Developing Evidence-Informed Early Childhood Intervention

E-Learning Lessons, Performance Checklists and Practice Guides

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Abstract

The foundations for the content, design, and preparation of early childhood intervention e-learning lessons, performance checklists, and practice guides are described. Methods and procedures described in the microlearning, professional development, early childhood intervention, expert performance, and product design literatures were used to develop an integrated framework for guiding product development. The framework includes six components based on research findings about the relationships between the integrated framework methods and procedures and how the confluence of research evidence informed the development of evidence-informed early childhood intervention products. The use of the framework is described and illustrated for two sets of e-learning lessons, performance checklists, and practice guides.

Keywords: E-learning, microlearning, expert performance, product design

1. Introduction

Lessons learned from more than 20 years of developing early childhood intervention materials and products for practitioners and parents informed the development of the methods and procedures described in this paper. Early childhood intervention (ECI) refers to the learning activities, experiences, and opportunities used with young children birth to 6-years-of-age with or without developmental disabilities or delays and their families (Dunst & Espe-Sherwindt, 2017; Sukkar, Dunst, & Kirkby, 2017). Exponential knowledge growth in ECI (Dunst, 2018a) has necessitated knowledge management and sharing in ways that increase ECI practitioner and family member adoption and use of evidence-informed ECI practices. Evidence-informed refers to the use of practice-based research evidence about the relationships between ECI practices and outcomes of interest to inform the content of ECI materials and products (Dunst, 2016; Nelson & Campbell, 2017).

The development of the e-learning lessons, performance checklists, and practice guides was based on research and practice informed by microlearning (Hug, 2016), evidence-based professional development (Dunst, 2015), evidence-based ECI practices (Dunst, 2017c), authentic e-learning experiences (Harrington, Reeves, & Oliver, 2010), the role of deliberate practice in expert learning and performance (Ericsson, 2006), and best practices in e-learning lesson (Karagiannidis, Politis, & Karasavvidis, 2014; Khan, 2005) and product (Lidwell, Holden, & Butler, 2003) design. Table 1 shows the primary sources of information found most helpful in the design and development of e-learning lessons, performance checklists, and practice guides.

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Insert Table 1 about here

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The e-learning lessons that have been the focus of our work are primarily web-based products. They are designed to be used by practitioner as self-guided learning tools (Athanasou, 2005; A. Beavers, 2009), or by a professional development specialists or course instructor to facilitate practitioner or student learning (E. Beavers, Orange, & Kirkwood, 2017). Performance checklists include "lists of tasks or steps required to complete a procedure [or practice] successfully…and serve as concrete reminders of which tasks need to be performed" to achieve desired outcomes or benefits (Wilson, 2013). Practice guides include the same content as e-learning lessons but are made available in a wide range of print and mobile device formats (Dunst, Hamby, Wilson, Espe-Sherwindt, & Nelson, 2017).

Figure 1 shows the relationship between the three ECI products and the fact that they overlap and are expected to have intended outcomes or benefits when used together to influence practitioner or family member understanding and use of evidence-informed ECI practices. Research evidence about the key characteristics of ECI practices was used to select or develop performance checklist indicators (Dunst, 2017c). Performance checklist indicators are, in turn, used to inform the content of the practices that are the focus of both e-learning lessons and practice guides (Dunst, 2017b). The content and organization of the practice guides are informed by best practices for reinforcing the content of the e-learning lessons (Ghirardini, 2011). The use of the e-learning lessons, performance checklists, and practice guides by ECI practitioners is expected to improve child, family, or practitioner outcomes to the extent the practices are used with adherence and fidelity (Hulleman & Kopp, 2012; Wolery, 2011).

