*, *275*(11), 877-878. doi:10.1001/jama.1996.03530350059035
- Björklund, C. (2014). Less is more: Mathematical manipulatives in early childhood education. *Early Child Development and Care*, *184*(31), 469-485. doi:10.1080/03004430.2013.799154
- Blauw-Hospers, C. H., & Hadders-Algra, M. (2007). A systematic review of the effects of early intervention on motor development. *Developmental Medicine and Child Neurology*, *47*(6), 421-432. doi:10.1111/j.1469-8749.2005.tb01165.x
- Bronfenbrenner, U. (1968). When is infant stimulation effective? In D. C. Glass (Ed.), *Environmental influences: Proceedings of a conference under the auspices of Russell Sage Foundation and the Rockefeller University* (pp. 251-256). New York: Rockefeller University Press.
- Bronfenbrenner, U. (1974). Is early intervention effective? *Day Care and Early Education*, *2*(2), 14-18. doi:10.1007/BF02353057
- Bronfenbrenner, U. (1992). Ecological systems theory. In R. Vasta (Ed.), *Six theories of child development: Revised formulations and current issues* (pp. 187-248). Philadelphia: Jessica Kingsley.
- Bronfenbrenner, U. (1999). Environments in developmental perspective: Theoretical and operational models. In S. L. Friedman & T. D. Wachs (Eds.), *Measuring environment across the life span: Emerging methods and concepts* (pp. 3-28). Washington, DC: American Psychological Association.
- Bruder, M. B. (2010). Early childhood intervention: A promise to children and families for their future. *Exceptional Children*, *76*, 339-355.
- Cabré, M. T. (1999). *Terminology: Theory, methods and applications*. Philadelphia: John Benjamin Publishing Company.
- Caldwell, B. (1970). The rationale for early intervention. *Exceptional Children*, *36*, 717-726.
- Caldwell, B., Bradley, R., & Elardo, R. (1975). Early stimulation. In J. Wortis (Ed.), *Mental retardation and developmental disabilities: An annual review: Vol. 7* (pp. 128-181). New York, NY: Brunner/Mazel.
- Calogiuri, G., & Chroni, S. (2014). The impact of the natural environment on the promotion of active living: An integrative systematic review. *BMC Public Health*, *14*, 873. Retrieved from <https://bmcpublichealth.biomedcentral.com/articles/10.1186/1471-2458-14-873> doi:10.1186/1471-2458-14-873
- Carroll, C., Patterson, M., Wood, S., Booth, A., Rick, J., & Balain, S. (2007). A conceptual framework for implementation fidelity. *Implementation Science*, *2*, 40. doi:10.1186/1748-5908-2-40

- Casler, L. (1965). The effects of extra tactile stimulation on a group of institutionalized infants. *Genetic Psychology Monographs*, 71, 137-175.
- Cochrane Collaboration. (1999). *Cochrane brochure*. Retrieved from <http://www.cochrane.org/cochrane/cc-broch.htm>
- Cook, B. G., Smith, G. J., & Tankersley, M. (2012). Evidence-based practices in education. In K. R. Harris, S. Graham, & T. Urdan (Eds.), *APA educational psychology handbook: Vol. 1, Theories, constructs, and critical issues* (pp. 495-527). Washington, DC: American Psychological Association.
- Corwin, M. D. (1996). Early intervention strategies with borderline clients. *Families in Society: The Journal of Contemporary Human Services*, 77(1), 40-49.
- Crooke, P. J., & Olswang, L. B. (2015). Practice-based research: Another pathway for closing the research-practice gap. *Journal of Speech, Language, and Hearing Research*, 58. doi:10.1044/2015_JSLHR-L-15-0243
- Crowder, R. G. (2015). *Principles of learning and memory* (Classic ed.). New York: Psychology Press.
- Dauch, C., Imwalle, M., Ocasio, B., & Metz, A. E. (2018). The influence of the number of toys in the environment on toddlers' play. *Infant Behavior and Development*, 50, 78-87. doi:10.1016/j.infbeh.2017.11.005
- Dempsey, I., & Keen, D. (2008). A review of processes and outcomes in family-centered services for children with a disability. *Topics in Early Childhood Special Education*, 28, 42-52. doi:10.1177/0271121408316699
- Densen, P. (2011). Challenges and opportunities facing medical education. *Transactions of the American Clinical and Climatological Association*, 122, 48-58.
