

**THE INSTRUCTIONAL DESIGN DISPOSITIONS AND EXPERTISE
INDEX: DEVELOPMENT AND PRE-PILOT**

by

Katherine J. Chartier

A Dissertation

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Doctor of Philosophy



Department of Curriculum and Instruction

West Lafayette, Indiana

December 2020

THE PURDUE UNIVERSITY GRADUATE SCHOOL
STATEMENT OF COMMITTEE APPROVAL

Dr. Adrie Koehler-Blair, Chair

Department of Curriculum & Instruction

Dr. Anne Traynor

Department of Educational Studies

Dr. Jennifer Richardson

Department of Curriculum & Instruction

Dr. John Gipson

Director of Summer Session

Approved by:

Dr. Janet Alsup

Dedicated to my family, friends, and mentors.

ACKNOWLEDGMENTS

I gratefully acknowledge my committee for their support, guidance, and feedback, which shaped the outcome of this work. To my family, friends, and LDT family, I wouldn't be here without you.

TABLE OF CONTENTS

LIST OF TABLES	7
LIST OF FIGURES	8
GLOSSARY	9
ABSTRACT.....	10
INTRODUCTION	11
LITERATURE REVIEW	13
Overview	13
Components of Expertise	14
Defining Instructional Design Expertise.....	15
Review of Existing Measures	16
METHODS	20
Instrument Development Procedures and Research Design	20
Item Generation	22
Expert Review Sample.....	36
Expert Review Procedures	37
Think-Aloud Sample.....	37
Think-Aloud Procedures	38
Pre-Pilot Sample and Procedures	39
RESULTS	42
Effectiveness of Items: Expert Review	42
Cognitive Processes: Think-Aloud	44
Instrument Revisions	47
Item and Sub-Scale Relationships	47
Components of Instructional Design Expertise	53
DISCUSSION	57
Item Development.....	57
Scale Development	58
Scale Evaluation.....	59
Implications and Intended Uses	60

Conclusion	62
REFERENCES	64
APPENNDIX A INSTRUMENT VERSIONING.....	70
APPENDIX B DATA COLLECTION PROTOCOLS	74
APPENDIX C INTER-ITEM CORRELATION MATRIX	92

LIST OF TABLES

Table 1 Existing Instrument Coverage	18
Table 2 Instrument Development Process	21
Table 3 Item Generation	24
Table 4 Additional items.....	35
Table 5 Expert Review Demographics	36
Table 6 Think-Aloud Demographics	38
Table 7 Years of Experience	40
Table 8 Related Experience	40
Table 9 Descriptive Statistics: ID Knowledge.....	48
Table 10 Descriptive Statistics: ID Skills	49
Table 11 Descriptive Statistics: ID Dispositions	51
Table 12 Subscale Correlations	53
Table 13 Percent of Agreement for Primary Constructs.....	55
Table 14 Validity Evidence	60

LIST OF FIGURES

Figure 1 Research Design	22
Figure 2 Knowledge Subscale Histogram.....	49
Figure 3 Skill Subscale Histogram	50
Figure 4 Disposition Subscale Histogram.....	52
Figure 5 Model of Instructional Design Expertise.....	60

GLOSSARY

Instructional design (ID) “encompasses the analysis of learning and performance problems, and the design, development, implementation, evaluation and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings, particularly educational institutions and the workplace” (Reiser, 2001, p. 5).

Instructional design expertise (IDE) integrates disciplinary knowledge, skills, and dispositions to manage a complex design process and efficiently solve instructional problems.

Instructional design knowledge is specific disciplinary knowledge including ID models, ID theories, educational technology, and learning theory.

Instructional design skills are defined as the ability to complete ID tasks with a degree of effectiveness. Instructional design tasks include work done by a designer within an ADDIE framework, as well as project management, problem solving, and other relevant tasks (e.g., communication, collaboration, etc.).

Instructional design dispositions are attributes (e.g., awareness, adaptiveness, flexibility) demonstrated in practice describing how designers apply knowledge and skill to effectively complete ID tasks.

ABSTRACT

For many years, scholars have investigated instructional design expertise and described the difficulty defining it. A lack of a clear definition, inclusive of primary components, poses a measurement problem for those seeking to evaluate the development of expertise. An overarching aim of this study is to gather evidence to support a definition of instructional design expertise (IDE) which includes knowledge, skills, and dispositions. Instructional design dispositions have not received much attention, but dispositions (e.g., adaptability, flexibility) are often described as distinguishing traits of expert designers. Existing ID competency instruments evaluate the perceived importance of knowledge and skills but are limited in tracking development past competency. They also do not adequately consider dispositions. The purpose of this research was to describe the development of the Instructional Design Dispositions and Expertise Index. Instrument development procedures included item generation, expert review, think-aloud sessions, and a small-scale item tryout. Over 200 designers agreed knowledge, skills, and dispositions are important components of expertise. Qualitative data corroborated quantitative findings further illuminating a relationship between these components and quality instructional design. Initial evidence of content and construct validity for the instrument is established. A validated expertise instrument would allow us to more fully understand and evaluate expertise and its development, which could inspire innovation in instructional design research, theory, and practice.

INTRODUCTION

Developing expertise is an important aim of competitive organizations (Germain & Ruiz, 2008). As the field of instructional design seeks to prepare high-performing professionals who can work effectively in a variety of roles across diverse organizations (e.g., education, industry, healthcare, nonprofit), developing expertise is a challenging but important endeavor (Larson & Lockee, 2005). Considering expertise has likely been of interest since the initiation of the instructional design field, but a recent special issue focused on the development of instructional designers suggests this is an important and timely topic (see *Journal of Computing in Higher Education*, April 2018). Over the past 30 years, scholars have sought to understand instructional design expertise (IDE) and how it develops (Brown & Green, 2018; Ertmer & Stepich, 2005; Ge & Hardre 2010; Rowland, 1992). These efforts provide an important foundation by identifying distinguishing characteristics of expert designers, yet scholars have recently identified a need to better understand the development of instructional designers from novice to expert (Brown & Green, 2018). An important first step in understanding the development of expertise is creating a clear definition and meaningful conceptualization of the traits which constitute expertise. Doing so would allow us to evaluate a variety of variables that impact designers' performance improvement over time.

When considering expertise, "it is foolhardy to talk about development, change, and performance improvement without specifying the measure of performance" (Swanson, 1994, p. 53). Therefore, a validated expertise instrument establishing primary components of expertise is needed to understand this latent trait. Further, an instrument capable of discriminating designers' abilities would provide a meaningful way to evaluate expertise development. Existing instruments focus on evaluating instructional designer and educational technologist competencies (Koszalka et al., 2013; Ritzhaupt et al., 2018). Competency is a related construct and component of expertise representing the ability to reach "a minimum level of acceptable performance" (Herling, 2000, p. 9). Instructional design competency instruments are useful for evaluating the training of novice designers and preparing them for entry-level roles. However, leading expertise scholars indicate significant professional development occurs after initiation to full time work (Ericsson et al., 1993; Ericsson, 2003). This aspect of expertise development is not captured by existing ID competency instruments and poses an important measurement

problem to be addressed. A measure evaluating the full continuum of expertise is needed. This research responds to this measurement gap by describing the development of the Instructional Design Dispositions and Expertise Index (IDDEI).

The IDDEI is a measure designed to evaluate how frequently instructional designers report applying knowledge, skills, and dispositions (e.g., adaptability, flexibility) in practice. These constructs emerged from a 25-year review where expert traits were synthesized to inform the following definition: “Instructional design expertise consists of the integration of knowledge, skills, and dispositions to consistently execute a high-quality design process across a variety of ID settings” (Chartier, in press). As expertise is a latent trait it is not directly observable and can only be measured by evaluating underlying variables, (DeVellis, 2017). In order to evaluate IDE or its development, these underlying constructs need to be validated. Thus, a primary goal of this research is to obtain evidence of validity to support the conceptualization of IDE as having three components: knowledge, skills, and dispositions.

Instrument development procedures are informed by McCoach et al., (2013) and include item generation, expert review sessions, designer think-aloud sessions, and a small-scale pilot (i.e., pre-pilot). These procedures will provide important information regarding the instrument’s usability and the relationship between sub-scales. Specifically, these procedures will address the following research questions.

RQ1: How do designers describe the effectiveness of the items?

RQ2: How does the instrument elicit designers’ response processes?

RQ3: What is the relationship between items and sub-scale scores?

RQ4: Do instructional designers perceive knowledge, skills, and dispositions as important components of expertise?

The following review of literature will provide a brief overview of expertise research, define key terms, and identify common dimensions of expertise. A review of existing IDE and competency measures supports the need to develop the IDDEI, which will be described in the methods section. Results from the expert review and designer think-aloud sessions will inform revisions to the instrument prior to the small-scale tryout. Results from the expert review and pre-pilot will provide evidence of validity. Implications for research, theory, and practice will be discussed.

LITERATURE REVIEW

Expertise is a complex, multifaceted, and multidimensional phenomenon (Baker et al., 2015; Herling, 2000; Kuchinke, 1997). Described as a ‘murky concept,’ expertise has a number of meanings and perhaps as many definitions as there are scholars studying them (Hoffman et al., 1995; Kuchinke, 1997; Schussler, 2006). Instructional design scholars have also noted the difficulty and complexity of defining expertise (Ertmer & Stepich, 2005; LeMaistre, 1998). This vagueness poses measurement challenges but also “provides a rationale for further study” (Schussler, 2006 p. 253). The following brief overview identifies common dimensions of expertise across a variety of disciplines.

Overview

In the 1950s, an expert was defined as “someone particularly skilled at general heuristic search” (Holyoak, 1991, p. 302). This idea was short lived as scholars revealed expertise depended on specialized, domain-specific knowledge (Holyoak, 1991). Moving through the next few decades, a strong emphasis on cognitive processes emerged as expertise was viewed as “the acquisition of large integrated ‘chunks’ of knowledge” (Holyoak, 1991, p. 302). Foundational works emerged in this period comparing expert and novice chess players (Chase & Simon, 1973; de Groot, 1965).

Considering expertise from a strict cognitive perspective was criticized by scholars who suggested a more holistic perspective was needed (Ericsson & Smith, 1993). In the 1980s, scholars considered skill acquisition and traits such as adaptiveness (Dreyfus & Dreyfus, 1986; Hatano & Inagaki, 1984). Dreyfus and Dreyfus (1986) outlined the processes involved in skill acquisition as novices progressed toward competence and from competence to expertise (Dreyfus & Dreyfus, 1986). Hatano and Inagaki (1984) differentiated adaptive from routine expertise citing adaptive experts were able to apply knowledge and skills effectively in novel situations. For example, repeated action or application of skills in a context without variation or ‘built in randomness’ does not produce adaptive experts however, “repeated application of the procedure with variations is likely to lead to adaptive expertise” (Hatano & Inagaki, 1984 p. 33).

Considering these foundational works suggests expertise may have cognitive (knowledge), behavioral (skills), and affective (dispositions) components.

Components of Expertise

Decades of expertise scholarship identify knowledge and skills as components of expertise. Expertise is often defined as being “highly skilled and knowledgeable in a specific area” (Kuchinke, 1997, p. 73). These traits have been evaluated in a variety of disciplines including aviation, design, medicine, and education (Baker et al., 2015; Charness & Tuffiash, 2008; Cross, 2018; Ericsson et al., 1993; Lawson & Dorst, 2009; Starkes & Ericsson, 2003). Cross-disciplinary findings confirm, experts are distinguished by extensive disciplinary knowledge and superior skill (Baker et al., 2015; Bransford et al., 2000; Chase & Simon, 1973; deGroot, 1965; Dreyfus & Dreyfus, 1986; Ericsson, 1993; Glasser & Chi, 1988). These findings support the definition of expertise as “consistently demonstrated actions of an individual that are both optimally efficient in their execution and effective in their results,” (Herling, 2000, p. 20). Experts’ knowledge and skill are associated with superior performance (Baker et al., 2015; Charness & Tuffiash, 2008, p. 427; Swanson, 1994).

Additionally, performing superiorly in disciplines where performance is not routine is described as adaptive expertise (Hatano & Inagaki, 1984; Hatano & Oura, 2003). “[A] substantive number of studies strongly suggest that some experts...can be characterized by their flexible, innovative, and creative competencies within the domain” (Hatano & Oura, 2003). The term adaptive expertise has been used for many years, but this idea may be more meaningfully conceptualized as an affective dimension of expertise, not a type of expertise. Traits, such as adaptability, which describe a pattern of behavior aimed at completing a goal in a particular context, are referred to as dispositions (Katz, 1993; Katz & Rath, 1985; Moreillon & Fontichiaro, 2008). While dispositions have not been extensively considered in expertise literature, “[i]n one sense of the term, “expert” or “expertise” applies to someone who is suitably disposed to succeed in matters of a restricted domain of (intellectual and/or practical) activities” (Quast, 2018 p. 398).

Dispositions such as adaptability and flexibility are characteristics of experts who perform superiorly in disciplines where performance is not routine (Hatano & Inagaki, 1984; Hatano & Oura, 2003). For example, dispositions have served as selection/exclusion criteria for

teacher education programs (Schussler, 2006), evaluated the consistency of critical care nurses' decision making (Hicks et al., 2003), and evaluated teachers' design dispositions (Koh et al., 2015). Dispositions have also been used to discriminate levels of expertise in pediatric rehabilitation therapists (King et al., 2008), and been linked with skill level in the development of sport expertise (Tedesqui & Young, 2017). Importantly, dispositions are typically assessed with other indicators of performance such as knowledge and skill (Schussler, 2006). Dispositions have been cited in a variety of disciplines as a valuable evaluative construct (Schussler, 2006). Dispositions are an important component of expertise to consider, especially in disciplines where performance is not routine (Hatano & Inagaki, 1984; Hatano & Oura, 2003).

In sum, themes from existing literature suggest, knowledge, skills, and dispositions are important components of expertise. These components represent affective (dispositions), cognitive (knowledge), and behavioral (skills) domains. This framework for evaluating expertise provides a holistic understanding sought by earlier scholars. Knowledge, skills, and dispositions are important components to consider because instructional design often involves engaging with ill-structured problems and creating innovative solutions. Expert designers are often distinguished by dispositions, which enable them to apply knowledge and skills more effectively than novices (Ashbaugh, 2013; Ertmer & Stepich, 2005; Hardre et al., 2005). The following section will define key terms and constructs evaluated in the IDDEI.

Defining Instructional Design Expertise

Instructional design (ID) has been described as an ill-structured problem-solving process (Ertmer & Stepich, 2005). However, a more comprehensive definition suggests ID:

encompasses the analysis of learning and performance problems, and the design, development, implementation, evaluation and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings, particularly educational institutions and the workplace. (Reiser, 2001, p. 5)

Instructional designers are tasked with managing ill-structured problems and a complex design process, which may include completing tasks in a variety of areas commonly referred to as ADDIE (i.e., analysis, design, development, implementation, evaluation). "Instructional design expertise involves the integration of knowledge, skills, and dispositions to consistently execute a

high-quality design process across a variety of ID settings” (Chartier, in press). This definition identifies three traits in relation to quality instructional design, which are defined as follows:

ID knowledge is an awareness of learning theories, ID models and processes, ID theories, and emerging educational technologies.