Insert Figure 1 about here

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2. Foundations for Product Development

The sources of information in Table 1 were used to inform the development of the e-learning lessons and other ECI products by incorporating key concepts and practices from the different but compatible fields of product design and development. Principles from microlearning were used to chunk learning content into small units where the different units, taken together, include the key characteristics of evidence-informed ECI practices (Gobet et al., 2001). The methods and procedures used to facilitate practitioner learning are informed by evidence-based professional development practices (Dunst, Bruder, & Hamby, 2015; Dunst, Trivette, & Hamby, 2010) and evidence-informed ECI practices (Dunst, 2016). The learning activities and exercises in the ECI products include real-world examples that practitioners are likely to encounter as part of their professions where the learning activities include multiple opportunities for deliberate practice (Reeves, Herrington, & Oliver, 2002). The preparation of all three ECI products (e-learning lessons, performance checklists, and practice guides) are informed by principles of product design (Lidwell et al., 2003).

The ways in which the six sets of product design and development elements are related is shown in Figure 2. The methods, procedures, and principles that are the foundations for both microlearning and evidence-based professional development each include three sets of practices: (1) introduction and illustration or demonstration the use of an ECI practice, (2) a series of learner activities and exercises to engage a practitioner in the use of a practice, and (3) practitioner self-evaluation or professional development specialist/instructor facilitated learner reflection on his or her understanding and use of a practice.

Insert Figure 2 about here

Any number of evidence-informed ECI practices can be the focus of microlearning and evidence-based professional development. A practitioner's ability to learn to use a practice is facilitated by authentic learning experiences that include distributed learning opportunities embedded throughout the ECI products (e.g., Bersin, 2004; Lidwell et al., 2003; Reeves et al., 2002). Deliberate practice is used to improve learner performance for promoting practitioner expertise (Herrington, Reeves, & Oliver, 2010; Oblinger & Maruyama, 1996).

A number of specific design principles and practices were explicitly used as part of ECI product development (e-learning lessons, performance checklists, and practice guides). These included the use of common terminology, content sequencing, layering, interactivity, and instructional videos to illustrate practitioner or parent use of the key characteristics of ECI practices. The principle of consistency was adhered to in terms of different products prepared in similar ways. As noted by Lidwell et al. (2003), the usability of different products 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 use of common terminology ensured that the same, similar, or common terms have the same meaning to facilitate learner understanding (Brenes, 2017; Cabré, 1999; Thaiss & Zawacki, 2006) and use of ECI practices (Colquhoun et al., 2014; Rabin & Brownson, 2012). Content sequencing was used to order learning content to improve learner understanding and integration of material within and between ECI products (Morrison, Ross, & Kemp, 2007). Layering was accomplished in terms of "organizing information into related groupings and then presenting or making available only certain groupings at any one time" (Lidwell et al., 2003, p.146). Interactivity was accomplished by incorporating as many exercises as possible into the e-learning

lessons to actively engage learners in activities to promote understanding and mastery of the ECI practices (Juwah, 2006; Wagner, 1997).

Two types of instructional videos were embedded in all of the e-learning lessons: Microvideos and tutorial videos (Brunner, 2018). "Microvideos are short instructional videos that focus on teaching a single" specific practice (Brunner, 2018, p. 1). These types of videos were used to illustrate the use of performance checklist practice indicators. Most of the microvideos are only 10 to 30 seconds in length for each checklist indicator although a few are about one-minute in length. This is consistent with research findings that short microvideos are most effective in terms of learner engagement (P. J. Guo, Kim, & Robin, 2014; Wistia Learning Center, 2016). Tutorial videos were used to "walk [a learner] through the steps needed to complete a task" (Brunner, 2018, p. 2). These videos were only 5 to 6 minutes long and illustrated how all of the practices on a performance checklist "go together" and constitute the key characteristics of a particular ECI practice. The length of the videos is based on research evidence that longer videos are related to attenuated learner engagement (P. Guo, 2013) and learning (Brame, 2015).

