CASEmakers
Sources of Information About Early Childhood & Family Support Practices

Sources of Information about Early Childhood Intervention Practice Tools

Deborah Hamby

Abstract

This *CASE*maker bibliography includes selected references about the development of practice tools used to promote early childhood intervention providers' adherence to evidence-based practices. The cognitive process aided, end user, format, and design elements need to be considered when creating these tools. Providing well-constructed practice tools to early childhood intervention practitioners along with training to use them may promote the use of evidence-based early childhood intervention practices.

Introduction

This CASEmaker bibliography includes selected references for developing tools to facilitate early childhood intervention practitioners' use of evidence-based practices which are often referred to as "practice tools." Providing practice tools is beneficial because "far more information [is created] than anyone can absorb…and…change [happens] far faster than anyone's ability to keep pace" (Senge, 2006, p. 69). Humans have limits in cognition in terms of working and long-term memory along with limited attention (McLaughlin & Byrne, 2020) and biases in judgement and reasoning (Brooks et al., 2020). Considering the overwhelming amount of information to process and human limitations, using practice tools has many benefits including "serv[ing] as a memory aid, moderat[ing] effects of fatigue, stress, and distraction, and standardiz[ing] performance of task across users" (Chaparro et al., 2019, p.25). Being able to readily access information in a practice tool may help a practitioner increase their efficacy of implementing early childhood intervention practices.

Early childhood intervention (ECI) researchers, administrators, and practitioners have created tools to help promote use of evidence-based intervention practices with children and families (Beecher et al., 2017; Dunst et al., 2014; Rush et al., 2020). Creating practice tools involves consideration of the cognitive process aided, end user, format, and design. The references in this bibliography highlight the many components to consider when constructing and putting to use a practice tool.

Cognitive Process and User Considerations

Developing an effective practice tool involves understanding the cognitive process to be supported (McLaughlin & Byrne, 2020) and the end user implementing a practice (Alspach, 2017). Cognitive processes that may be supported by practice tools include visual attention, working memory, decision-making, and learning (Smith & Kelly, 2016). Both Alexandre et al. (2019) and McLaughlin and Bryne (2020) suggest understanding the cognitive process being aided to determine the type of tool that would be most beneficial. Along with the cognitive process, the end users must be considered (Gagliardi et al., 2015; Kollman & Hardré, 2013; Winters et al., 2009), specifically, their skill level, experience level, and environment of implementation (Fletcher & Bedwell, 2014). Wandersman et al. (2012) recommend having the end user involved in development improves "alignment between the purpose of the tool and the needs of the end-user" (p. 450). The following references pres-

CASEmakers is an electronic publication of the Center for the Advanced Study of Excellence in Early Childhood and Family Support Practices, Family, Infant and Preschool Program, J. Iverson Riddle Developmental Center, Morganton, NC. CASE is an applied research center focusing on the characteristics of evidence-based practices and methods for promoting utilization of practices informed by research.

Rx Prescription for Practice Rx

Improve your skills in developing and designing early childhood intervention practice tools by reading the following:

Dunst, C. J. (2017). Procedures for developing evidence-informed performance checklists for improving early childhood intervention practices. *Journal of Education and Learning*, *6*(3), 1-13. http://doi.org/10.5539/jel.v6n3p1

Gagliardi, A. R., Brouwers, M. C., & Bhattacharyya, O. K. (2015). The development of guideline implementation tools: A qualitative study. *Canadian Medical Association Journal Open*, *3*(1), E127-E133. https://doi.org/10.9778/cmajo.20140064

Kollmann, S., & Hardré, P. (2013). Tools of the trade: The role of perceptions and context in designing and developing instructional learning aids. *Journal of Applied Instructional Design*, *3*(1), 5-17. https://www.jaid.pub/vol-3-issue-1-2013

McLaughlin, A. C., & Byrne, V. E. (2020). A fundamental cognitive taxonomy for cognition aids. *Human Factors*, *62*(6), 865-873. https://doi.org/10.1177%2F0018720820920099