ID skills are the ability to complete ID tasks with a degree of quality (e.g., effectiveness and efficiency).

ID dispositions are attributes demonstrated in practice describing how designers complete ID tasks with a degree of quality.

Consistent with themes from general expertise literature, knowledge and skills are an important component of instructional design expertise. Expert designers have more knowledge and better problem-solving skills compared to novices (Hardre et al., 2005; LeMaistre, 1998). Further, dispositions such as adaptability, flexibility, and intentionality describe how expert designers apply ID knowledge and skill more effectively and efficiently than novices (Ashbaugh, 2013; Ertmer & Stepich, 2005; Hardre et al., 2005). Given the fact that designers are tasked with solving ill-structured instructional problems in a variety of settings, dispositions are a salient construct which, when combined with knowledge and skill, may be a meaningful indicator of performance, or expertise. A primary aim of this research is to gather support for this definition and underlying constructs. Understanding how these dimensions are currently evaluated in existing measures is an important step in justifying the development of a new instrument. This will be the focus of the remainder of this review.

Review of Existing Measures

To identify existing measures relating to instructional design expertise, I conducted several database searches in November of 2019. The Mental Measurement Yearbook and other common education and psychology databases (i.e., Academic Search Premiere, Education Source, ERIC, and PSYC Info) were used to identify relevant measures. My initial searches containing the phrase instructional design expertise did not yield any hits. Competency is a related construct and component of expertise as models and frameworks describe the development of expertise along a novice-competent-expert continuum (Baker et al., 2015; Dreyfus & Dreyfus, 1986; Herling, 2000). Therefore, this term was included in the search criteria.

A total of 27 articles were generated from 3 competency searches summarized below (see Table 1). I reviewed article abstracts and retrieved eleven articles focused on ID competency for further analysis. These 11 articles were evaluated based on the following questions:

- Has IDE or competency been evaluated quantitatively?
- Has the instrument development process been described?
- Has evidence of validity been provided?
- Are ID knowledge, skills, or dispositions measured?

From completing this process, I identified three articles focused on measuring ID competency quantitatively which described the instrument development process, including item generation, and provided evidence of construct validity (Koszalka et al., 2013; Ritzhaupt & Martin, 2014; Ritzhaupt et al., 2018). The International Board of Standards for Training, Performance, and Instruction (IBSTPI) published the 4th edition of Instructional Designer Competencies in 2013 (Koszalka et al., 2013). Over 30 years of work by a team of researchers and ID professionals validated twenty competencies representing five domains including professional foundations, planning and analysis, design and development, evaluation and implementation, and management (Koszalka et al., 2013).

In 2014, Ritzhaupt and Martin developed the Educational Technologist Multimedia Competency Survey (i.e., ETMCS). An extensive literature review, analysis of over 200 job postings, and expert review identified 85 competencies which were organized into knowledge, skill, and ability domains. Recently, an updated version, the Educational Technologist Competencies Survey, was published (Ritzhaupt et al., 2018). I reviewed the competencies identified in these three works to determine if ID knowledge, skills, and dispositions were covered. Themes from existing measures are provided below (see Table 1).

Table 1*Existing Instrument Coverage*

	IBSTPI (2013)	ETMCS (2014)	ETCS (2018)
<u>Knowledge</u>			
Theory/ID principles	Y	Y	Y
Systems-thinking	Y	N	N
Update and improve	Y	N	N
Share knowledge	Y	N	N
Ethics	Y	Y	Y
<u>Skills</u>			
Communication	Y	Y	Y
Technology	Y	Y	Y
ADDIE	Y	Y	Y
Collaboration	Y	Y	Y
Plan/manage ID	Y	Y	Y
Problem-solving	N	N	Y
<u>Dispositions</u>			
Adaptability	N	N	Y

Both the IBSTPI and ETCS have knowledge items related to ID theory, models, and principles guiding the design process (e.g., ADDIE). The ETCS also cites knowledge of online learning/teaching, cognitive load theory, adult learning theory, and technology integration as important. Common skills between the measures include communication, collaboration, design, technology integration, and management. The ETCS also cites problem solving as a skill. Dispositions are not referred to directly, but adaptability is cited in two ability items in the ETCS. Scholars have used these scales with various groups (e.g., web-based instructional designers, higher education, e-learning, educational technologist) confirming these items and dimensions are appropriate across various ID roles and positions (Iqdami & Branch, 2016; Parhar & Mishra, 2000; Park & Luo, 2017; Sugar et al., 2012).

Instructional design competencies are well developed, reflect years of collaborative work, and careful evaluation of job postings (Koszalka et al., 2013; Ritzhaupt et al., 2018). However,

both measures utilize agreement scaling to evaluate designers' perceptions of items criticality. Existing measures provide important evidence of content validity, but evidence describing the frequency with which these traits are used by designers is limited. Koszalka et al., (2013) evaluated 133 designers with at least six years of experience who graduated from a leading ID graduate program and found all competencies "were used sometimes to very often" (p. 118).

Existing ID competency instruments have effectively identified important items representative of designers' knowledge and skills. However, they are limited in two primary ways. First, if expertise is conceptualized as superior performance and competence as a minimal level of acceptable performance (Herling, 2000; Swanson, 1994), then measures of perceived importance fail to evaluate this foundational idea. Existing instruments are limited in providing information about items that discriminate individual abilities. For example, which knowledge, skill, or ability items do experts most frequently endorse? An instrument designed to differentiate designer's abilities is needed to evaluate expertise, or related constructs such as competence.

A second limitation is existing competency measures are limited in evaluating dispositions. Existing literature comparing expert and novice instructional designers suggests dispositions such as flexibility are related to effective problem solving and quality solutions (Ashbaugh, 2013; Ertmer & Stepich, 2005; Hardre et al., 2005). If dispositions can represent quality performance, then they are an important component of expertise which is not adequately evaluated in existing ID competency measures. An instrument designed to evaluate the frequency with which designers report executing particular behaviors indicative of ID knowledge, skills, and dispositions would extend existing measures by providing more information and insight about designers' level of expertise. The Instructional Design Dispositions and Expertise Index is designed with this goal in mind. The procedures outlined in the following section describe the development of this instrument.

METHODS

Expertise is a latent trait which means it is not directly observable and can only be measured by evaluating underlying variables (DeVellis, 2017). The review of literature supports knowledge, skills, and dispositions as salient constructs associated with expertise. The purpose of this research is to describe the development of the Instructional Design Disposition and Expertise Index (IDDEI). This instrument consists of three sub-scales: ID knowledge, skills, and dispositions. It is designed to evaluate the frequency with which designers apply knowledge, skills, and dispositions in practice. Instrument development procedures and research design are described below and will address the following research questions:

RQ1: How do designers describe the effectiveness of the items?

RQ2: How does the instrument elicit designers' response processes?

RQ3: What is the relationship between items and sub-scale scores?

RQ4: To what extent do instructional designers perceive knowledge, skills, and dispositions as important dimensions of expertise?

Instrument Development Procedures and Research Design

Given existing competency instruments are limited in evaluating instructional design expertise, a measure evaluating the full continuum of expertise is needed. Scholars suggest a three-phase approach for developing and validating scales in social and behavioral research (Boateng et al., 2018). These phases include item development, scale development, and scale validation. Item development includes identifying constructs and generating items. Scale development focuses on pre-testing questions. Scale evaluation includes tests of dimensionality, reliability, and validity (Boateng et al., 2018). McCoach and colleagues (2013) further detail important steps of the instrument development process. Table 2 summarizes their instrument development steps within the overarching phases described by Boateng et al., (2018). This formative instrument development study included item generation, expert review, think-aloud sessions, and a small-scale item tryout, also referred to as a pre-pilot (McCoach et al., 2013).

Table 2*Instrument Development Process*

Item Development
Confirm no existing instruments adequately serve your purpose
Describe constructs and key definitions
Generate items for each dimension
Select/generate response scaling
Ensure adequate content representation of each dimension
Scale development
Judgmental review of items
Create final version of survey including demographic questions, directions, etc.
Pre-pilot instrument with small number of respondents from target population
Scale evaluation
Conduct EFA, reliability analysis, and examine scale properties
Revise instrument
Conduct CFA, reliability analysis, and examine scale properties
Prepare test manual or manuscript

First, items were generated based off the work of York and Ertmer (2011, 2016). Second, the expert review and think aloud sessions collected qualitative data describing the usefulness and effectiveness of the items and constructs (RQ 1-2). Qualitative data lends evidence of validity based on test content and response processes (i.e., content and construct validity) as designers described their interpretation, reaction, and justification for endorsing an item (Bandalos, 2018). Results from these sessions also informed revisions to the instrument prior to the small-scale tryout. As expertise cannot be directly evaluated, exploring correlations between ID knowledge, skills, and dispositions provides information about the overarching latent trait, expertise (DeVellis, 2017). Third, the full item tryout provided quantitative data describing the relationships between items and subscales (RQ 3). This data provided initial evidence of the instruments internal structure as correlations described the relationship between items and constructs. (Bandalos, 2018). However, tests of dimensionality, reliability, and validity will be steps for future research. Finally, quantitative and qualitative data were corroborated to best understand the perceived importance of the primary constructs (RQ4). Corroborating evidence from qualitative and quantitative data sources provided “breadth and depth of understanding” (Johnson et al., 2007, p. 123). A conceptual model of this research design is provided below (see Figure 1).

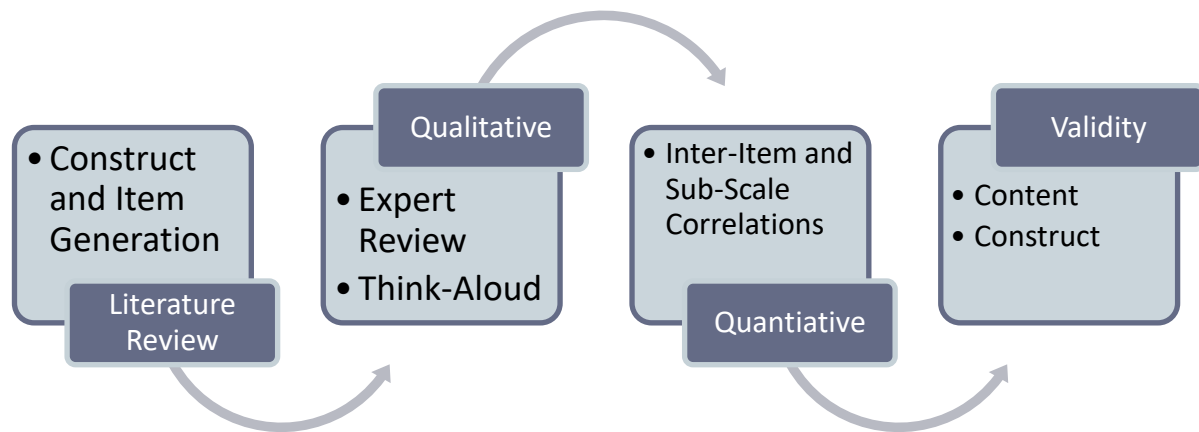


Figure 1. *Research Design*

Item Generation

The purpose of the IDDEI is to evaluate the consistency with which designers apply knowledge, skills, and dispositions in practice. It is comprised of three sub-scales: ID knowledge, skills, and dispositions. Conceptual definitions for these constructs were provided in the review of literature. This instrument evaluates expertise by considering quality and consistency (i.e., frequency) as indicators of performance.

A Delphi study conducted by York and Ertmer (2011) outlined over 60 principles, or heuristics, such as “needs analysis is the foundation for evaluation” (p. 849). These principles guide experts when applying knowledge and skills in a context of practice. Given experts’ design processes produce superior products and solutions compared to novices (Ertmer & Stepich, 2005; Hardre et al., 2005; Rowland, 1992), the frequent use of these principles will serve as an indicator of quality. As each principle corresponded to at least one IBSTPI competency standard, they informed the item generation process (York & Ertmer, 2011).

The following steps guided item generation. First, a table replicating the findings of York & Ertmer (2016) was created to organize principles into categories. After assigning each principle to a category (i.e., analysis, design, development, implementation, evaluation, communication, client project management, or design characteristics), they were numbered 1-61. After initial review a few items were combined or rearranged for organizational purposes. For

instance, principles related to communication, client, and project management were assigned to one overarching category labeled Management. Principle 6 was moved from Analysis to Management. Principle 22 was split into two principles, one assigned to Design and one to Management. Principle 23 was moved from Design to Management, and principle 25 was moved to Designer Characteristics. These steps are only relevant in tracking how items were numbered for subsequent item generation (i.e., 1-9 Analysis, 10-23 Design, 24-26 Development, 27-28 Evaluation, 29-53 Management, 54-62 Designer Characteristics).

Second, each principle was analyzed and assigned to one of the primary constructs (i.e., knowledge, skills, or dispositions). The definitions of ID knowledge, skills, and dispositions cited above guided decision making. Principles describing ID knowledge (e.g., of theories, models, instructional strategies) and an awareness of various components of the ID process (e.g., learners' needs, design continues through implementation) were assigned to the knowledge category. A total of 14 principles (i.e., 1, 4, 5, 7, 14, 15, 16, 17, 18, 19, 22, 23, 59, 60) were assigned to this category. Principles describing ID skills including problem solving, communication, and collaboration were assigned to the skill category. A total of 26 principles (i.e., 2, 6, 8, 9, 10, 11, 12, 13, 21, 27, 28, 29, 30, 31, 36, 37, 40, 41, 42, 43, 45, 46, 49, 51, 52, 53) were assigned to this category. Principles describing designer's characteristics and how experts approached the design process were assigned to the disposition category. A total of 22 principles were initially assigned to this category (i.e., 3, 20, 24, 25, 26, 32, 33, 34, 35, 38, 39, 44, 47, 48, 50, 54, 55, 56, 57, 58, 61, 62).

Finally, after each principle was assigned to a construct, they were rewritten as behavioral statements. For example, principle four, know your learners' prerequisite knowledge (York & Ertmer, 2016) assigned to the knowledge construct was re-written as follows: I am aware of the need to design instruction that targets learners' existing knowledge levels. Through an iterative process, each behavioral statement was reviewed. In some cases, similar items were combined. For example, principles 14-17 were combined into one question evaluating designers' awareness of strategies that enhance learning. While, some items represent more than one principle, all items represent at least one rule of thumb experts report using in practice. This process resulted in the 3 subscales including 15 knowledge, 20 skill, and 20 disposition items (see Table 3).