3. Product Design and Development

Our initial work focused primarily on the development of performance checklists (e.g., Raab & Dunst, 2006) and practice guides (Dunst, Pace, & Hamby, 2007). The reader is referred to Dunst (2018b) for compilations of both types of products. Our recent product development activities have focused on e-learning lessons, and how performance checklists and practice guides can be used, respectively, to inform e-learning content and reinforce e-learning knowledge and skill acquisition.

The methods and procedures described above were used for developing six sets of early childhood intervention e-learning lessons: Family capacity-building practices, naturalistic instruction, everyday child learning activities, interest-based child learning, early childhood contingency (cause-effect) learning, and authentic child assessment practices. The family capacity-building e-learning lessons are freely available at ectacenter.org/decrp/fcb.asp. The other ECI e-learning lessons are freely available at ecpcprofessionaldevelopment.org.

The e-learning lessons were all prepared using Adobe Captivate 9 (Adobe Systems Incorporated, 2015) in order to include responsive content and interactive elements (instructional video, knowledge checks, playback control, etc.). The instructional design includes multiple features and elements (roll-overs, embedded video, playback options, accessibility functions, etc.) to actively engage practitioners in learning to use ECI practices. Lessons learned from the development and evaluation of ECI performance checklists and practice guides informed the content and design of the e-learning lessons.

The e-learning lessons as well as the performance checklists and practice guides are available on an open source content management system (Word Press Foundation, 2003) that makes any product accessible on any type of mobile or nonmobile device. Two sets of the ECI products are briefly described next to provide readers descriptions of how the sources of information in Table 1 and Figure 2 were used to develop e-learning lessons.

3.1. Family Capacity-Building E-Learning Lessons

The agents of provision of ECI practices are often parents and other family members rather than practitioners, where practitioners build family capacity to use ECI practices with their children. Family capacity-building refers to ECI practitioner use of methods and strategies for promoting parents' and other family members' abilities to provide young children development-

enhancing learning opportunities (Dunst & Swanson, 2006). The foundations for the e-learning lessons are based on the fact that many practitioners do not routinely use capacity-building practices in their work with caregivers of young children (Dunst, Bruder, & Espe-Sherwindt, 2014).

There are five family capacity-building e-learning lessons. The lessons are designed so that material learned in earlier lessons are the building blocks for material learned in later lessons. The foundations and content of the e-learning lessons are three sets of evidence-based adult learning practices that are associated with a host of positive learner outcomes (Dunst & Trivette, 2012; Dunst et al., 2010).

The first e-learning lesson includes a brief overview of family capacity-building to introduce a practitioner or student to the meaning and intent of capacity-building practices. Lessons 2, 3, and 4 include, respectively, descriptions, illustrations, and learner exercises for each of the three sets of adult learning practices. Both microvideo and tutorial videos are used throughout the lessons. The e-learning lessons also include knowledge checks to reinforce practitioners' or students' understanding of the key characteristics of family capacity-building practices. The final lesson incorporates the content from all of the other e-learning lessons and includes extensive use of video illustrations, knowledge checks, and interactive exercises for developing learner deeper understanding of and ability to use family capacity-building practices. All five lessons were developed with explicit attention to the product design elements in Table 1 and Figure 2.

3.2. Early Childhood Intervention E-Learning Lessons

Lessons learned from developing the family capacity-building lessons were used to inform the development of five additional e-learning lessons. This included, but was not limited

to, fewer lessons for each practice, more authentic e-learning exercises, and inclusion of multiple "follow-up" suggestions and resources for additional learning opportunities. The latter was described as "digging deeper" learner activities.

Each of the five ECI practices includes three lessons, all formatted in the same manner. The first lesson for each practice includes an overview of the key characteristics of a practice and the expected benefits of the practice. The second lesson uses a performance checklist of the key characteristics of a practice where most lessons include microvideos to illustrate each of the key practice characteristics. Following the illustration of each practice characteristic, a tutorial video is used to illustrate how all the key characteristics "go together" and "make up" a particular type of ECI practice. The third lesson includes multiple learner activities for using a performance checklist to analyze a series of instructional videos and a series of authentic learner exercises for a practitioner or student to use to reinforce learner understanding and mastery of a practice. The five sets of e-learning lessons constitute our most recent efforts to adhere to all of the design features described in this paper.