Wandersman, A., Chien, V., & Katz, J. (2012). Toward an evidence-based system for innovation support for implementing innovations with quality: Tools, training, technical assistance, and quality assurance/quality improvement. *American Journal of Community Psychology*, *50*(3/4), 445-459. https://doi.org/10.1007/s10464-012-9509-7

ent information about aligning practice tools with cognitive processes and intended end-users:

Alexandre, B., Navarro, J., Reynaud, E., & Osiurak, F. (2019). Which cognitive tools do we prefer to use, and is that preference rational? *Cognition*, *186*, 108-114. https://doi.org/10.1016/j.cognition.2019.02.005

Fletcher, K. A., & Bedwell, W. L. (2014). Cognitive aids: Design suggestions for the medical field. *Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care*, *3*(1), 148-152. https://doi.org/10.1177%2F2327857914031024

McLaughlin, A. C., & Byrne, V. E. (2020). A fundamental cognitive taxonomy for cognition aids. *Human Factors*, *62*(6), 865-873. https://doi.org/10.1177%2F0018720820920099

Matching Format to Cognitive Process

Practice tools vary in format (e.g., infographics, checklists, flowcharts), and certain formats work better for certain cognitive processes and purposes. An infographic format enhances understanding of new or complex information through a visual display of information (Dunlap & Lowenthal, 2016). A checklist format works well for procedural tasks to prevent forgetting critical steps (Gawande, 2009; Hosp, 2012) or for "evaluation of a service against a set of principles, best practices, or specific criteria" (Wilson, 2013, p. 5). The process of making a complex decision may involve considerable mental effort leading to cognitive fatigue. Creating a flowchart offers "a structure to the decision-making process by ordering the content to focus on" (Hosp, 2012, p. 4), helps "evaluate the completeness and accuracy of the procedure" (Sugai, 1997, p. 40), and "assist(s) with improving a process" (Bernhardt, 2011, p. 4). The following references explain how to match tool format to the procedure or practice being implemented:

Dunlap, J. C., & Lowenthal, P. R. (2016). Getting graphic about infographics: Design lessons learned from popular infographics. *Journal of Visual Literacy*, *35*(1), 42-59. https://doi.org/10.1080/1051144X.2016.1205832

Gawande, A. (2009). *The checklist manifesto: How to get things right*. Metropolitan Books.

Hosp, J. L. (2012). Formative evaluation: Developing a framework for using assessment data to plan instruction. *Focus on Exceptional Children*, *44*(9), 1-10. https://doi.org/10.17161/foec.v44i9.6915

Design Elements

After the practice tool's format has been determined, the design elements need to be considered since content presentation impacts effectiveness (Chrimes, 2016; Kollman & Hardré, 2013). Clebone et al. (2019) explain how the connections between human factors, cognition principles, and cognitive tool design interplay to ensure functionality and usability. A practice tool should only include the essential elements presented in a logical order to increase the accuracy of procedures or decision-making process and to prevent adding to the cognitive load of the procedure. (Alspach, 2017; Clebone et al., 2019; Wandersman et al., 2012). The written content should "focus on comprehension … ensuring the readers can use the information" (Albers, 2015, p. 272), and

be presented in a font and color that enhances instead of distracts from the content (Koschmider et al., 2016). Several especially relevant references include:

Albers, M. J. (2015). Infographics and communicating complex information. In A. Marcus (Ed.), *Design, user experience, and usability: Users and interactions. DUXU 2015. Lecture notes in computer science* (Vol. 9187, pp. 267-276). Springer. https://doi.org/10.1007/978-3-319-20898-5_26

Fletcher, K. A., Bedwell, W. L., Frick, S. E., & Telford, B. N. (2018). Enhancing training with well-designed checklists. *International Journal of Training and Development*, *22*(4), 289-300. https://doi.org/10.1111/ijtd.12139

Kollmann, S., & Hardré, P. (2013). Tools of the trade: The role of perceptions and context in designing and developing instructional learning aids. *Journal of Applied Instructional Design*, *3*(1), 5-17. https://www.jaid.pub/vol-3-issue-1-2013