Table 3*Item Generation*

Principle	Knowledge	Skills	Dispositions
1. Ask yourself, “Is instruction the solution to this problem?”	I am aware of situations where instruction is an appropriate solution to a problem. (IDDEI 1)		
2. Invest as much time as you can in your audience analysis.		I invest as much time as possible becoming familiar with my learners/audience. (IDDEI 22)	
3. Know your learners or target audience.			I am aware of and sensitive to the needs of learners. (IDDEI 44)
4. Know your learners’ prerequisite knowledge.	I am aware of the need to design instruction that targets learners existing knowledge and skills. (IDDEI 4)		I am aware of and sensitive to the needs of learners. (IDDEI 44)
5. Needs analysis is the foundation for evaluation.	I am aware that needs analysis (gap analysis, front end analysis) is the foundation for evaluation. (IDDEI 2)		
6. Determine what it is you want your learners to perform after the instructional experience. What is the criterion for successful performance?	I am aware of learning goals/performance outcomes. (IDDEI 5)	I create goals which specify the criteria for success. (IDDEI 23)	

(continued)

Principle	Knowledge	Skills	Dispositions
7. There are things that need to be determined at the front end to make you successful at the back end.	I am aware of ID tasks that need to be completed at the front end to ensure a successful end result. (IDDEI 3)		I am intentional and make strategic design decisions. (IDDEI 50)
8. Constraints are a key to design. Look for constraints that have been placed on a project.	I am aware of project constraints. (IDDEI 7)	I manage project constraints. (IDDEI 27)	
9. Never look at the problem at face value. You have to get to the core of the problem and solve all of the sub-problems.		I identify the main ID problem and relevant sub-problems. (IDDEI 21)	
10. When faced with something complex, look for previous examples that have characteristics that you can draw upon and that can give you ideas on how to solve the problem.			I am aware of relevant knowledge and experience which I use as a starting point for new projects. (IDDEI 41)
11. Approach the design problem with the end in mind. What are the deliverables? What are the learning/performance outcomes?		I design with the end in mind as I align goals and strategies with desired outcomes. (IDDEI 24)	I am intentional and align goals and strategies with desired outcomes. (IDDEI 51)
12. Generate multiple possible solutions that will solve the problem.		I generate multiple solutions for a given problem. (IDDEI 28)	I am open to diverse views or solutions. (IDDEI 54)

(continued)

Principle	Knowledge	Skills	Dispositions
13. When designing instruction, consider the context in which the learning will be applied. Ask yourself, "How can I put learning into context?"		I make decisions based on how learning will be applied in the performance context. (IDDEI 26)	
14. "When designing instruction, consider active learning. Ask yourself, "How can I make learners more actively engaged?"	I am aware of strategies that enhance learning (e.g., active learning strategies, learner choice, motivation, scaffolding, etc.). (IDDEI 13)		
15. Determine what will keep learners motivated during the instructional experience.	I am aware of strategies that enhance learning (e.g., active learning strategies, learner choice, motivation, scaffolding, etc.). (IDDEI 13)		
16. Consider utilizing scaffolding in your instructional experience. Give the learners the tools they need to succeed.	I am aware of strategies that enhance learning (e.g., active learning strategies, learner choice, motivation, scaffolding, etc.). (IDDEI 13)		
17. Be sure the instruction gives learners the opportunity to make choices.	I am aware of strategies that enhance learning (e.g., active learning strategies, learner choice, motivation, scaffolding, etc.). (IDDEI 13)		

(continued)

Principle	Knowledge	Skills	Dispositions
18. Ensure that design speaks to a value chain of learning (i.e., that learning contributes to behaviors and that behaviors contribute to organizational or business results).	I am aware of how learning is linked with organizational goals/ outcomes. (IDDEI 6)		
19. Understand the learning associated with the technology.	I am aware of the impact technology has on learning. (IDDEI 14)		
20. Don't let technology drive the design.			I adapt decisions about technology integration based on the unique needs of each project. (IDDEI 52)
21. Remember the novice learner who needs to build basic skills.		I make decisions based on learners needs and existing knowledge/skills. (IDDEI 25)	
22. When designing instruction, think about elaboration theory. Ask yourself, "What's the 'big picture' to which the components are attached?"	I am aware of the interrelated nature of instructional design tasks (e.g., needs drive decision making, design continues through implementation). (IDDEI 8)		

(continued)

Principle	Knowledge	Skills	Dispositions
23. Design continues through the delivery or implementation phase.	I am aware of the interrelated nature of instructional design tasks (e.g., needs drive decision making, design continues through implementation). (IDDEI 8)		
24. Allow the content to guide how users interact with the training (linear, user-driven, etc.), not the tools used to develop the training.			I am intentional and make strategic design decisions. (IDDEI 50)
25. Technology can get in your way, and if you don't deal with it you can get yourself into trouble.			I adapt decisions about technology integration based on the unique needs of each project. (IDDEI 52)
26. Make every effort to be part of the production process			I am aware of my role in the ID process (IDDEI 59)
27. Always conduct a pilot.	I am aware of formative and summative evaluation procedures. (IDDEI 9)	I conduct a pilot test. (IDDEI 32)	I am open to diverse views or solutions. (IDDEI 54)
28. When possible, have a subject matter expert and a non-subject matter expert review the final product.		I have subject matter experts and non-subject matter experts review the final product. (IDDEI 31)	I adapt ideas, designs, and solutions based on feedback from others (e.g., subject-matter experts, clients, etc.). (IDDEI 56)

(continued)

Principle	Knowledge	Skills	Dispositions
29. As a designer you need to listen more than you talk.		I am an active listener. (IDDEI 33)	
30. When verifying information, you often will learn more information.		I verify given information and ask relevant follow up questions to prevent miscommunication. (IDDEI 34)	
31. Verify all the information you receive from the client to prevent miscommunication.		I verify given information and ask relevant follow up questions to prevent miscommunication. (IDDEI 34)	
32. You need to understand and speak the language of your client.			I adapt ID terminology into language my client can understand. (IDDEI 48)
33. Don't use technical instructional design terminology with the client unless you have to.			I adapt ID terminology into language my client can understand. (IDDEI 48)
34. Ask all possible relevant questions throughout the entire design process.			I am open to new information. (IDDEI 55)
35. You are rarely going to collect all the desired outcomes with just one interview with the client			I am intentional about seeking information at different points as a client won't always tell me all I need to know about a problem during one session. (IDDEI 47)

(continued)

Principle	Knowledge	Skills	Dispositions
36. In communicating with the client, use visuals and documents to prevent miscommunication.		I create prototypes to effectively communicate and test ideas. (IDDEI 30)	
37. Negotiate the scope of the project with the client and create a statement of work upfront.		I negotiate the scope and create a statement of work with the client before beginning a project. (IDDEI 35)	I am flexible in negotiating the scope and timeline with a client who may believe it is easier to move from conceptualization to implementation than it actually is. (IDDEI 46)
38. Be honest with the client.			I am open and honest with the client. (IDDEI 49)
39. You have to be sensitive to the context and the culture of the client.			I am aware of and sensitive to the culture and context of the client. (IDDEI 45)
40. You need to build trust with the client. This can be done through explaining what you are doing, why you are doing it, and how it is of value to them.		I build trust with the client. (IDDEI 36)	
41. Figure out who all the stakeholders are in the room; and figure out who is not in the room that is still a stakeholder.		I collaborate with all stakeholders. (IDDEI 29)	

(continued)

Principle	Knowledge	Skills	Dispositions
42. You need to manage the client's expectations.		I manage others' expectations/requests by creating a shared understanding of project goals and deliverables. (IDDEI 37)	
43. You have to determine whether the client really knows what he or she wants.		I manage others' expectations/requests by creating a shared understanding of project goals and deliverables. (IDDEI 37)	
44. Subject matter expert's documentation often fails to provide the necessary critical thinking. The subject matter expert forgets to tell you basic steps and concepts he or she forgot he or she once learned.			I am intentional about seeking information at different points as a client won't always tell me all I need to know about a problem during one interview. (IDDEI 47)
45. When multiple stakeholders are involved, ask your client to identify your "single point of contact." Make sure that person understands what is expected—gathering feedback on your design for you, getting approvals, and so forth.		I identify points of contact and the appropriate chain of command for getting feedback, approvals, etc. (IDDEI 38)	

(continued)

Principle	Knowledge	Skills	Dispositions
46. Bring together the client and other stakeholders for synchronous meetings at each "gate" in a phased process.		I facilitate client and stakeholder meetings at key decision points. (IDDEI 39)	
47. The instructional designer should take prodigious notes during meetings. Do not rely purely on documentation or the subject matter expert.			I am open to new information. (IDDEI 55)
48. Sometimes the client will not tell you all there is to know about a problem.			I am open to new information. (IDDEI 55)
49. You may have to mockup something to show the client to make sure that you get all of the desired outcomes right.		I create prototypes to effectively communicate and test ideas. (IDDEI 30)	
50. The client typically thinks it is much easier to move from the conceptualization to the implementation than it actually is.			I am flexible in negotiating the scope and timeline with a client who may believe it is easier to move from conceptualization to implementation than it actually is. (IDDEI 46)
51. Resist the technical expert's propensity to focus on the most complex or innovative aspects of a product.		I manage others' expectations/requests by creating a shared understanding of project goals and deliverables. (IDDEI 37)	

(continued)

Principle	Knowledge	Skills	Dispositions
52. Resist the subject matter expert's desire to teach the solution to the hot problem of the day unless it is a common problem seen by the average learner.		I manage others' expectations/requests by creating a shared understanding of project goals and deliverables. (IDDEI 37)	
53. Involve the right people at the right time, because design is a people process.		I involve the right people at the right time. (IDDEI 40)	
54. Acknowledge your limitations. Don't accept a job that is outside of your expertise.			I am aware of my limitations as a designer. (IDDEI 57)
55. You often don't get to do the best instructional design you want to, due to constraints, resources, time, budget, and so forth.			I am aware you often don't get to do the best ID you want to because of constraints, such as resources, time, and budget. (IDDEI 53)
56. Use previous experiences, if possible, as a starting point for new projects.			I am aware of relevant knowledge and experience which I use as a starting point for new projects. (IDDEI 41)
			I intentionally draw upon previous experience to help me solve a novel or complex problem. (IDDEI 43)

(continued)

Principle	Knowledge	Skills	Dispositions
57. Be prepared to think abstractly.	I think critically about abstract, or ill-structured, problems. (IDDEI 17)		
58. Understand that every design situation is unique.			I adapt my approach to each unique design situation. (IDDEI 58)
59. You need to know the theories. You need to know the models. You need to have that foundation.	I am aware of learning theories. (IDDEI 11) I am aware of ID models and theories. (IDDEI 12)		I flexibly apply ID knowledge based on the needs of each project. (IDDEI 42)
60. Design is a people process.	I am aware that design is a people process. (IDDEI 10)		
61. It is the instructional designer's job to press for quality in the design.			I work to create a quality product even if some of my work/intentions aren't represented in the final deliverable. (IDDEI 60)
62. Prepare to do a lot of work that is never going to show up in the final product.			I work to create a quality product even if some of my intentions aren't represented in the final deliverable. (IDDEI 60)
Item Total:	K = 15	S = 20	D = 20

To ensure content coverage and create equal questions among the subscales, five additional knowledge items were added (see Table 4). Given the marked increase in online learning and the prevalence of designers who agreed principles of online teaching and learning are important components of competency, item 15 was added to cover this topic (Ritzhaupt et al., 2018; Seaman et al., 2018). Additionally, items 16-20 were added to capture distinguishing characteristics of experts' knowledge. For example, characteristics such as organized knowledge, flexible retrieval, and reflection, or metacognition, are cited in cross-disciplinary expertise research and instructional design literature (Bransford et al., 2000; Chartier, in press). Given the principles outlined by York & Ertmer (2016) did not include metacognitive components of knowledge or describe principles for online teaching or learning, these items were added to ensure adequate content coverage. Further, McCoach and colleagues (2013) suggest "the proportions of questions for each of the dimensions or sub-dimensions should be roughly proportional to the importance of that concept in the definition of the overall dimension or construct" (p. 279). As knowledge, skills, and dispositions are assumed to be equally important components of expertise, efforts were made to create equal items among subscales. A 5-point Likert scale (Always, Frequently, About Half the Time, Rarely, Never) was applied to these items.

Table 4

Additional items

Item Number	Item	Citation
15	I am aware of principles for online teaching and learning.	Ritzhaupt et al., (2018)
16	I have organized ID knowledge into meaningful patterns, or mental frameworks (e.g., ADDIE), which allow me to quickly retrieve relevant concepts.	Ertmer et al., (2009) Ertmer et al., (2008) Kirschner et al., (2002) Rowland, (1992)
18	I have developed rules that guide my ID work	York & Ertmer (2011, 2016)
19	I may use rules subconsciously, but I could relate them to ID concepts if asked.	York & Ertmer (2011, 2016)
20	I am reflective throughout the design process.	Ertmer & Stepich, (2005) Hardre et al., (2005) Rowley, (2005)

Steps to finalize the instrument included adding, 20 demographic items to understand designers' characteristics (e.g., years of experience, type of experience, etc.). As scholars have suggested experience is associated with the development of knowledge, skills, and dispositions (Ge & Hardre, 2010; Slagter van Tryon et al., 2018; Stepich & Ertmer, 2009), a few related questions were added to this section which will be used for future model or theory building. A 5-point Likert development or agreement scale was used to evaluate these demographic items. In total, the instrument is comprised of 80 questions with 20 items in each section. After all items were created and scaled, directions, including definitions of key terms, were added to prepare the instrument for initial testing. Initial item screening was done with one content and one measurement professional who reviewed the items for quality and consistency. Revisions and adjustments were made as needed. A full version of the initial instrument, without scaling, is provided in Appendix A.

Expert Review Sample

Instructional designers were recruited to participate in the expert review and think-aloud sessions. Three seasoned designers were purposively selected to participate in the expert review. They are well-known expertise and instructional design scholars who have collectively over 50 years of experience. Demographic data from experts who participated by reviewing the entire instrument are provided below (see Table 5).

Table 5

Expert Review Demographics

Pseudonym	Gender Identifier	Ethnic Identifier
Beth	She/Her	Caucasian
Lindsey	She/Her	Caucasian
Tom	He/Him	Caucasian

Beth has more than 20 years of experience in higher education and administration. She also has over 10 years of experience consulting with domestic and international organizations. She has published articles, textbooks, and chapters dedicated to understanding the ID field. Lindsey has 10 years of experience as an instructor in higher education and has conducted

instructional design expertise related research. Tom, retired, spent 25 years teaching a variety of ID courses. He conducted research on instructional design expertise and co-authored an educational technology textbook.

Expert Review Procedures

Upon agreeing to participate in the study, experts were emailed a copy of the pre-survey (see Appendix B). Experts were asked to identify components of expertise prior to reviewing the glossary of terms. After sharing their initial conceptions of expertise, they reviewed the glossary and responded to several questions evaluating their perceptions of the definitions and underlying constructs. After completing the pre-survey, experts were emailed the expert review protocol (see Appendix B) which was informed by McCoach et al., (2013). Experts provided written feedback regarding their evaluation of each item's goodness of fit, relevance, clarity, and appropriateness for a range of designers (see Appendix B). Experts also reviewed the subscales holistically to identify any missing or redundant items.

Think-Aloud Sample

Simultaneously, think aloud sessions, which sought to understand how designers experienced the instrument and items, were conducted. Convenience sampling was used to recruit four designers with diverse backgrounds and a range of ID experience to participate in a think-aloud session. Novice designers currently in an instructional design degree program were solicited as well as two more experienced designers who have worked as full-time designers. Diverse age, gender, and ethnic backgrounds were also considered in choosing participants. Demographic data is summarized below (see Table 6).