- Division for Early Childhood. (2014). *DEC recommended practices in early intervention/early childhood special education*. Retrieved from <http://www.dec-spced.org/recommendedpractices>
- Dunn, W. (2008). *Bringing evidence into everyday practice: Practical strategies for healthcare professionals*. Thorofare, NJ: SLACK Inc.
- Dunst, C. J. (1996). Early intervention in the USA: Programs, models, and practices. In M. Brambring, H. Rauh, & A. Beelmann (Eds.), *Early childhood intervention: Theory, evaluation, and practice* (pp. 11-52). Berlin, Germany: de Gruyter.
- Dunst, C. J. (2016). Role of research syntheses for identifying evidence-based early childhood intervention practices. In B. Reichow, B. A. Boyd, E. E. Barton, & S. L. Odom (Eds.), *Handbook of early childhood special education* (pp. 541-563). Switzerland: Springer International.
- Dunst, C. J. (2017a). Procedures for developing evidence-informed performance checklists for improving early childhood intervention practices. *Journal of Education and Learning*, 6(3), 1-13. Retrieved from <http://www.ccsenet.org/journal/index.php/jel/article/view/66005> doi:10.5539/jel.v6n3px
- Dunst, C. J. (2017b). Research foundations for evidence-informed early childhood intervention performance checklists. *Education Sciences*, 7(4), Number 78. Retrieved from <http://www.mdpi.com/2227-7102/7/4/78> doi:10.3390/educsci7040078
- Dunst, C. J. (2018a). Foundations for the need for evidence-informed early childhood intervention performance checklists and practice guides. In C. J. Dunst (Ed.), *Evidence-informed early childhood intervention performance checklists and practice guides* [Winterberry Press Monograph Series]. Asheville, NC: Winterberry Press.

- Dunst, C. J. (2018b). Knowledge management and sharing in the age of exponential knowledge growth in early childhood intervention. In C. J. Dunst (Ed.), *Evidence-informed early childhood intervention performance checklists and practice guides*. [Winterberry Press Monograph Series]. Asheville, NC: Winterberry Press.
- Dunst, C. J. (Ed.) (2018c). *Evidence-informed early childhood intervention performance checklists and practice guides* [Winterberry Press Monograph Series]. Asheville, NC: Winterberry Press.
- Dunst, C. J., Bruder, M. B., Trivette, C. M., & Hamby, D. W. (2005). Young children's natural learning environments: Contrasting approaches to early childhood intervention indicate differential learning opportunities. *Psychological Reports, 96*, 231-234. doi:10.2466/pr0.96.1.231-234
- Dunst, C. J., Bruder, M. B., Trivette, C. M., & Hamby, D. W. (2006). Everyday activity settings, natural learning environments, and early intervention practices. *Journal of Policy and Practice in Intellectual Disabilities, 3*, 3-10. doi:10.1111/j.1741-1130.2006.00047.x
- Dunst, C. J., & Espe-Sherwindt, M. (2016). Family-centered practices in early childhood intervention. In B. Reichow, B. A. Boyd, E. E. Barton, & S. L. Odom (Eds.), *Handbook of early childhood special education* (pp. 37-55). Switzerland: Springer International.
- Dunst, C. J., Hamby, D. W., Wilson, L., Espe-Sherwindt, M., & Nelson, D. E. (2017). Practitioner-informed improvements in early childhood intervention performance checklists and practice guides. *Research and Evaluation in Education, 3*(1), 12-27. doi:10.21831/reid.v3i1.14158
- Dunst, C. J., & Raab, M. (2004). Parents' and practitioners' perspectives of young children's everyday natural learning environments. *Psychological Reports, 93*, 251-256. doi:10.2466/pr0.94.1.251-256
- Dunst, C. J., Trivette, C. M., & Cutspec, P. A. (2007). *Toward an operational definition of evidence-based practices*. Asheville, NC: Winterberry Press.
- Dunst, C. J., Trivette, C. M., & Hamby, D. W. (2007). Meta-analysis of family-centered helpgiving practices research. *Mental Retardation and Developmental Disabilities Research Reviews, 13*, 370-378. doi:10.1002/mrdd.20176
- Dunst, C. J., Trivette, C. M., & Hamby, D. W. (2008). *Research synthesis and meta-analysis of studies of family-centered practices*. Asheville, NC: Winterberry Press.