Koschmider, A., Figl, K., & Schoknecht, A. (2016). A comprehensive overview of visual design of process model element labels. In M. Reichert & H. Reijers (Eds.), *Business process management workshops. BPM 2016. Lecture notes in business information processing* (Vol. 256, pp. 571-582). Springer. https://doi.org/10.1007/978-3-319-42887-1_46

Creditability and Implementability

Successful use of the practice tool depends on the creditability and implementability of the tool. Creditability is established by the evidence supporting the practice tool content that includes a comprehensive literature search for evidence along with documenting these sources and the methods used to develop the tool (Dunst, 2017; Gagliardi et al., 2015). Gagliardi et al. (2015) also explain a tool needs a clear objective in terms of intent, use, and impact along with detailed instructions for implementation. Salbach et al. (2021) explain implementability features of a tool such as useability, validity, and applicability, and Leeman et al. (2018) describe how similar attributes (complexity, adaptability, and relative advantage) influence tool use. A pilot test of the tool involving end users giving feedback about how to improve the tool ensures that all these elements are working as the developers had intended (Gagliardi et al., 2015; Salbach et al., 2021; Winters et al., 2009). The following references explain the importance of creditability and implementability:

Gagliardi, A. R., Brouwers, M. C., & Bhattacharyya, O. K. (2015). The development of guideline implementation tools: A qualitative study. *Canadian Medical Association Journal Open*, *3*(1), E127-E133. https://doi.org/10.9778/cmajo.20140064

Leeman, J., Wiecha, J. L., Vu, M., Blitstein, J. L., Allgood, S., Lee, S., & Merlo, C. (2018). School health implementation tools: A mixed methods evaluation of factors influencing their use. *Implementation Science*, *13*, Article 48. https://doi.org/10.1186/s13012-018-0738-5

Salbach, N. M., MacKay-Lyons, M., Solomon, P., Howe, J. A., McDonald, A., Bayley, M. T., Veitch, S., Sivarajah, L. Cacoilo, J., & Mihailidis, A. (2021). The role of theory to develop and evaluate a toolkit to increase clinical measurement and interpretation of walking speed and distance in adults post stroke. *Disability and Rehabilitation*, Advance online publication. https://doi.org/10.1080/09638288.2020.1867653

Supporting Use of Tools

A practice tool may explain a simple procedure, and a well-designed tool may by itself increase fidelity to a procedure (Parnell et al., 2017). More often, the practice tool is created for a complex practice to help increase implementation fidelity. Training on practices and procedures, including a well-designed practice tool for support, increases accuracy and lessens the cognitive load (Fletcher et al., 2018; Wandersman et al., 2012). Marshall (2017) suggests providing training that uses "cross-referencing the (foundation) manuals with the (implementation) cognitive tool during learning and then practicing" (p. 290). Also, a plan should be in place to evaluate the practice tool's efficacy over time and to update the tool as practices evolve (Salbach et al., 2021; Wandersman et al., 2012; Winters et al., 2009). Relevant references about the importance of training to use practice tools include:

Marshall, S. D. (2017). Helping experts and expert teams perform under duress: An agenda for cognitive aid research. *Anaesthesia*, *72*(3), 289-295.

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Conclusion

Quality practice tools require developers to thoughtfully consider many details from conception to implementation to ensure the tool is beneficial in practice. A well-designed practice tool supports the cognitive process and task through functionality and usability, and is evidence-based and user-friendly. A checklist may help supervisors evaluate if practitioners are implementing evidence-based practices with fidelity. A flowchart will help a new ECI practitioner gather information about family routines and activities or observe child behavior. The information and references included in this CASEmaker highlight some points to consider when creating new practice tools to help early childhood intervention practitioners implement evidenced-based practices.

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Author

Deborah Hamby is a Researcher at the Family, Infant, and Preschool Program, and Investigator at the Center for Advanced Study of Early Childhood and Family Support Practices, J. Iverson Riddle Developmental Center, Morganton, North Carolina.