Table 6*Think-Aloud Demographics*

Pseudonym	Gender Identifier	Ethnic Identifier	Classification
James	He/Him	Caucasian	Developing
Kiara	She/Her	Asian/Indian	Competent
Ann	She/Her	Caucasian	Experienced
Suzhen	She/Her	Asian/Taiwanese	Expert

James and Kiara are currently enrolled in an ID doctoral program. James has 3 years of middle school teaching experience and Kiara has five years of experience as an instructional designer creating print and digital educational products for K-12 and higher education audiences. Ann has a master's degree in adult education and is currently pursuing a PhD in instructional design. She has a background in graphic design and has worked for 10 years as an instructional designer in higher education. She has spent the last 5 years working in medical education. Suzhen has a PhD in Curriculum and Instruction and has worked for 15 years as a designer in higher education. She also has 15 years of teaching experience and 2 years of experience as an instructional design manager.

Think-Aloud Procedures

After arranging a date and time for the sessions, designers were emailed a short pre-survey to collect demographic data (see Appendix B). In addition to typical demographic data (age, ethnicity, gender), designers' also rate their expertise on a 5-point scale (novice, developing, competent, experienced, expert). Designers self-reported expertise classification is included in Table 6 above. After completing the pre-survey, a link to a video conference was sent. After a short orientation focused on reviewing the procedures for session and ensuring participants understood key terms, designers expressed their thoughts aloud while reading and completing a subset of items. They provided feedback on the clarity of items, described their preference for item scaling, and provided insights to their responses. These sessions were recorded and transcribed.

The goal of this qualitative phase was to gather data to contribute evidence of content validity and inform revisions to the instrument. Designers' feedback was reviewed concurrently and resulted in a number of changes to the instrument, which are detailed in the results section. The final expert review was conducted with the revised instrument. After the final expert review, the instrument was prepared for the pre-pilot by adding instructions and the glossary. A survey was then created using Qualtrics.

Pre-Pilot Sample and Procedures

To begin to evaluate the effectiveness of the instrument, a small-scale item tryout, or pre-pilot was conducted with the full, revised instrument (see Appendix A). Recruitment for the pre-pilot included posting an invitation to participate in the study on various social media sites including LinkedIn, Facebook, and professional listservs. Current students, including solely online students, from a large, Midwest university were also recruited via institutional listservs or LMS platforms. Alumni from this same institution were also recruited to participate. As designers were invited to broadly share the invitation, participants were potentially recruited by word of mouth or via professional networking. A small financial incentive was offered to the first seventy-five participations. A total of 310 participants completed the survey. After survey data were retrieved the following steps were used to clean the data. First, to ensure all responses fell into the appropriate range, descriptive statistics were evaluated, including reviewing skewness, kurtosis, and outlier information. Any incomplete data, outliers, or data out of range were deleted. After removing incomplete data, a final sample of 206 participants remained. Demographic data are summarized below.

The mean age was 40 with ages ranging from 25-70 years. Gender and ethnicity data were not available. Over 65% (n=134) of participants reported holding an advanced instructional design degree, approximately 55% (n=115) were currently enrolled in an ID certificate or degree program, and 45% (n=93) reported working as full-time designers. Participants' instructional design experience ranged from 0-45 years with over 60% (n=119) of designers having less than 10 years of instructional design experience, 24% reporting 10-19 years, and 18% (n=37) reporting 20 plus years (see Table 7). Related experience was also reported including teaching, mentoring instructional designers, consulting, and training other professionals (see Table 8).

Table 7*Years of Experience*

	Frequency	Percent
0-5	81	39.4
6-10	48	23.3
11-15	31	15
16-20	11	5.5
21-25	10	5
26-30	5	2.5
31-35	5	2.5
36-40	11	5.4
41-45	4	2
Total	206	100
Missing	0	

Table 8*Related Experience*

	Frequency	Percent
<u>Teaching</u>		
0-9	91	44.1
10-20	64	32.8
20+	40	20.5
<u>Mentor ID</u>		
0-9	111	67.7
10-20	28	17.1
20+	25	14.0
<u>Consulting</u>		
0-9	92	44.8
10-20	37	18.1
20+	25	12.0
<u>Training Others</u>		
0-9	82	40.7
10-20	43	20.9
20+	28	13.9
Total	206	100

*Missing: n=11 teaching; n=42 mentor instructional designer; n=52 consulting; n=51 train other

After cleaning data and exploring descriptive statistics, a correlation matrix was computed for each item to determine the strength of the relationships between items. Pairwise correlations were also computed to determine the relationship across subscale scores (RQ3). As a latent variable, expertise cannot be directly evaluated, but evaluating the strength of pairwise correlations helps infer how highly each item is correlated with the latent variable (DeVellis, 2017). As discussed previously, qualitative data from the expert review and think-aloud sessions were corroborated with quantitative findings to address the final research question (RQ4). Doing so provided important interpretative strength to understand the extent to which designers perceive knowledge, skills, and dispositions as important dimensions of expertise. Corroborating findings from multiple sources and methods will provided needed evidence of validity (Bandalos, 2018).

RESULTS

The purpose of this research was to describe the development of the Instructional Design Dispositions and Expertise Index. My research design included a qualitative and quantitative phase. The qualitative phase included item generation, expert review, and think-aloud sessions. The quantitative phase included a small-scale item tryout, or pre-pilot. and address the following research questions:

RQ1: How do expert designers describe the effectiveness of the items?

RQ2: How does the instrument elicit designers' response processes?

RQ3: What is the relationship between sub-scale (e.g., knowledge, skill, disposition) scores?

RQ4: To what extent do instructional designers perceive knowledge, skills, and dispositions as important components of expertise?

Results from the qualitative phase described the effectiveness of the items and how the instrument elicited designers' response processes (RQ1, 2). Feedback from this phase also informed revisions to the instrument prior to the pre-pilot. Finding from the quantitative phase described the relationship between items and sub-scales (RQ3). Data from both phases were corroborated to leverage the strengths of both approaches to best understand the importance of the primary constructs (RQ4).

Effectiveness of Items: Expert Review

Primary findings from the qualitative phase described the effectiveness of items. Expert review participants unanimously agreed all 60 items were assigned to the correct construct and the items reflected relevant aspects of the corresponding trait. A few items (i.e., 1-3, 5, 7, 10) were identified as not clearly worded. For example, Tom and Beth suggested item one (e.g., identify situations where instruction is an appropriate solution to a problem) was not clearly worded. Tom clarified, "in many situations instruction is part of a solution...and more expert IDs are more likely to think in terms of multiple solutions. Beth was uncertain about item ten (i.e., aware design is a people process) citing "design is many things, being a people process is only on part of that."

Interestingly, the most common reason an item was identified for revision was because experts suggested it was not appropriate for designers with a range of experience or expertise. A total of 27 items representing all three constructs were endorsed as not appropriate for a range of designers (i.e., knowledge 16-20; skills 21, 29, 35, 37; dispositions 42-55, 57-59). Importantly, experts described these items as being more characteristic of experts or difficult for novices. For example, Beth and Lindsey agreed item 16, organizing knowledge into meaningful patterns is more characteristic of experts. Beth stated, “this is easier and more relevant for experts than novices.” She also indicated applying knowledge flexibly in an ID setting as a disposition more characteristic of experts than novices. When discussing skills, Lindsey suggested identifying the main ID problem and relevant sub-problems as not characteristics of all designers. Beth also suggested collaborating effectively with stakeholders is difficult for novices to do. When rating each item’s appropriateness for a range of designers, dispositions were often perceived as an expert trait. For example, 17 items were identified as not relevant for all designers in the disposition category compared to 4-5 items in the other two categories. For example, Beth explicitly stated, “adaptability is an expert skill.” She also described awareness as a reflective practice that takes time to master. Lindsey suggested making intentional, strategic design decisions, intentionally aligning goals and outcomes, and adapting decisions about technology integration were more characteristic of expert designers. When considering items holistically Lindsey said, “I feel like an expert can do all of them.” While Beth agreed on a number of these items, when it comes to being open to diverse views, solutions, or new information (i.e., items 54, 55) she suggested, “this is tough for novices.” Finally, Beth also identified three items (i.e., 35, 37, 39) that are more applicable for designers working in industry versus education. These items include tasks such as managing the scope, or others’ expectations, and collaborating with stakeholders.

Overall, experts agreed the items were assigned to an appropriate category, were relevant for a range of designers, and represented ID in a variety of contexts. All experts agreed there were no redundant questions. While Beth and Lindsey suggested there might be other items, when asked explicitly to consider content coverage, no additional items were suggested. Remarking on the coverage of items Tom summarized, “I think you’ve done a good job pulling together elements of knowledge, skills, and dispositions.” However, when it comes to measuring expertise Beth warns “if the hope is to have a comprehensive list of all the things instructional

designers do, I doubt we'll be able to get there. I'd say it's not possible to have a truly comprehensive list of all the things instructional designers need to know, feel, be able to do, etc."

Cognitive Processes: Think-Aloud

Findings from the think-aloud sessions provided information regarding how the instrument elicits designers' cognitive processes. As designers participated, they shared insights which provide additional evidence of item effectiveness as well as practical tips for improving the format of the survey. These sessions also provide initial information about how designers from various ethnic, educational, and instructional design backgrounds react to the items. The average length of these sessions was 36 minutes with a range in duration from 22 (Suzhen) to 53 minutes (James). Designers' average scores for the subscales were 4.4 (knowledge), 3.5 (skills), and 3.0 (dispositions). At the end of each section they were asked to provide feedback or suggested revisions for the items. Designers made comments such as "The questions were quite clear and easy to understand" (Kiara) or would indicate no revisions were needed. However, they each had insights and questions during the session that illuminated their cognitive processes.

In the knowledge section, James and Kiara both expressed uncertainty with how to interpret the term aware. Kiara stated, "Now, I'm also thinking when I'm saying I am aware. Does that mean I always have that information, or does that mean I am consciously aware?" James also considered the meaning of aware by discussing challenges with the term in relation to the rating scale. Our brief discussion highlighted an important observation.

James: "We agree on what these questions mean. I think that this sort of scale with always to never is not capturing the nuances of, of what might make these different items different. Since it's like a frequency thing, the question is awareness. My responses are based on frequency, and I feel like that's incongruous."

Researcher: "So are you thinking more along a yes, no continuum?"

James: "Yeah, I think of it as a yes, no."

Even with their initial uncertainty, after brief, clarifying conversations, James and Kiara were able to affirmatively endorse the items. For example, when responding to item 2 (i.e., I am aware that needs analysis is the foundation for evaluation), Kiara responded, "Yes, absolutely. I think that is one of the first that you take into account when you're designing instruction." James also affirmed his awareness of project constraints and commented "Yeah, that's always forefront in

my mind for a middle school classroom.” Interestingly, neither Ann nor Suzhen expressed this same uncertainty and were able to respond to the knowledge items more easily. Although, Ann did have some initial uncertainty regarding one item related to principles for online learning stating, “I don’t know what principles are.” Suzhen often described the quality of the questions, describing items 16-19 as good questions. She suggested thinking critically about problems is not necessarily unique to ID but could apply to other types of work. She suggested being reflective about the design process was “a very good question.”

In the skill section, designers frequently provided justifications for their rating choices. For example, when rating her ability to identify ID problems and sub-problems, Kiara endorsed option C, about half the time. She explained “a lot of times you have so much of a time crunch and unavailability of information that I did not engage in identifying sub-problems. I just went ahead with what I had at hand.” When considering her ability to align goals and strategies with desired outcomes she reported, “Yes, always. In fact, I like to work with the bigger picture in my head and make sure that I[m] always align to the bigger picture at every step of my instructional design. So, I would go with always.” Similarly, when James was considering how he manages project constraints, he said, “There are a lot of different project constraints. A lot of them I cannot manage. I try to manage all the ones I can but a lot of them I can’t. So, I’m just going to say occasionally, a lot of time I’m just making my design work within the existing constraints instead of trying to manage them.” When considering if he generates multiple solutions for a problem, he said “Yeah, not so much. Yeah, I do try to be flexible. I really try but still that only puts me at occasionally.” In relation to item 31 (i.e., I collaborate with others to review materials before implementing or facilitating instruction), Ann described, “I typically have people review before it’s a final, because once it’s done it’s done. So, I’ll have them review more in the draft phases. I’m going to say never because once its final I don’t want anyone poking around anymore.” Ann also identified two items (i.e., 34, 35) evaluating more than one idea. For example, after reading “I verify given information and ask relevant follow up questions to prevent miscommunication,” Ann stated, “Those are two different things, I could do one, but not the other.” When responding to the item “I negotiate the scope and create a statement of work” she cited, “again, two different things. Suzhen didn’t provide as much verbal feedback, but her ID and management experience enabled her to easily endorse skill item such as building trust with clients, managing expectations, and understanding the chain of command. She also

suggested facilitating client/stakeholder meetings would depend on the designer's role and structure of the organization.

In the dispositions section, Suzhen, Kiara, and Ann commented the questions were “good,” clear, and easy to understand. When evaluating her ability to apply ID knowledge flexibly, Kiara stated, “I haven't really evaluated myself. I wouldn't rate very high right now. I feel like I need to learn a lot and being more flexible with my knowledge. And especially now that I'm in PhD, I know that I'm working on increasing my knowledge and I wouldn't be that flexible yet in applying all that I learned, and I will take some time to do that.” However, when it comes to intentionally drawing upon experience to solve new problems, she said, “I think that's how my brain functions that it tries to bring in examples from my experience first and then link everything new to it, so very often.” James also described his intentionality when it comes to making strategic design decisions: “I do feel like I'm always very intentional about the stuff that I do, and I do feel like it's always strategic.” Evaluating her awareness of project constraints, Ann commented it was a “very good, very good question...it's not one I see very often” but that the verbiage was cumbersome. Consistent with her previous responses, Suzhen had little explicit feedback, quickly endorsed the disposition items, remarked, “these questions are good,” and did not recommend any final revisions when prompted.

At the end of the think-aloud sessions, designers were asked a few questions about potentially problematic aspects of the instrument. Designers were asked if they were able to keep the preface phrase (“When engaged in instructional design work...”) in mind as they answered each question. While only the first three questions in each session contain the preface, all designers reported they were able to keep their experience in mind as they responded to the items. Ann remarked, “Yes! It seemed natural to think of my own experiences on how I do ID work.” Designers were also exposed to three variations of frequency scaling and asked to identify which one was most preferred. Three of the four designers chose rating scale B (Always, Usually, About Half the Time, Seldom, Never). James and Ann described this scale as the clearest, most consistent, and most measurable. Kiara described how the rating about half the time was better and more relatable than alternatives such as sometimes or occasionally. She also summarized her general approach to rating the items. “While answering these questions, I'm going by approximation and my confidence levels and thus quantifying it does not make much difference in the answer... in hindsight, I would have chosen 'sometimes' anyway if it were

Option C.” As limited comments about the scaling were given during the sessions, these responses provide valuable insight to the usability of the instrument.

Instrument Revisions

Results from two expert reviews and four think-aloud sessions were used to make a number of notable revisions to the instrument (see Appendix A). First, additional terms other than aware were used as stems for all knowledge items. Examples included phrases specifically mentioned in the think-aloud by James (e.g., I think about) as well as terms such as identify, and consider. Second, any items identified as containing two distinct ideas were divided into separate questions. For example, item 35 was split and became item 24 and 35 respectively (see Table 11). Third, the scaling most preferred by designers (Always, Usually, About Half the Time, Seldom, Never) was used for all items. Additional items were revised for clarity and item ten (e.g., design is a people process) was eliminated due to Beth’s feedback. The revised items are documented in Appendix A. After items were revised, the final expert review was conducted to ensure no further revisions were needed. Out of 60 items, Tom only cited 3 knowledge items which were not clearly worded (i.e., 1, 3, 5). Minor adjustments were made to these items.