- Dunst, C. J., Trivette, C. M., Hamby, D. W., & Bruder, M. B. (2006). Influences of contrasting natural learning environment experiences on child, parent, and family well-being. *Journal of Developmental and Physical Disabilities, 18*, 235-250. doi:10.1007/s10882-006-9013-9
- Education of the Handicapped Act. (1986). *Handicapped infants and toddlers* (PL 99-457, Section 623).
- Elek, C., & Page, J. (2018). Critical features of effective coaching for early childhood educators: A review of empirical research literature. *Professional Development in Education, 1*-19. Retrieved from <https://www.tandfonline.com/doi/abs/10.1080/19415257.2018.1452781> doi:10.1080/19415257.2018.1452781
- Elmore, R. F. (1979-1980). Backward mapping: Implementation research and policy decisions. *Political Science Quarterly, 94*, 601-616.
- Epley, P., Summers, J. A., & Turnbull, A. (2010). Characteristics and trends in family-centered conceptualizations. *Journal of Family Social Work, 13*, 269-285. doi:10.1080/10522150903514017.

- Fernandez-Moure, J. S. (2016). Lost in translation: The gap in scientific advancements and clinical application. *Frontiers in Bioengineering and Biotechnology*. Retrieved from <http://frontiersin.org/people/u/325151> doi:10.3389/fbioe.2016.00043
- Fjortoft, I. (2001). The natural environment as a playground for children: The impact of outdoor play activities in pre-primary school children. *Early Childhood Education Journal*, 29, 111-117.
- Foster, M., Berger, M., & McLean, M. (1981). Rethinking a good idea: A reassessment of parent involvement. *Topics in Early Childhood Special Education*, 1(3), 55-65. doi:10.1177/027112148100100311
- Francis, G. L. (2012). The psychology of replication and replication in psychology. *Perspectives on Psychological Science*, 7, 585-594. doi:10.1177/1745691612459520
- Friesen, B. J., & Koroloff, N. M. (1990). Family-centered services: Implications for mental health administration and research. *Journal of Mental Health Administration*, 17, 13-25. doi:10.1007/BF02518576
- Gawande, A. (2009). *The checklist manifesto: How to get things right*. New York: Metropolitan Books.
- Giné, C., Gràcia, M., Vilaseca, R., & García-Díe, M. T. (2006). Rethinking early childhood intervention: Proposals for future development. *Infancia y Aprendizaje*, 29, 297-313.
- Giné, C., Vilaseca, R., Gràcia, M., & García-Díe, M. T. (2004). Early intervention in Spain: Some directions for future development. *Infants and Young Children*, 17(3), 247-257.
- Gobet, F., Lane, P. C. R., Croker, S., Cheng, P. C.-H., Jones, G., Oliver, I., & Pine, J. M. (2001). Chunking mechanisms in human learning. *TRENDS in Cognitive Sciences*, 5(6).
- Goudie, A. S. (2019). *Human impact on the natural environment: Past, present, and future* (8th ed.). Hoboken, NJ: Wiley Blackwell.
- Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: Time for a map? *Journal of Continuing Education in the Health Professions*, 26, 13-24. Retrieved from <https://onlinelibrary.wiley.com/doi/pdf/10.1002/chp.47> doi:10.1002/chp.47
- Green, J. (2018). *The reiki healing handbook: Transmit healing energy through your hands to achieve deep relaxation, inner peace and total well being*. New York: Book Sales.
- Green, L. W. (2008). Making research relevant: If it is an evidence-based practice, where's the practice-based evidence? *Family Practice*, 25(Suppl 1), i20-i24. doi:10.1093/fampra/cmn055
- Groark, C. J., Eidelman, S. M., Maude, S., & Kaczmarek, L. (2011). *Early childhood intervention: Shaping the future for children with special needs and their families*. Santa Barbara, CA: Praeger.
- Guralnick, M. J. (2005). Early intervention for children with intellectual disabilities: Current knowledge and future prospects. *Journal of Applied Research in Intellectual Disabilities*, 18, 313-324. doi:10.1111/j.1468-3148.2005.00270.x
- Haahtela, T., Selroos, O., & O'Byrne, P. M. (2015). Revisiting early intervention in adult asthma. *European Respiratory Journal*. doi:10.1183/23120541.00022-2015
- Halpern, D. F., & Hakel, M. D. (2003). Applying the science of learning to the university and beyond: Teaching for long-term retention and transfer. *Change*, 35(4), 36-41.