4. Product Evaluation

Whenever possible, we sought practitioner and family member input on all of the products, where suggestions and feedback were used to inform changes and improvements in the e-learning lessons, performance checklists, and practice guides (e.g., Dunst et al., 2007; Dunst & Raab, 2007; Swanson, Roper, Raab, & Dunst, 2006). All three products described in this paper have been the focus of either or both field tests and evaluations to be assured they included intended characteristics and are judged as beneficial to end-users.

Evaluations of the performance checklists and practice guides focused on practitioner and family member social validity appraisals of both products. Social validity refers to both the

importance and acceptability of intervention practices and the expected benefits of the practices (Foster & Mash, 1999). Research indicates that the likelihood of a practice being adopted and used by a practitioner or family member is dependent on whether the practice is judged as worth the time and effort to use to have desired outcomes (Strain, Barton, & Dunlap, 2012). Dunst, Raab, and Hamby (2016), for example, found parents' social validity judgments of interest-based child language learning practices were directly related to parents' fidelity of use of the practices and indirectly related to child language development mediated by fidelity of use of the practices. In a series of field-test evaluations of the types of performance checklists and practice guides in the e-learning lessons, we found that social validity appraisals of both products improved as a function of using end-user feedback in earlier field-tests to improve products evaluated in later field-tests (Dunst, 2017a; Dunst et al., 2017).

The e-learning lessons were field tested with six experienced ECI practitioners where feedback was used to inform changes in the lessons and the exercises used to engage practitioners in the use of ECI practices (Dunst, Howse, Embler, & Hamby, 2018). The participants were two ECI program directors, two ECI technical assistance providers, and two ECI practitioners all with extensive experience working with young children and their families. Results indicated that different features of the e-learning lessons (instructional design, interactivity, learner exercises, video illustrations, etc.) were judged highly by all the practitioners (Dunst et al., 2018). Participant feedback was used to inform improvements in the e-learning lessons that were the focus of evaluation as well as were used to inform the design and development of subsequently developed e-learning lessons.

5. Conclusion

The methods and procedures for designing, developing, and evaluating the ECI products described in this paper emerged over many years of experience working with ECI practitioners and families. Product development was informed by both the research and practice of others also interested in better designed e-learning lessons, performance checklists, and practice guides as well as our own research. The outcome was the development of the model and framework described in this paper for the systematic design of ECI products,

Although the model and framework were developed specifically for the design of ECI products, the model could be used easily as part of the design and development of products in other fields and for other purposes. The framework in Figure 2 would be especially suited for use by others inasmuch as it incorporates key elements and features of evidence-based and evidence-informed product design and practice development elements extensively investigated by product design experts (Bersin, 2004; Cheng, Wang, Mørch, Chen, & Spector, 2014; Keengwe & Kang, 2013; Nye & Turner, 2007).