Overall, findings from expert review and think-aloud sessions suggested the items were effective and elicit appropriate cognitive processes from designers. Experts agree, items were relevant, clearly worded, and appropriate for designers with a range of expertise and experience, even if some may be more discriminating. Scaling choices are easy for designers to endorse, and the instrument appeared to be straightforward and user-friendly. Designers were also able to think about their ID experience while completing the survey. The goal of this qualitative phase, including expert review and think-aloud sessions, was to gather information to inform revisions and understand the effectiveness of the items. Important revisions have been discussed which were made in preparation for the pre-pilot.

Item and Sub-Scale Relationships

The goal of the quantitative phase was to address research question 3 and 4. This section will present descriptive statistics and correlational data to understand the relationship between items and subscales. Descriptive statistics and themes from the qualitative

phase are presented in the subsequent section to highlight designers' perceptions of the primary constructs.

Descriptive statistics for each item are presented in the tables below (see Tables 9-11). Data for all items fell within the appropriate range (1-5). Sub-scale mean scores were also computed by averaging each respondents' score. The knowledge sub-scale had a mean of 4 and standard deviation of .53 (see Table 9). Sub-scale item means ranged from 3.76-4.19 with standard deviations approximating one. Skewness and kurtosis statistics for these items were also appropriate: skewness -1.12-.49; kurtosis -.26-1.41. The histogram below further indicated the knowledge sub-scale was normally distributed (see Figure 2).

Table 9

Descriptive Statistics: ID Knowledge

	N	Minimum	Maximum	Mean	Std. Error	Std. Deviation
Q1_InstSoln	206	1	5	4.08	0.06	0.85
Q2_AnalysisFnd	206	1	5	4.19	0.06	0.90
Q3_IDTasks	206	1	5	3.97	0.06	0.90
Q4_LearnerKS	206	1	5	4.14	0.07	0.93
Q5_MindfulGoals	206	1	5	4.20	0.06	0.91
Q6_LearningLinkedGoals	206	1	5	4.07	0.06	0.83
Q7_AwareConstraints	206	1	5	3.90	0.06	0.89
Q8_InterrelatedNature	206	1	5	3.99	0.06	0.91
Q9_EvaluationStrat	206	1	5	3.93	0.07	1.01
Q10_UptoDateInfo	206	1	5	3.76	0.07	0.97
Q11_ReflectK	206	1	5	3.85	0.06	0.92
Q12_ThinkIDPrinc	206	1	5	3.80	0.07	0.98
Q13_StratEnhLearn	206	1	5	4.12	0.06	0.91

(continued)

	N	Minimum	Maximum	Mean	Std. Error	Std. Deviation
Q14_ImpactTech	206	1	5	4.09	0.06	0.89
Q15_PrincOL	206	1	5	4.09	0.06	0.89
Q16_EfficientRetrieval	206	1	5	3.86	0.06	0.91
Q17_CritThink	206	1	5	3.95	0.06	0.88
Q18_Rules	206	1	5	3.93	0.06	0.92
Q19_RulesExplicit	206	1	5	3.96	0.06	0.89
Q20_ReflectExp	206	2	5	4.06	0.06	0.82

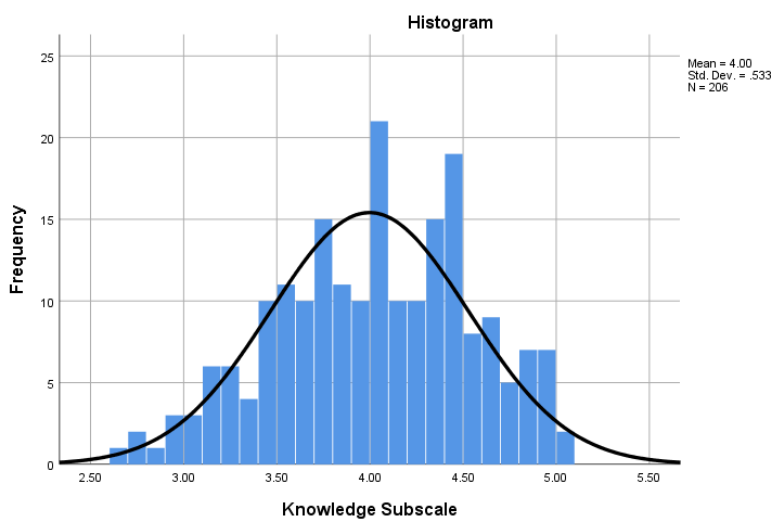


Figure 2. *Knowledge Subscale Histogram*

The ID skill subscale had a mean of 3.94 and standard deviation .50. Subscale item means ranged from 3.67-4.06 with standard deviations approximating one (see Table 10). Skewness and kurtosis ranges for these items were also appropriate: skewness -.97 to -.34; kurtosis -.49 to 1.04. The histogram below further indicated the skill sub-scale was normally distributed (see Figure 3).

Table 10*Descriptive Statistics: ID Skills*

	N	Minimum	Maximum	Mean	Std. Error	Std. Deviation
Q21_IDProb	206	1	5	3.90	0.06	0.88
Q22_TimeAnalysis	206	1	5	3.86	0.07	0.93
Q23_CreateGoal	206	1	5	4.02	0.06	0.89
Q24_MgScope	206	1	5	3.83	0.07	0.99
Q25_DecLNeed	206	1	5	3.99	0.06	0.86
Q26_DecPerfCntx	206	1	5	3.99	0.06	0.89
Q27_MgConst	206	2	5	3.93	0.06	0.80
Q28_MltSoln	206	1	5	3.79	0.07	0.96
Q29_Collaborate	206	1	5	4.09	0.07	0.97
Q30_Prototypes	206	1	5	3.67	0.07	1.00
Q31_RevMat	206	1	5	4.11	0.06	0.91
Q32_Pilot	206	1	5	3.41	0.07	1.03
Q33_ActListen	206	1	5	4.03	0.06	0.86
Q34_VerInfo	206	1	5	4.03	0.06	0.84
Q35_SharedUnder	206	1	5	3.90	0.07	0.98
Q36_Trust	206	1	5	4.10	0.06	0.91
Q37_MgExpect	206	1	5	3.98	0.06	0.89
Q38_Roles	206	1	5	3.99	0.06	0.91
Q39_FacComm	206	1	5	4.04	0.06	0.88
Q40_ImpPlan	206	1	5	4.06	0.057	0.82

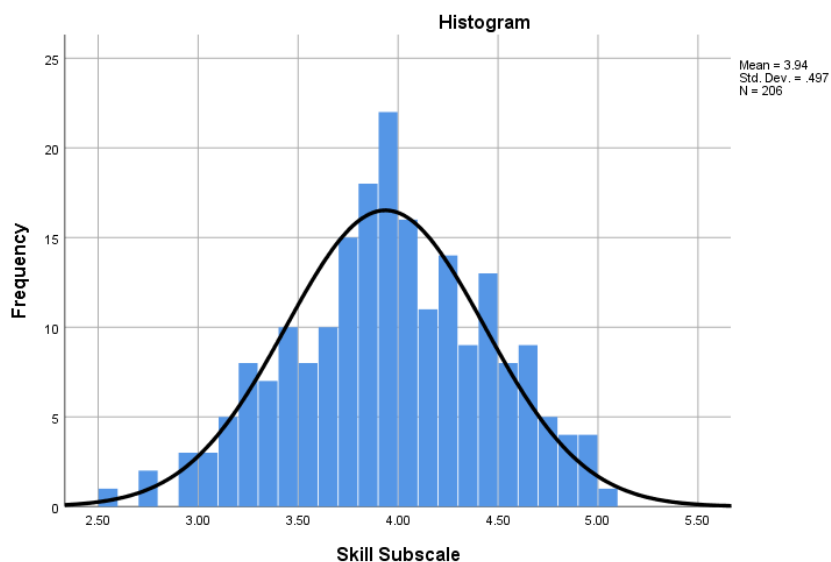


Figure 3. *Skill Subscale Histogram*

The ID disposition subscale had a mean of 4.06 and standard deviation .56. Subscale item means ranged from 3.67-4.06 with standard deviations approximating one (see Table 11). Skewness and kurtosis ranges for these items were also appropriate: skewness -.112 to -.48; kurtosis -.12 to 1.43. The histogram below further indicated the disposition sub-scale was normally distributed (see Figure 4).

Table 11

Descriptive Statistics: ID Dispositions

	N	Minimum	Maximum	Mean	Std. Error	Std. Deviation
Q41_AwareKE	206	1	5	4.01	0.06	0.84
Q42_FlexK	206	1	5	4.13	0.06	0.84
Q43_IntExpPS	206	1	5	4.12	0.07	0.93
Q44_AwareN	206	1	5	4.03	0.06	0.82
Q45_AwareCulture	206	1	5	3.93	0.06	0.86

(continued)

	N	Minimum	Maximum	Mean	Std. Error	Std. Deviation
Q46_FlexMgScope	206	1	5	3.9	0.06	0.85
Q47_IntSeekInfo	206	1	5	4.1	0.06	0.85
Q48_AdIDTerm	206	1	5	4.0	0.06	0.90
Q49_OpHonest	206	1	5	4.2	0.06	0.91
Q50_StrategicDD	206	1	5	3.97	0.07	0.978
Q51_IntAlign	206	1	5	4.09	0.07	0.94
Q52_AdaptTech	206	1	5	4.09	0.06	0.82
Q53_AwareConst	206	1	5	4.11	0.06	0.88
Q54_OpenViews	206	1	5	4.07	0.06	0.87
Q55_OpenNewInfo	206	1	5	4.11	0.06	0.89
Q56_AdaptIdeas	206	1	5	4.08	0.06	0.88
Q57_AwareLimit	206	1	5	4.00	0.07	0.94
Q58_AdaptApproach	206	1	5	3.97	0.06	0.86
Q59_AwareRole	206	1	5	4.09	0.06	0.90
Q60_QualityProd	206	1	5	4.20	0.06	0.92

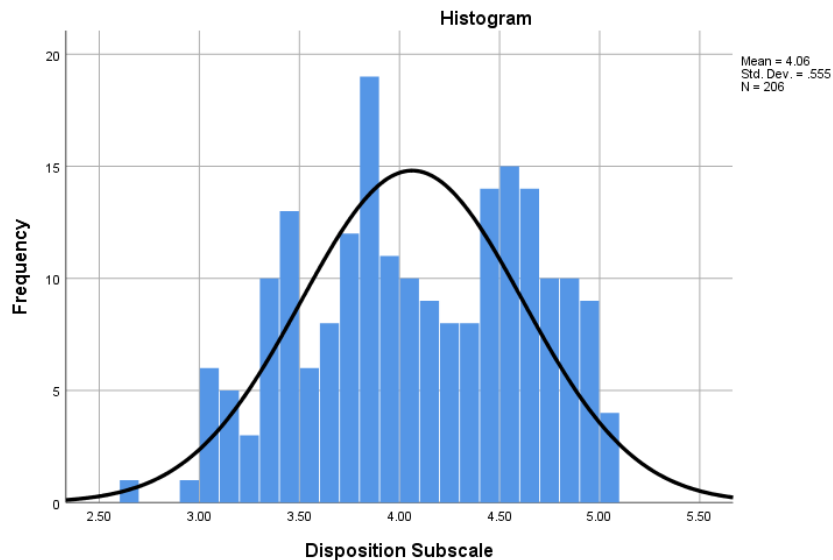


Figure 4. *Disposition Subscale Histogram*

Reviewing descriptive statistics confirms data are appropriate for analysis. The item correlation matrix (see Appendix C) identified the strength of the relationships between items. Correlations ranged from -.38 to .99. A majority of item correlations were significant and low-to-moderately correlated. A few items were not significantly correlated, were negatively correlated, or were highly correlated. Most notably, item 32 regarding conducting a pilot test was negatively correlated with a number of items (4, 7, 13, 25, 43, 48, 49, 50, 53, 56, 59, 60). Pair-wise correlations were also computed (see Table 12) and described the strength of the relationship between sub-scales. Subscale sum score correlations were high (.80 - .82) and significant at the .01 level.

Table 12
Subscale Correlations

		Knowledge	Skill	Disposition
Knowledge	Pearson	1.00	.80**	.80**
	Correlation			
	Sig (w-tailed)		< 0.01	< 0.01
	N	206	206	206
Skill	Pearson	.80**	1.00	.82**
	Correlation			
	Sig (w-tailed)	< 0.01		< 0.01
	N	206	206	206
Disposition	Pearson	.80**	.82**	1.00
	Correlation			
	Sig (w-tailed)	< 0.01	< 0.01	
	N	206	206	206

**Correlation is significant at .01

Components of Instructional Design Expertise

An important aim of this study to was to understand designers' perceived importance of the primary constructs (RQ4). The table below reports the extent to which instructional designers agree knowledge, skills, and dispositions are important components of IDE (see Table 13). Mean

scores for these items are as follows: 4.03 (knowledge), 4.28 (skills), and 4.19 (dispositions). Overall, 80-85% of designers agree or strongly agree, knowledge, skills, and dispositions are an important component of expertise with few to no designers disagreeing or strongly disagreeing. These findings are supported by notable statements from designers who participated in expert review or think-aloud sessions. Further elaboration of these findings below described the importance of these traits and the impact they have on designers' ability to execute an effective design process.

Beth, Tom, and James described how basic knowledge of ID models, processes, design, media, and technology are important/critical for ID work. James cited "Educational theories provide a structure through which design problems can be approached." Lindsey and Ann described how knowledge impacts the effectiveness of learning environments and designers' ability to solve ID problems. James further described how knowledge of technology tools aids the design process and may even act as solutions themselves.

Describing the importance of ID skills, a majority of designers cited skills as essential for building instruction or completing projects. Anne, Kiara, and Lindsey described how skills help a designer meet learners' needs, create successful learning outcomes, and find the best solution for instructional problems. Suzhen and Beth described skills in relation to a designers' value in helping a team or client. Suzhen explains, "An individual needs to have both the knowledge and skills related to instructional design and technology, as well as the soft skills or social skills in order to become a successful instructional designer. Why do they hire you as an instructional designer? Because you bring in a set of knowledge and skills that they don't have."

Tom described the importance of dispositions: "ID situations are often dynamic which makes it important to be willing to adapt to the changing situation." Kiara similarly considered this idea by describing how dispositions such as flexibility help a designer be methodical in the approach to design "in a manner that allow[ed] for flexibility and modifications at the right intervals and places." Ann added that dispositions are also important in helping designers "check [their] ego" when working with others. Beth and Kiara suggested dispositions are traits which distinguish designers who can bring passion and uniqueness to their work.