- Hamilton, M. E., Roach, M. A., & Riley, D. A. (2003). Moving toward family-centered early care and education: The past, the present and a glimpse of the future. *Early Childhood Education Journal, 30*, 225-232. doi:10.1023/A:1023335523871
- Hansen, A. S. (2018). The visitor: Connecting health, wellbeing and the natural environment. In I. Azara, E. Michopoulou, F. Niccolini, D. Taff, & A. Clarke (Eds.), *Tourism, health, wellbeing and protected areas* (pp. 125-137). Boston: CAB International.
- Hertwig, R., & Todd, P. M. (2003). More is not always better: The benefits of cognitive limits. In D. Hardman & L. Macchi (Eds.), *Thinking: Psychological perspectives on reasoning, judgment and decision making* (pp. 213-231). Chichester, England: Wiley.
- Humphries, T. L. (2007). *Effectiveness of dolphin-assisted therapy as a behavioral intervention for young children with disabilities*. Asheville, NC: Winterberry Press.
- Hutchinson, J. R., & Nelson, K. E. (1985). How public agencies can provide family-centered services. *Social Casework, 66*, 367-371.
- Huysman, M. H., & de Wit, D. H. (2002). *Knowledge sharing in practice*. Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Janus, S. S. (2016). *Becoming a knowledge-sharing organization: A handbook for scaling up solutions through knowledge capturing and sharing*. Washington, DC: World Bank. doi:10.1596/978-1-4648-0943-9
- Jasny, B., Chin, G., Chong, L., & Vignieri, S. (2011). Again, and again, and again . . . *Science, 334*, Article 1225. doi:10.1126/science.334.6060.1225
- Kaiser, C. E., & Hayden, A. H. (1977). The education of the very, very young or But what can you teach an infant? *Educational Horizons, 4*-15.
- Kemp, P., & Turnbull, A. P. (2014). Coaching with parents in early intervention: An interdisciplinary research synthesis. *Infants & Young Children, 27*(4), 305-324. doi:10.1097/IYC.0000000000000018
- King, G., & Chiarello, L. A. (2014). Family-centered care for children with cerebral palsy: Conceptual and practical considerations to advance care and practice. *Journal of Child Neurology, 29*(8), 1046-1054. doi:10.1177/0883073814533009
- Lidwell, W., Holden, K., & Butler, J. (2003). *Universal principles of design*. Beverly, MA: Rockport Publishers.
- Lohr, L. L., & Gall, J. E. (2008). Representation strategies. In J. M. Spector, M. D. Merrill, J. Van Merriënboer, & M. P. Driscoll (Eds.), *Handbook of research on educational communications and technology* (3rd ed., pp. 85-96). New York: Routledge.
- Masiello, T. L., & Pace, J. (2007). *Influences of craniosacral therapy on the health and development of infants and young children*. Asheville, NC: Winterberry Press.
- Mathy, F., & Feldman, J. (2012). What's magic about magic numbers? Chunking and data compression in short-term memory. *Cognition, 122*, 346-362. doi:10.1016/j.cognition.2011.11.003
- McWilliam, R. A. (1999). Controversial practices: The need for a reacculturation of early intervention fields. *Topics in Early Childhood Special Education, 19*, 177-188.
- McWilliam, R. A. (2015). Future of early intervention with infants and toddlers for whom typical experiences are not effective. *Remedial and Special Education, 36*(1), 33-38. doi:10.1177/0741932514554105
- Meige, A., & Schmitt, J. (2015). *Innovation intelligence: Commoditization, digitalization, acceleration, major pressure on innovation drivers*. Philadelphia: Absans Publishing.

- Merriam-Webster. (2016). *Merriam-Webster Dictionary*. Springfield, MA: Merriam-Webster, Inc.
- Milicevic, M. (2015). Contemporary education and digital technologies. *International Journal of Social Science and Humanity*, 5(7), 656-659. doi:10.7763/IJSSH.2015.V5.535
- Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review*, 63, 81-97. doi:10.1037/h0043158
- Moore, T. (2012, August). *Rethinking early childhood intervention services: Implications for policy and practice*. Paper presented at the 10th Biennial National Conference of Early Childhood Intervention Australia, and the 1st Asia-Pacific Early Childhood Intervention Conference, Perth, Western Australia.
- Natural Environment Research Council. (1971). *The sciences of the natural environment*. Swindon, UK: Author.