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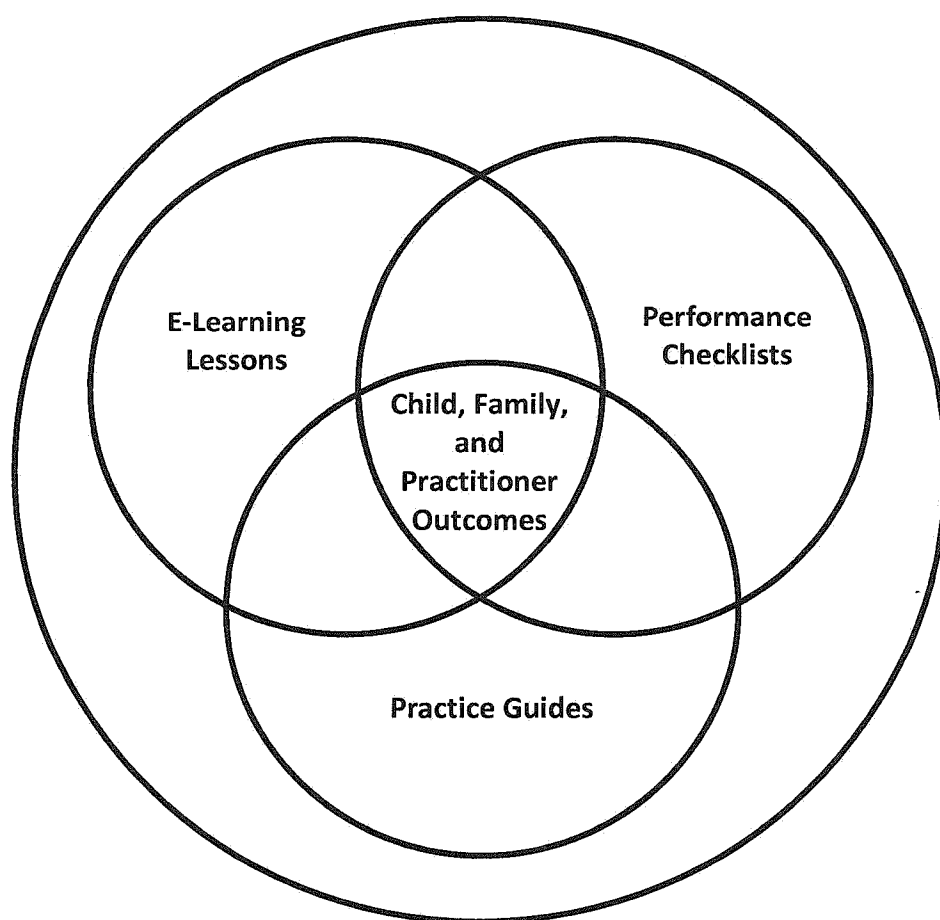
Figure 1. Interrelationships among the three sets of early childhood intervention practices and their effects of child, family, and practitioner outcomes.