Table 13*Percent of Agreement for Primary Constructs*

	Frequency	Percent	Importance	Impact
<u>ID Knowledge</u>				
Strongly Agree	54	26.2	You can't be an expert without foundational knowledge (Lindsey).	It is essential in order to develop effective learning environments/ events (Ann)
Agree	110	53.4		
Neutral	37	18.0		
Disagree	5	2.4		
Strongly Disagree	0	0.0		
Total	206	100.0		
<u>ID Skills</u>				
Strongly Agree	92	44.7	Highly developed skills are an essential component of expertise (James).	Skills make instruction effective (Kiara) and help you find the best solution (Lindsey).
Agree	82	39.8		
Neutral	29	14.1		
Disagree	3	1.5		
Strongly Disagree	0	0.0		
Total	206	100.0		
<u>ID Dispositions</u>				
Strongly Agree	72	35.0	Being adaptable and open to new things is extraordinarily important when doing ID work (Ann).	Dispositions are the willingness that makes skills work (Tom).
Agree	102	49.5		
Neutral	28	13.6		
Disagree	3	1.5		
Strongly Disagree	0	0.0		
Strongly Agree	72	35.0		
Total	205	99.5		

In sum, over 200 designers, with a range of experience, agreed knowledge, skills, and dispositions are important components of IDE. Developing designers, who are currently students, articulated the importance of these traits and the impact they have on the effectiveness of the design process and solutions. While less experienced, their insights are consistent with their more expert counterparts. For example, although James rated his expertise lower than any of the other designers who participated in expert review or think-aloud sessions, his insights support both qualitative and quantitative findings. He summarized,

Once expertise is acquired, there will be an assumption of quality in the work that the IDer takes on, and the ID skills will make or break the execution of these projects. Also, having proper dispositions may be even more important than skills and knowledge during the learning process as an IDer gains expertise.

Quantitative results indicate strong agreement that knowledge, skills, and dispositions are important components of IDE. Qualitative themes corroborated these findings and provide a rich, nuanced understanding of their importance as designers illuminated an important relationship between these traits and effective ID work.

DISCUSSION

Expertise is a complex, multidimensional phenomena, but understanding and evaluating its development is an aim of all competitive organizations (Baker et al., 2015; Germain & Ruiz, 2008; Herling, 2000; Kuchinke, 1997). For decades, scholars have worked to understand instructional design expertise (Brown & Green, 2018; Ertmer & Stepich, 2005; Ge & Hardre 2010; Rowland, 1992). Themes from existing literature suggest experts have superior ID knowledge, skills, and dispositions compared to novices (Chartier, in press). Existing instructional design competency instruments identify traits designers perceive as important and are useful as tools for evaluating designers' development towards competency (Koszalka et al., 2013; Ritzhaupt et al., 2018). However, they may be limited in evaluating designers' development from competent to expert. An instrument capable of evaluating the full continuum of expertise and its development is needed.

Further, dispositions (e.g., adaptability, flexibility) are traits which distinguish expert from novice designers (Ashbaugh, 2013; Ertmer & Stepich, 2005; Hardre et al., 2005). However, this trait is not adequately captured in existing ID measures. A primary aim of this research was to accumulate evidence to support the conceptualization of IDE as “the integration of knowledge, skills, and dispositions to consistently execute a high-quality design process across a variety of ID settings” (Chartier, in press). To do so, the Instructional Design Dispositions and Expertise Index (IDDEI) was developed which evaluates the frequency with which designers endorse applying these traits in practice. The discussion below summarizes the instrument development process including item development, scale development, and scale validation. Implications and intended uses for this instrument are then discussed.

Item Development

The first phase of the instrument development process focused on generating items (Boateng et al., 2018). Principles of expert practice have been established and are associated with items in existing ID competency measures (Koszalka et al., 2013; York & Ertmer, 2011, 2016). These principles were used to generate item stems and were assigned to an appropriate construct (i.e., knowledge, skills, dispositions). One limitation of this study is the fact that only one

researcher participated in item generation, including initially assigning items to their respective constructs. To mitigate bias, examples from established measures were used to guide decision making. For example, in an exploratory factor analysis, Ritzhaupt et al., (2018) found online teaching/learning and ID models/principles strongly loaded onto the knowledge domain. Collaboration, communication, and problem-solving items loaded onto the skill domain. Similar items in the IDDEI were also assigned to these respective categories. To further manage this limitation, expert designers evaluated each item's goodness of fit within the assigned category. All three experts were unanimous in agreeing all items were assigned appropriately. To confirm these constructs and evaluate each item's goodness of fit, future research will focus on conducting tests of dimensionality (e.g., exploratory factor analysis, confirmatory factor analysis, item response theory).

Scale Development

The second phase focused on scale development, including conducting a judgmental review to pre-test items (Boateng et al., 2018; McCoach et al., 2013). For example, the expert review confirmed the constructs were adequately represented and the items were relevant. These findings contributed evidence of the validity based on test content (Bandalos, 2018). However, Beth highlights another challenge:

If the hope is to have a comprehensive list of all the things instructional designers do, I doubt we'll be able to get there. I'd say it's not possible to have a truly comprehensive list of all the things instructional designers need to know, feel, be able to do, etc.

Experts potentially possess additional traits not captured by this instrument. However, expertise researchers cite a measurement limitation when identifying a large range of expert traits because it becomes difficult to organize items into categories that lend meaningful analysis (Baker et al., 2015). Thus, this work focused on synthesizing characteristics previously identified by scholars who spent years working with experts (York & Ertmer 2011, 2016). The methods section described how these characteristics were organized into items representing three traits (i.e., knowledge, skills, dispositions). The expert review confirmed the instrument has adequate content coverage. Further, over 200 designers agreed these traits are important components of expertise. Thus, the instrument is appropriate for evaluating expertise, as it is currently understood. Future instrument development phases will focus on refining the instrument to create

the most parsimonious version possible. Exploring principles experts use in the implementation and evaluation of instructional design work would also be beneficial as there is a lack of coverage in these areas (see York & Ertmer, 2016).

Scale Evaluation

Given the formative nature of this research, scale evaluation sought to understand designers' perceptions of the instruments usability and evaluated the relationship between items and constructs. Findings from the think-aloud session described designers' interpretation, reaction, and justification for endorsing an item. These findings established evidence of construct validity and confirmed the items "tap into the intended cognitive processes" (Bandalos, 2018, p. 268). For example, designers were unanimous in agreeing they were able to remember and think about their ID experience while responding to the items. They could justify their rating choices and often provided relevant connections to their experience. These findings suggest the instrument is an adequate measure of what designers do in practice.

Results from item and subscale correlations described the relationship between items and subscales. Moderate, significant inter-item correlations suggest the instrument does not contain any redundant items. High, significant sub-scale correlations suggest the constructs represent expertise. As expertise cannot be directly evaluated, high correlations between subscales suggests the constructs represent an overarching latent trait (DeVellis, 2017). These findings contributed evidence of the internal structure of the instrument and suggest ID knowledge, skills, and dispositions are important constructs which can be used to evaluate expertise.

In sum, the instrument development process incorporated methods which lend evidence of validity. The table below is adapted from Bandalos (2018) and summarizes these methods. Findings suggest the IDDEI is an appropriate and effective measure of expertise. However, as Tom noted repeatedly in his review, "dispositions (attributes) are particularly difficult to distinguish from skills because they are best seen when demonstrated in practice." Future research conducting factor analysis and structural equation modeling will provide additional information about the internal structure of the instrument and provide more understanding of the interrelationship between constructs.

Table 14*Validity Evidence*

Evidence	Method	Validity
Test Content	Expert Review	Content
Response Processes	Think-Aloud	Construct
Internal Structure	Item and Subscale Correlations	Construct

Implications and Intended Uses

For many years, scholars have been grappling with how to best define instructional design expertise. Similarly, how expertise develops has been previously considered, yet recent works describe an ongoing need to better understand this phenomenon (Brown & Green, 2018; Slagter van Tryon et al., 2018). A lack of a clear definition limits our ability to evaluate expertise and its development. Findings from this instrument development research addressed this problem and have important implications for research, theory, and practice. These implications will be framed within a discussion of intended uses for the instrument.

First, the IDDEI could be used to conduct structural equation modeling. This research has gathered qualitative and quantitative evidence which supports the proposed definition of expertise. Instructional design knowledge, skills, and dispositions are highly correlated constructs which represent an overarching trait, expertise. These traits are also perceived by designers as important components of expertise. Evidence of validity discussed previously speaks to the truth value of these ideas conceptually, and demonstrates the instrument is capable of measuring these traits. These findings substantiate the model of expertise proposed previously (see Chartier, in press) and highlight affective (dispositions), cognitive (knowledge), and behavioral (skills) dimensions of expertise (see Figure 5). The instrument can be used to conduct structural equation modeling which would advance our understanding of the relationship between these constructs and the strength of predictive pathways. A model of expertise would have implications for theory development.

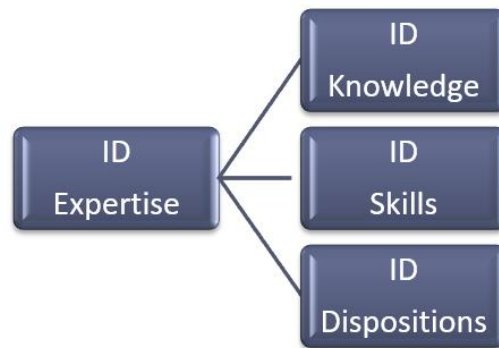


Figure 5. *Model of Instructional Design Expertise*

Instructional theories, such as systems theory, and ID models have been criticized for many years as being too linear, procedural, or generic and as an ineffective method for training designers because they do not adequately represent what experts do in practice (Silber, 2007; Zemke & Rossett, 2002). The IDDEI activates appropriate cognitive processes and is an appropriate measure for assessing what designers do in practice. Future work to evaluate how designers' knowledge, skills, and dispositions relate to the effective execution of common ID tasks (e.g., analysis, implementation, evaluation) would inform instructional design theory (see Reigeluth and Carr-Chellman, 2009). Further, dispositions could be explored to better understand designers' role in managing a complex design process and inform the development of ID models and processes which are more representative of expert practice.

Second, scores from this instrument could be used to refine definitions of expert, competent, and novice designers. One challenge in evaluating the development of IDE, including comparing differences between groups, is the lack of meaningful classifications. Years of experience is currently the most often used classification, however, it does not provide much information about designers' abilities (Chartier, in press). Item response theory could identify discriminating items and provide a better understanding of the characteristics most associated with expertise. Further, work to create cut scores for the instrument would provide a way to classify designers based on where their scores fall on certain traits. This understanding could inform new definitions of expert, competent, and novice designers and provide a more nuanced representation of designers' abilities. Clearer definitions of key terms would allow differences

between groups to be more meaningfully evaluated. As differences between designers with a range of expertise are explored, we will have a more complete understanding of expertise and the variables most associated with its development. Progress in these areas would also corroborate decades of ID research exploring differences between expert and novice designers (Ertmer & Stepich, 2005; Hardre et al., 2005; Perez & Emery 1995; Rowland, 1992).

Finally, this instrument is intended to be used as a tool to evaluate the full continuum of expertise, or the progression of instructional designers from novice to expert. Existing competency measures consider the development of designers or educational technologists from novice towards competent, but may not adequately assess development from competent to expert. Scholars have explored the roles of experience and guidance in the development of expertise in novices (Ertmer et al., 2009; Ge & Hardre, 2010; Hardre et al., 2006; Stepich et al., 2001; Verstegen et al., 2008), but additional research in this area evaluating how competent designers develop towards expertise would fill an important gap in the literature. This instrument could be used to evaluate the development of expertise, especially after designers begin full-time work in the field. Tracking the development of expertise across time and in a variety of settings (e.g., education, industry) would provide information about the rigor and effectiveness of programs and institutions. However, this instrument and corresponding scores should not be used punitively against individuals or institutions. Instead, it should be used as a tool for self-assessment or as a means of identifying strengths and opportunities in developing designers. Using scores in this manner would allow mentors to provide individualized guidance and tailored opportunities for growth. Exploring the relationship between expertise, years of experience, and guidance would further explain scores and provide a better understanding of how traits develop. Tracking the development of knowledge, skills, and dispositions and providing individualized feedback as designers gain experience could expedite the development of expertise.

Conclusion

This instrument development research has provided validity evidence to support a new conceptualization of instructional design expertise. Findings suggest IDE includes affective, cognitive, and behavioral dimensions, which are consistent with existing literature considering knowledge and skills as important components of expertise (Baker et al., 2015; Bransford, Brown, & Cocking, 2000; Chase & Simon, 1973; DeGroot, 1965; Dreyfus & Dreyfus, 1986;

Ericsson, 1993; Glasser & Chi, 1988). Dispositions such as adaptiveness are also essential when performing non-routine tasks (Hatano & Inagaki, 1984). As instructional design performance is not routine, dispositions are an important outcome of this study. The definition of instructional design expertise includes this important trait, is well situated in existing literature, and validated by over 200 designers. This research described the development of the Instructional Design Dispositions and Expertise Index (IDDEI) which extends existing measures by evaluating the frequency with which designers with a range of expertise (e.g., novice to expert) report applying knowledge, skills, and dispositions in practice. This research has also established evidence of validity based on test content, response processes, and internal structure (e.g., content and construct validity). Ongoing IDE work will contribute additional evidence of validity and provide a better understanding of this complex construct. A validated measure with meaningful scoring would create new avenues for instructors, mentors, and researchers across a variety of ID settings to “evaluate it when we see it.” Evaluating expertise, especially distinguishing aspects of experts’ superior performance, would provide a way to document effective, efficient, and high-quality ID work. Scaffolding designers’ performance improvement over time would expedite the development of expertise and contribute to the rigor of the field as designers are prepared to perform superiorly in professional roles.

REFERENCES

- Ashbaugh, M. L. (2013). Expert instructional designer voices: Leadership competencies critical to global practice and quality online learning designs. *Quarterly Review of Distance Education, 14*(2), 97–118
- Baker, J., Wattie, N., & Schorer, J. (2015). Defining expertise: A taxonomy for researchers in skill acquisition and expertise. In J. Baker & D. Farrow (Eds.), *Routledge handbook of sport expertise*. (pp. 145–155). Routledge/Taylor & Francis Group.
- Bandalos, D. L. (2018). *Measurement theory and applications for the social sciences*. New York: Guilford.
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). How experts differ from novices. In J.D. Bransford, A.L. Brown, & R.R. Cocking (Eds.), *How People Learn: Brain, Mind, Experience, and school* (pp. 31-50). National Academy Press.
- Brown, A. H., & Green, T. D. (2018). Beyond teaching instructional design models: Exploring the design process to advance professional development and expertise. *Journal of Computing in Higher Education, 30*(1), 176–186. <https://doi.org/10.1007/s12528-017-9164-y>
- Boateng, G. O., Neilands, T. B., Frongillo, E. A., Melgar-Quinonez, H. R., & Young, S. L. (2018). Best Practices for Developing and Validating Scales for Health, Social, and Behavioral Research: A Primer. *Frontiers in Public Health, 6*, 1-18. <https://doi.org/10.3389/fpubh.2018.00149>
- Charness, N., & Tuffiash, M. (2008). The Role of Expertise Research and Human Factors in Capturing, Explaining, and Producing Superior Performance. *Human Factors, 50*(3), 427–432. <https://doi.org/10.1518/001872008X312206>
- Chartier, K.J. (in press). Investigating Instructional Design Expertise: A 25-Year Review of Literature. *Performance Improvement Quarterly*.
- Chase, W. G., & Simon, H. A. (1973). Perception in chess. *Cognitive Psychology, 4*(1), 55–81. [https://doi.org/10.1016/0010-0285\(73\)90004-2](https://doi.org/10.1016/0010-0285(73)90004-2)
- Cross, Nigel (2018). Expertise in Professional Design. In: K. A. Ericsson, R. Hoffman, A. Kozbelt, A. M. Williams (Eds.), *Cambridge Handbook of Expertise and Expert Performance* (2nd ed., pp. 372–388). Cambridge University Press.