- Painter, G. (1968). *Infant education*. San Rafael, CA: Dimensions.
- Peters, E., Dieckmann, N., Dixon, A., Hibbard, J. H., & Mertz, C. K. (2007). Less is more in presenting quality information to consumers. *Medical Care Research and Review*, 64(2), 169-190. doi:10.1177/1077558706298290
- Rabinowicz, S., & Ray, S. (2018). Knowledge translation: Supports, challenges, and opportunities for change in early intervention. *Infants & Young Children*, 31(2), 144-156. doi:10.1097/IYC.0000000000000112
- Ramey, C. T., & Ramey, S. L. (1998). Early intervention and early experience. *American Psychologist*, 53, 109-120.
- Ramey, S. L., & Ramey, C. T. (1999). Early experience and early intervention for children "at risk" for developmental delay and mental retardation. *Mental Retardation and Developmental Disabilities Research Reviews*, 5, 1-10.
- Rehman, S. (2016). Knowledge management: Challenges in curriculum design amid knowledge explosion. In E. Grodzki & C. Calma (Eds.), *Knowledge management and challenges in education* (pp. 9-19). Krakow, Poland: Scholars Ink Publications and Jungo Press.
- Riccio, D. C., Rabinowitz, V. C., & Axelrod, S. (1994). Memory: When less is more. *American Psychologist*, 49(11), 917-926.
- Roberts, R. N., & Magrab, P. R. (1991). Psychologists' role in a family-centered approach to practice, training, and research with young children. *American Psychologist*, 46, 144-148.
- Rolandelli, P. S., & Dunst, C. J. (2007). *Influences of hippotherapy on the motor and socio-emotional behavior of young children with disabilities*. Asheville, NC: Winterberry Press.
- Rosenbaum, P., King, S., Law, M., King, G., & Evans, J. (1998). Family-centred service: A conceptual framework and research review. *Physical and Occupational Therapy In Pediatrics*, 18(1), 1-20.
- Schwartz, B. L. (2014). *Memory: Foundations and applications* (2nd ed.). Los Angeles: SAGE.
- Serrano, A. M., Mas, J. M., Canadas, M., & Gine, C. (2017). Family systems and family-centred intervention practices in Portugal and Spain: Iberian reflections on early childhood intervention. In H. Sukkar, C. J. Dunst, & J. Kirkby (Eds.), *Early childhood intervention: Working with families of young children with special needs*. Abingdon, Oxfordshire: Routledge.
- Skeels, H. M., & Dye, H. B. (1939). Psychology: A study of the effects of differential stimulation on mentally retarded children. *Proceedings and Addresses of the American Association on Mental Deficiency*, 44, 114-136.

- Strain, P. S. (2018). Personal thoughts on early childhood special education research: An historical perspective, threats to relevance, and call to action. *Journal of Early Intervention, 40*(2), 107-116. doi:10.1177/1053815117750411
- Sudsawad, P. (2007). *Knowledge translation: Introduction to models, strategies, and measures*. Austin, TX: Southwest Educational Development Laboratory, National Center for the Dissemination of Disability Research. Retrieved from <http://www.ncddr.org/kt/products/ktintro/ktintro.pdf>.
- Thompson, W., & Heron, W. (1954). The effects of restricting early experience on the problem solving capacity of dogs. *Canadian Journal of Psychology, 8*(17-31).
- Townshend, K., Jordan, Z., Stephenson, M., & Tsey, K. (2016). The effectiveness of mindful parenting programs in promoting parents' and children's wellbeing: A systematic review. *JBI Database of Systematic Reviews & Implementation Reports, 14*(3), 139-180. doi:10.11124/JBISRIR-2016-2314
- Uzgiris, I. C. (1977). Plasticity and structure: The role of experience in infancy. In I. C. Uzgiris & F. Weizmann (Eds.), *The structuring of experience* (pp. 89-112). New York, NY: Plenum Press.
- Weikart, D. P., & Lambie, D. Z. (1970). Early enrichment in infants. In V. H. Denenberg (Ed.), *Education of the infant and young child* (pp. 83-107). New York, NY: Academic Press.
- Wilson, M., Warren, J. M., & Abbott, L. (1965). Infantile stimulation, activity, and learning by cats. *Child Development, 8*(4), 843-853. doi:10.1111/j.1467-8624.1965.tb05343.x