Microlearning

1. Introduction, problem definition, and task description

2. Activity (exercise, problem solving)

3. Closure (discussion, reflection, feedback)

Evidence-Informed Early Childhood Intervention Practices

Child-Focused Practices

Parent-Focused Practices

Family-Focused Practices

Practitioner-Focused Practices

Product Design

Principle of Consistency

Common Terminology

Content Sequencing

Layering

Interactivity

Instructional Videos

Evidence-Based Professional Development

1. Introduction and Illustration of a practice

2. Learner activities and self-evaluation

3. PDS or faculty-guided learner reflection and feedback

Practitioner Learning Activities

Authentic Learning Experiences

Distributed Learning Opportunities

Deliberate Practice to Improve Performance

Early Childhood Intervention Products

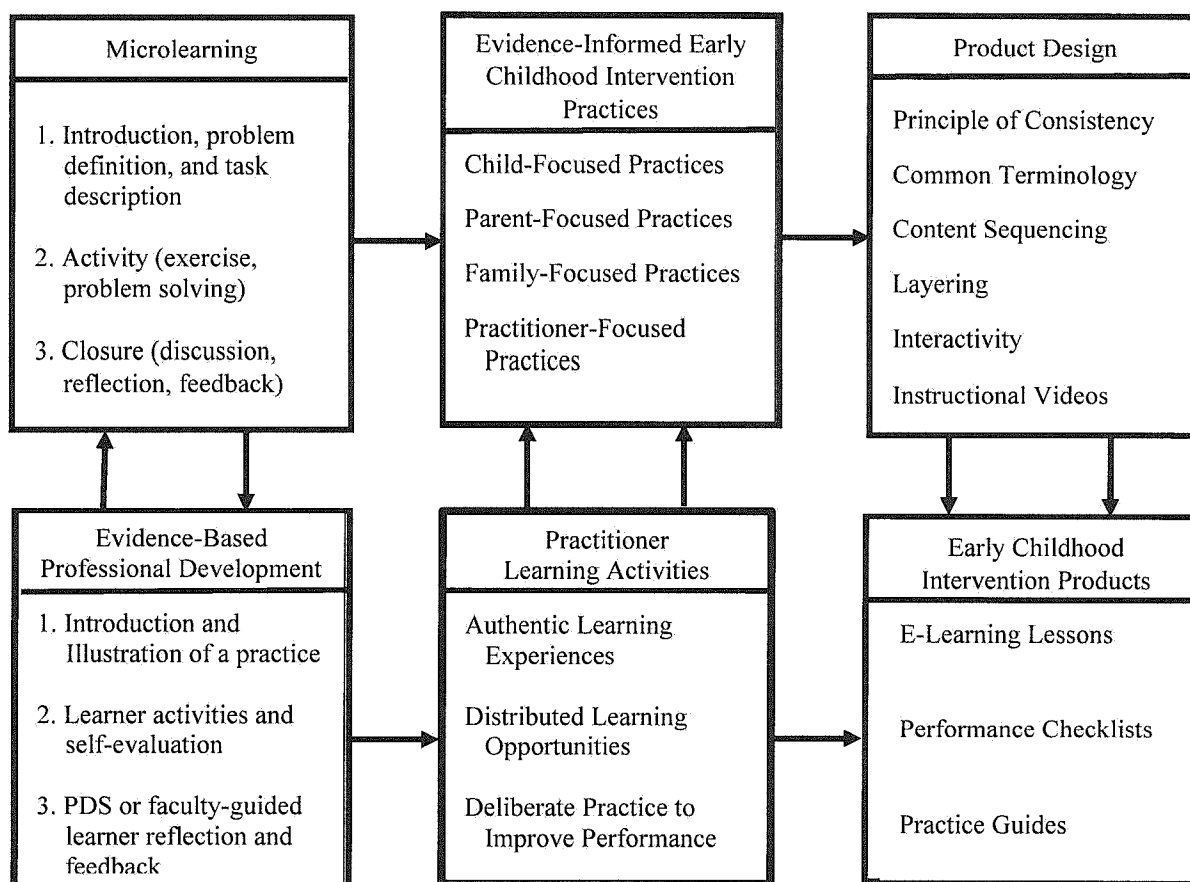E-Learning Lessons

Performance Checklists

Practice Guides

Figure 2. Model for showing the relationships among the key features of product development and design. (NOTE. PDS = Professional development specialist.)

Table 1

Sources of Information for the Development of Evidence-Informed Early Childhood Intervention Products

Product Design	Representative Sources
Microlearning (Preparation of relatively small learning units that include specific learning activities that can be completed in a short period of time)	Buchem & Hamelmann (2010) Hug (2016)
Evidence-Based Professional Development (Professional development methods and procedures informed by research evidence for the effects of the methods and procedures on learner outcomes)	Dunst et al. (2015) Dunst et al.(2010)
Early Childhood Intervention Practices (Planned or naturally occurring activities, experiences, events, and learning opportunities that are empirically related to improvements or changes in child, parent, family, or practitioner outcomes)	Dunst (2016) Dunst (2017)
Authentic Adult Learning Activities (Learning activities that actively involve learners in real-world experiences that provide opportunities for improving understanding of the effects of intervention practices on outcomes of interest)	Herrington et al. (2010 Reeves et al. (2002)
Deliberate Practice (Learning experiences and opportunities that actively engage learners in deliberate practice to facilitate and promote acquisition of expert performance)	Ericsson (2006) Ward et al. (2004)
Product Design (Preparation of e-learning and other products that are learner-centered and include and adhere to evidence-based design features [e.g., principal of consistency])	Herrington (2006) Lidwell et al. (2003)