- DeVellis, R.F. (2017). *Scale development* (4th ed.). SAGE.
- de Groot, A. D. (1965). *Thought and Choice in Chess*. Amsterdam University Press. Retrieved from <http://ebookcentral.proquest.com/lib/purdue/detail.action?docID=437584>
- Dreyfus, H.L., Dreyfus, S.E., & Athanasiou, T. (1986). *Mind Over Machine: The Power of Human Intuition and Expertise in the Era of the Computer*. The Free Press.
- Ericsson, K. A., Krampe, R. T., & Tesch-Romer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363-406.
- Ericsson, K.A. (2003). Development of elite performance and deliberate practice: A update from the perspective of the expert performance approach. In J.L. Starks & K.A. Ericsson (Eds.), *Expert Performance in Sports: Advances in Research on Sport Expertise* (pp. 49-83). Human Kinetics.
- Ericsson, K.J. & Smith, J. (1993). Prospects and limits of the empirical study of expertise: An introduction. In K.A. Ericsson & J. Smith (Eds.), *Toward a General Theory of Expertise Prospects and Limits* (pp. 1-38). Cambridge University Press.
- Ertmer, P.A. & Stepich, D.A. (2005). Instructional design expertise: How will we know it when we see it? *Educational Technology*, 45(6), 38-43.
- Ertmer, P.A., Stepich, D.A., Flanagan, S., Kocaman-Karoglu, A., Reiner, C., Reyes, L., Santone, A.L., Ushigusa, S. (2009). Impact of guidance on the problem-solving efforts of instruction design novices. *Performance Improvement Quarterly*, 21(4), 117-132.
- Ertmer, P.A., Stepich, D.A., York, C.S., Stickman, A., Wu, Xuemei, Zurek, S., & Goktas, Y. (2008). How instructional design experts use knowledge and experience to solve ill-structured problems. *Performance Improvement Quarterly*, 21(1), 17-42.
- Ge, X., & Hardre, P.L. (2010). Self-processes and learning environment as influences in the development of expertise in instructional design. *Learning Environments Research*, 13, 23–41. <https://doi.org/10.1007/s10984-009-9064-9>
- Germain, M.-L., & Ruiz, C. E. (2008, Feb). Defining Expertise Across Nations: Myth or Reality of a Global Definition. *Academy of Human Resource Development International Research Conference in the Americas*. Paper presented at 2008 Academy of Human Resource Development International Research Conference, Panama City, FL.
- Glaser, R., & Chi, M.T.H. (1988). Overview. In M.T.H. Chi, R. Glaser, & M.J. Farr (Eds.), *The Nature of Expertise* (pp. xv-xxxvi).

- Hardre, P.L., Ge, X., & Thomas, M.K. (2005). Toward a model of development for instructional design expertise. *Educational Technology*, 45(1), 53-57.
- Hatano, G., & Inagaki, K. (1984). *Two Courses of Expertise*. Hokkaido University Collection of Scholarly and Academic Papers.
- Hatano, G., & Oura, Y. (2003). Commentary: Reconceptualizing School Learning Using Insight from Expertise Research. *Educational Researcher*, 32(8), 26–29.
<https://doi.org/10.3102/0013189X032008026>
- Herling, R. W. (2000). Operational Definitions of Expertise and Competence. *Advances in Developing Human Resources*, 2(1), 8–21. <https://doi.org/10.1177/152342230000200103>
- Hicks, F. D., Merritt, S. L., & Elstein, A. S. (2003). Critical Thinking and Clinical Decision Making in Critical Care Nursing: A Pilot Study. *Heart & Lung*, 32(3), 169–180.
[https://doi.org/10.1016/S0147-9563\(03\)00038-4](https://doi.org/10.1016/S0147-9563(03)00038-4)
- Holyoak, K.J. (1991) Symbolic connectionism: Toward third-generation theories of expertise. In K.A. Ericsson & J. Smith (Eds.), *Toward a General Theory of Expertise Prospects and Limits* (pp. 301-335). Cambridge University Press.
- Iqdami, M., & Branch, R. (2016). Examining Multimedia Competencies for Educational Technologists in Higher Education. *Tech Trends*, 60(4), 365–373.
<https://doi.org/10.1007/s11528-016-0064-1>
- Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a Definition of Mixed Methods Research. *Journal of Mixed Methods Research*, 1(2), 112–133.
<https://doi.org/10.1177/1558689806298224>
- Katz, L.G. & Rath, J.D. (1985). Dispositions as goals for teacher education. *Teaching & Teacher Education*, 1(4), 301-307.
- Katz, L. G. (1993). Dispositions as educational goals. *ERIC Digest*, 1-5.
- King, G., Bartlett, D. J., Currie, M., Gilpin, M., Baxter, D., Willoughby, C., Tucker, M.A., & Strachan, D. (2008). Measuring the expertise of pediatric rehabilitation therapists. *International Journal of Disability, Development and Education*, 55(1), 5–26.
<https://doi.org/10.1080/10349120701654522>
- Kirschner, P., Carr, C., Van Merriënboer, J., & Sloep, P. (2002). How expert designers design. *Performance Improvement Quarterly*, 15(4), 86–104. <https://doi.org/10.1111/j.1937-8327.2002.tb00267.x>

- Koh, J. H. L., Chai, C. S., Hong, H.-Y., & Tsai, C.-C. (2015). A survey to examine teachers' perceptions of design dispositions, lesson design practices, and their relationships with technological pedagogical content knowledge (TPACK). *Asia-Pacific Journal of Teacher Education*, 43(5), 378–391. <https://doi.org/10.1080/1359866X.2014.941280>
- Koszalka, T. A., Russ-Eft, D.F., Reiser, R.A., Canela, F.A., Grabowski, B.L., Wallington, C.J. (2013). *Instructional Designer Competencies: The Standards* (4th ed.). Information Age Publishing, Inc.
- Kuchinke, K. P. (1997). Employee Expertise: The Status of the Theory and the Literature. *Performance Improvement Quarterly*, 10(4), 72–86. <https://doi.org/10.1111/j.1937-8327.1997.tb00068.x>
- Larson, M. B., & Lockee, B. B. 1. (2005). Workplace Cultures: Preparing Instructional Designers for Varied Career Environments. *Educational Media & Technology Yearbook*, 30, 37–51.
- Lawson, B., & Dorst, K. (2009). *Design Expertise*. Elsevier Ltd.
- LeMaistre, C. (1998). What is an expert instructional designer? Evidence of expert performance during formative evaluation. *Educational Technology Research and Development*, 46(3), 21–36. <https://doi.org/10.1007/BF02299759>
- McCoach, D.B., Gable, R.K., & Madura, J.P. (2013). *Instrument development in the affective Domain: School and corporate applications* (3rd ed.). Springer.
- Moreillon, J. & Fontichiaro, K. (2008). Teaching and assessing the dispositions: A garden of opportunity. *Knowledge Quest, Evidence-Based Practice*, 37(2), 64-67.
- Parhar, M., & Mishra, S. (2000). Competencies for Web-based Instructional Designers. *Indian Journal of Open Learning*, 9(3), 415–422.
- Park, J.-Y., & Luo, H. (2017). Refining a Competency Model for Instructional Designers in the Context of Online Higher Education. *International Education Studies*, 10(9), 87–98.
- Perez, R.S., & Emery, C.D. (1995). Designer thinking: How novices and experts think about instructional design. *Performance Improvement Quarterly*, 8(3), 80-95.
- Quast, C. (2018). Towards a Balanced Account of Expertise. *Social Epistemology*, 32(6), 397–419. <https://doi.org/10.1080/02691728.2018.1546349>

- Reigeluth, C.M., & Carr-Chellman, A.A. (2009b). Understanding instructional theory. In C. M. Reigeluth & A. A. Carr-Chellman (Eds.), *Instructional-Design Theories and Models: Building a Common Knowledge Base* (vol. 3., pp.3-26). Routledge.
- Reiser, R. A., (2001). What field did you say you were in? Defining and naming our field. In R.A. Reiser & J.J. Dempsey (Eds.), *Trends and Issues in Instructional Design and Technology* (3rd ed., pp. 1-7). Pearson Education Inc.
- Ritzhaupt, A., & Martin, F. (2014). Development and validation of the educational technologist multimedia competency survey. *Educational Technology Research & Development*, 62(1), 13–33. <https://doi.org/10.1007/s11423-013-9325-2>
- Ritzhaupt, A.D., Martin, F., Pastore, R., Kang, Y. (2018). Development and validation of the educational technologist competencies survey (ETCS): Knowledge skills, and abilities. *Journal of Computing in Higher Education*, 30(1), 3-33.
- Rowland, G. (1992). What do instructional designers actually do? An initial investigation of expert practice. *Performance Improvement Quarterly*, 5(2), 65-86.
- Rowley, K. (2005). Inquiry into the practices of expert courseware designers: A pragmatic method for the design of effective instructional systems. *Journal of Educational Computing Research*, 33(4), 419–450. <https://doi.org/10.2190/9MLR-ARTQ-BD1P-KETN>
- Schussler, D. L. (2006). Defining Dispositions: Wading Through Murky Waters. *Teacher Educator*, 41(4), 251–268. <https://doi.org/10.1080/08878730609555387>
- Seaman, J. E., Allen, I. E., & Seaman, J. (2018). *Grade increase: Tracking distance education in the United States*. Babson Survey Research Group.
- Silber, K.H. (2007). A principle-based model of instructional design: A new way of thinking about and teaching ID. *Educational Technology*, 47(5), 5-19.
- Slagter van Tryon, P. J., McDonald, J., & Hirumi, A. (2018). Preparing the next generation of instructional designers: A cross-institution faculty collaboration. *Journal of Computing in Higher Education*, 30(1), 125–153. <https://doi.org/10.1007/s12528-018-9167-3>
- Starkes, J.L., & Ericsson, K.A. (2003). *Expert Performance in Sports: Advances in Research on Sport Expertise*. Human Kinetics.
- Stepich, D.A., & Ertmer, P.A. (2009). Teaching instructional design expertise: Strategies to support students’ problem-finding skills. *Teaching, Instruction, Cognition, and Learning*, 7, 147-170.

- Stepich, D. A., Ertmer, P. A., & Lane, M. M. (2001). Problem-solving in a case-based course: Strategies for facilitating coached expertise. *Educational Technology Research and Development*, 49(3), 53–67. <https://doi.org/10.1007/BF02504915>
- Sugar, W., Hoard, B., Brown, A., & Daniels, L. (2012). Identifying Multimedia Production Competencies and Skills of Instructional Design and Technology Professionals: An Analysis of Recent Job Postings. *Journal of Educational Technology Systems*, 40(3), 227–249. <https://doi.org/10.2190/ET.40.3.b>
- Swanson, R.A., (1994). *Analysis for improving performance: Tools for diagnosing organizations and documenting workplace expertise*. Berrett-Koehler Publishers, Inc.
- Tedesqui, R. A. B., & Young, B. W. (2018). Comparing the contribution of conscientiousness, self-control, and grit to key criteria of sport expertise development. *Psychology of Sport and Exercise*, 34, 110–118. <https://doi.org/10.1016/j.psychsport.2017.10.002>
- Verstegen, D., Barnard, B., & Pilot, A. (2008). Instructional Design by Novice Designers: Two Empirical Studies. *Journal of Interactive Learning Research*, 19(2), 351-383.
- Yenice, N. (2012). A review on learning styles and critically thinking disposition of pre-service science teachers in terms of miscellaneous variables. *Asia-Pacific Forum on Science Learning and Teaching*, 13(2), 1-31.
- York, C.S., & Ertmer, P.A. (2011). Towards an understanding of instructional design heuristics: An exploratory Delphi study. *Educational Technology, Research, and Development*, 59, 841-863.
- York, C.S., & Ertmer, P.A. (2016). Examining instructional design principles applied by experienced designers in practice. *Performance Improvement Quarterly*, 29(2), 169-192. <http://doi:10.1002/piq.21220>
- Zemke, R., & Rossett, A. (2002). A hard look at ISD. *Training*, 39(2), 26-34.

APPENNDIX A INSTRUMENT VERSIONING

Table 17 Original & Revised Items

Original Item	Revised Item
1. I am aware of situations where instruction is an appropriate solution to a problem.	1. I identify situations in which an instructional solution(s) may be appropriate.
2. I am aware that needs analysis (gap analysis, front end analysis) is the foundation for evaluation.	2. I am aware that needs analysis (gap analysis, front end analysis) is the foundation for design, development, and evaluation decisions.
3. I am aware of ID tasks that need to be completed at the front end to ensure a successful end result.	3. I consider ID tasks which need to be completed at the front end to ensure a successful end result.
4. I am aware of the need to design instruction that targets learners existing knowledge and skills.	4. I am aware of the need to design instruction that targets learners' existing knowledge and skills.
5. I am aware of learning goals/performance outcomes.	5. I am mindful of learning goals/performance outcomes.
6. I am aware of how learning is linked with organizational goals/outcomes.	6. I consider how learning is linked with organizational goals/outcomes.
7. I am aware of project constraints.	7. I am aware of project constraints.
8. I am aware of the interrelated nature of instructional design tasks (e.g., needs drive decision making, design continues through implementation).	8. I think about the interrelated nature of instructional design tasks (e.g., needs inform decision making, design continues through implementation).
9. I am aware of formative and summative evaluation procedures.	9. I consider evaluation procedures (e.g., formative and summative).
10. I am aware that design is a people process.	10. I seek up to date information to inform my decisions (e.g., read ID literature, poll ID communities, etc.)
11. I am aware of learning theories.	11. I reflect on learning theories and principles.
12. I am aware of ID models, processes, and theories.	12. I think about ID models and processes.
13. I am aware of strategies that enhance learning (e.g., active learning strategies, learner choice, motivation, scaffolding, etc.).	13. I consider strategies that enhance learning (e.g., active learning strategies, learner choice, motivation, scaffolding, etc.).
14. I am aware of the impact technology has on learning.	14. I am mindful of the impact technology has on learning.
15. I am aware of principles for online teaching and learning.	15. I think about principles of online teaching and learning (e.g., multimedia)

16. I have organized knowledge into meaningful patterns, or mental frameworks (e.g., ADDIE), which allow me to quickly retrieve relevant concepts.	16. I can quickly retrieve relevant concepts because my ID knowledge is organized into meaningful patterns or mental frameworks (e.g., ADDIE).
17. I think critically about abstract, or ill-structured, problems.	17. I think deeply and critically about abstract, or ill-structured, problems.
18. I have developed rules that guide my ID work.	18. I have developed rules (e.g., guiding principles, informed practices) that guide my work.
19. I may use rules subconsciously, but I could relate them to ID concepts if asked.	19. I may use rules subconsciously, but I could relate them to ID concepts if asked.
20. I am reflective throughout the design process.	20. I reflect on my ID experience, or the experiences of others, throughout the design process.
21. I identify the main ID problem and relevant sub-problems.	21. I identify the main ID problem and relevant sub-problems.
22. I invest as much time as possible becoming familiar with my learners/audience.	22. I invest as much time as possible becoming familiar with my learners/audience.
23. I create goals which specify the criteria for success.	23. I create goals which specify the criteria for success.
24. I design with the end in mind as I align goals and strategies with desired outcomes.	24. I manage the scope of a project.
25. I make decisions based on learners needs and existing knowledge/skills.	25. I make decisions based on learner's needs and existing knowledge/skills.
26. I make decisions based on how learning will be applied in the performance context.	26. I make decisions based on how learning will be applied in the performance context.
27. I manage project constraints.	27. I manage project constraints.
28. I generate multiple solutions for a given problem.	28. I generate multiple, tentative solutions for a problem.
29. I collaborate with all stakeholders.	29. I collaborate with others.
30. I create prototypes to effectively communicate and test ideas.	30. I create prototypes to effectively communicate and test ideas.
31. I have subject matter experts and non-subject matter experts review the final product.	31. I collaborate with others (e.g., subject matter experts, non-subject matter experts) to review materials before implementing or facilitating instruction.
32. I conduct a pilot test.	32. I conduct a pilot test.
33. I am an active listener.	33. I am an active listener.

34. I verify given information and ask relevant follow up questions to prevent miscommunication.	34. I verify and seek additional information to prevent miscommunication.
35. I negotiate the scope and create a statement of work with the client before beginning a project.	35. I create a shared understanding of project goals and deliverables, or a statement of work, before beginning a project.
36. I build trust with the client.	36. I build trust with others.
37. I manage others expectations/requests by creating a shared understanding of project goals and deliverables.	37. I manage others' expectations/requests.
38. I identify points of contact and the appropriate chain of command for getting feedback, approvals, etc.	38. I clarify roles, identify points of contact, and understand the chain of command before beginning a project.
39. I facilitate client and stakeholder meetings at key decision points.	39. I facilitate communication at key decision points.
40. I involve the right people at the right time.	40. I create a plan for implementing instruction/training.
41. I am aware of relevant knowledge and experience which I use as a starting point for new projects.	41. I am aware of relevant knowledge and experience which I use as a starting point for new projects.
42. I flexibly apply ID knowledge based on the needs of each project.	42. I flexibly apply ID knowledge based on the needs of each project.
43. I intentionally draw upon previous experience or examples from others to help me solve a novel or complex problem.	43. I intentionally draw upon previous experience or examples from others to help me solve a new or complex problem.
44. I am aware of and sensitive to the needs of learners.	44. I am aware of and sensitive to the needs of learners.
45. I am aware of and sensitive to the culture and context of the client.	45. I am aware of and sensitive to the culture and context of others.
46. I am flexible in negotiating the scope and timeline with a client who may believe it is easier to move from conceptualization to implementation that it actually is.	46. I am flexible in negotiating the scope and timeline of a project as needed.
47. I am intentional about seeking information at different points as a client won't always tell me all I need to know about a problem during one session.	47. I am intentional about seeking information at different points in the design process.
48. I adapt ID terminology into language my client can understand.	48. I adapt ID terminology into language others can understand.
49. I am open and honest with the client.	49. I am open and honest with others.
50. I am intentional and make strategic design decisions.	50. I make strategic design decisions.

51. I am intentional in aligning goals and strategies with desired outcomes.	51. I am intentional in aligning goals and strategies with desired outcomes.
52. I adapt decisions about technology integration based on the unique needs of each project.	52. I adapt decisions about technology integration based on the unique needs of each project.
53. I am aware you often don't get to do the best ID you want to because of constraints, such as resources, time, and budget.	53. I am aware constraints (e.g., resources, time, budget) may impact the quality of ID processes and products
54. I am open to diverse views or solutions.	54. I am open to the diverse views of others.
55. I am open to new information.	55. I am open to new information which may impact my ideas or solutions.
56. I adapt ideas, designs, and solutions based on feedback from others (e.g., subject-matter experts, clients, etc.).	56. I adapt ideas, designs, and solutions based on feedback from others (e.g., subject-matter experts, clients, etc.).
57. I am aware of my limitations as a designer.	57. I am aware of my limitations as a designer.
58. I adapt my approach to each unique design situation.	58. I adapt my approach to each unique design situation.
59. I am aware of my role in the ID process.	59. I am aware of my role in the instructional design process.
60. I work to create a quality product even if some of my work/intentions aren't represented in the final deliverable.	60. I work to create a quality product even if some of my intentions aren't represented in the final deliverable.

APPENDIX B DATA COLLECTION PROTOCOLS

Expert Review (Pre-Survey)

The following questions will evaluate the definitions and constructs used to inform the creation of the Instructional Design Dispositions and Expertise Index (IDDEI). Respond as thoroughly as possible citing examples, references, or resources as necessary. Please respond to the first question before previewing or moving forward with subsequent questions. This survey should take approximately 30 minutes. Thank you.

1. List and describe the essential components of instructional design (ID) expertise. Please identify main components by listing a key word which may represent a variety of important characteristics. Then describe why you believe this keyword (i.e., trait) is an essential component of expertise.

As you begin reflecting on this question you may think of multiple characteristics an expert designer might demonstrate in practice. Synthesize these ideas into overarching traits to identify a main component of expertise. Then, describe why this trait is important.

You may write, draw, or model your ideas below as desired.

A recent review of ID expertise literature proposed the following definition:

Instructional design expertise involves the integration of knowledge, skills, and dispositions to consistently execute a high-quality design process across a variety of settings.

Question	Response
2. How does this definition relate to/extend existing definitions or conceptualizations of ID expertise?	
3. Do you agree the three traits (i.e., knowledge, skills, and disposition) identified in this definition are each an important component of ID expertise?	Explain your response in the open text area here. Then review the definitions and rate your agreement below.
a) ID Knowledge: an awareness of learning theories, ID models and processes, ID theories, and emerging educational technologies.	<p>ID Knowledge is an important component of ID expertise.</p> <p><input type="checkbox"/> Strongly Agree</p> <p><input type="checkbox"/> Agree</p> <p><input type="checkbox"/> Neutral</p> <p><input type="checkbox"/> Disagree</p> <p><input type="checkbox"/> Strongly Disagree</p>
b) ID Skills: the ability to complete ID tasks with a degree of quality (e.g., effectiveness and efficiency).	<p>ID Skills are an important component of ID expertise.</p> <p><input type="checkbox"/> Strongly Agree</p> <p><input type="checkbox"/> Agree</p> <p><input type="checkbox"/> Neutral</p> <p><input type="checkbox"/> Disagree</p> <p><input type="checkbox"/> Strongly Disagree</p>
c) ID Dispositions: attributes (e.g., adaptability, flexibility) demonstrated in practice describing how designers complete ID tasks with a degree of quality.	<p>ID Dispositions are an important component of ID expertise.</p> <p><input type="checkbox"/> Strongly Agree</p> <p><input type="checkbox"/> Agree</p> <p><input type="checkbox"/> Neutral</p> <p><input type="checkbox"/> Disagree</p> <p><input type="checkbox"/> Strongly Disagree</p>

Key terms are provided in the glossary below. As you respond to the final question, feel free to use the open text box or track changes to provide feedback.

Glossary

Instructional design expertise involves the integration of knowledge, skills, and dispositions to consistently execute a high-quality design process across a variety of settings.*

Instructional design knowledge is an awareness of learning theories, ID models and processes, ID theories, and emerging educational technologies.

Instructional design skills are the ability to complete ID tasks with a degree of quality (e.g., effectiveness and efficiency).

Instructional design tasks are work done by an instructional designer including analysis, design, development, implementation, and evaluation (i.e., ADDIE) tasks, as well as tasks involving managing the design processes and relationships with others.

Instructional design dispositions are attributes demonstrated in practice describing how designers complete ID tasks with a degree of quality.

* This definition assumes experience is a factor associated with the development of expertise, not a component constituting expertise.

Question	Response
4. Why is ID knowledge an important component of ID expertise?	
5. Why are ID skills an important component of ID expertise?	
6. Why are ID dispositions an important component of ID expertise?	
7. Do these three constructs (i.e., knowledge, skills, dispositions) adequately represent ID expertise?	
8. Would you agree expert instructional designers have superior knowledge, skills, and dispositions compared to less experienced designers? Provide relevant examples.	
9. Would superior ID knowledge, skills, and dispositions promote quality (e.g., effective, efficient) design work? Provide relevant examples.	
10. Please share any final thoughts, recommendations, or suggested revisions regarding the constructs or definitions in the glossary.	

Expert Review: Full Item Review Protocol

This review focuses on evaluating each item of the Instructional Design Dispositions and Expertise Index to determine goodness of fit within each category and the breadth of content coverage. The glossary is provided below if you would like to review key terms before beginning. This review should take approximately 60 minutes. Thank you.

Glossary

Instructional design (ID) expertise involves the integration of knowledge, skills, and dispositions to consistently execute a high-quality design process across a variety of settings.*

Instructional design knowledge is an awareness of learning theories, ID models and processes, ID theories, and emerging educational technologies.

Instructional design skills are the ability to complete ID tasks with a degree of quality (e.g., effectiveness and efficiency).

Instructional design tasks are work done by an instructional designer including analysis, design, development, implementation, and evaluation (i.e., ADDIE) tasks, as well as tasks involving managing the design processes and relationships with others.

Instructional design dispositions are attributes (e.g., awareness, flexibility, intentionality) demonstrated in practice describing how designers complete ID tasks with a degree of quality.

* This definition assumes experience is a factor associated with the development of expertise, not a component constituting expertise.

Think-Aloud: Pre-Survey

Before our think-aloud session, please take a few minutes to respond to these questions which will help us create an anonymous designer profile for you in our write up. Thank you.

Question	Response
1. Preferred gender identifier.	
2. Preferred ethnic identifier.	
3. Describe your educational background including degree(s) earned and/or in process.	
4. Describe your instructional design experience including number of years, type of experience, etc.	
5. Describe additional related experience (e.g., teaching, training, etc.).	

Instructional design expertise involves the integration of knowledge, skills, and dispositions to consistently execute a high-quality design process across a variety of settings.

<p>6. Do you agree each of the traits identified in this definition (i.e., knowledge, skills, and dispositions) are an important component of ID expertise?</p>	<p><u>Explain your response in this open text area.</u></p> <p><u>Then review the definitions and rate your agreement.</u></p> <p>ID Knowledge is an important component of ID expertise.</p> <div> <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Neutral <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree </div> <p>ID Skills are an important component of ID expertise.</p> <div> <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Neutral <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree </div> <p>ID Dispositions: are attributes (e.g., adaptability, flexibility) demonstrated in practice describing how designers complete ID tasks with a degree of quality.</p> <div> <input type="checkbox"/> Strongly Agree <input type="checkbox"/> Agree <input type="checkbox"/> Neutral <input type="checkbox"/> Disagree <input type="checkbox"/> Strongly Disagree </div>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Instructional Design Knowledge

Definition: *ID knowledge is an awareness of learning theories, ID models and processes, ID theories, and emerging educational technologies.*

Read the ID knowledge items below. Use the check the box to answer the following questions:

- Does the item fit in its respective category?
- Is the item relevant to the construct/category?
- Is the item clearly worded and unambiguous?
- Is the item appropriate for a range of instructional designers (e.g., novice, competent, expert)?
- Is the item appropriate for instructional designers working in a variety of contexts (e.g., education, industry?)

Provide any feedback or suggested revisions in the final column. Feel free to add comments or use track changes as desired.

IDDEI Item	Category Fit		Relevant to Construct		Clearly Worded		Range of Designers		Range of ID Context		Feedback & Revisions
When engaged in instructional design work...											
1. I am aware of situations where instruction is an appropriate solution to a problem.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
2. I am aware that needs analysis (gap analysis, front end analysis) is the foundation for evaluation.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
3. I am aware of ID tasks that need to be completed at the front end to ensure a successful end result.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

4. I am aware of the need to design instruction that targets learners existing knowledge and skills.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
5. I am aware of learning goals/performance outcomes.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
6. I am aware of how learning is linked with organizational goals/outcomes.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
7. I am aware of project constraints.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
8. I am aware of the interrelated nature of instructional design tasks (e.g., needs drive decision making, design continues through implementation).	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
9. I am aware of formative and summative evaluation procedures.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
10. I am aware that design is a people process.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
11. I am aware of learning theories.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
12. I am aware of ID models, processes, and theories.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

13. I am aware of strategies that enhance learning (e.g., active learning strategies, learner choice, motivation, scaffolding, etc.).	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
14. I am aware of the impact technology has on learning.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
15. I am aware of principles for online teaching and learning.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
16. I have organized knowledge into meaningful patterns, or mental frameworks (e.g., ADDIE), which allow me to quickly retrieve relevant concepts.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
17. I think critically about abstract, or ill-structured, problems.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
18. I have developed rules that guide my work.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
19. I may use rules subconsciously, but I could relate them to ID concepts if asked.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
20. I am reflective throughout the design process.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

ID Knowledge Reflection

1. Are there any knowledge items missing that should be added?
2. Are there any redundant items that could be deleted?

Instructional Design Skills

Definition: *ID skills are the ability to complete ID tasks with a degree of quality (e.g., effectiveness and efficiency).*

Read the ID skill items below. Use the check the box to answer the following questions:

- Does the item fit in its respective category (e.g., category fit)?
- Is the item relevant to the construct/category?
- Is the item clearly worded and unambiguous?
- Is the item appropriate for a range of instructional designers (e.g., novice, competent, expert)?
- Is the item appropriate for instructional designers working in a variety of contexts (e.g., education, industry?)

Provide any feedback or suggested revisions in the final column. Feel free to add comments or use track changes as desired.

IDDEI Item	Category Fit		Relevant to Construct		Clearly Worded		Range of Designers		Range of ID Context		Feedback & Revisions
When engaged in instructional design work...											
21. I identify the main ID problem and relevant sub-problems.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
22. I invest as much time as possible becoming familiar with my learners/audience.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
23. I create goals which specify the criteria for success.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
24. I design with the end in mind as I align goals and strategies with desired outcomes.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
25. I make decisions based on learners needs and existing knowledge/skills.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

26. I make decisions based on how learning will be applied in the performance context.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
27. I manage project constraints.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
28. I generate multiple solutions for a given problem.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
29. I collaborate with all stakeholders.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
30. I create prototypes to effectively communicate and test ideas.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
31. I have subject matter experts and non-subject matter experts review the final product.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
32. I conduct a pilot test.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
33. I am an active listener.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
34. I verify given information and ask relevant follow up questions to prevent miscommunication.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
35. I negotiate the scope and create a statement of work with the client before beginning a project.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

36. I build trust with the client.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
37. I manage others' expectations/requests by creating a shared understanding of project goals and deliverables.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
38. I identify points of contact and the appropriate chain of command for getting feedback, approvals, etc.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
39. I facilitate client and stakeholder meetings at key decision points.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
40. I involve the right people at the right time.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

ID Skills Reflection

3. Are there any skill items missing that should be added?

4. Are there any redundant items that could be deleted?

Instructional Design Dispositions

Definition: *Instructional design dispositions are attributes (e.g., awareness, flexibility, intentionality) demonstrated in practice describing how designers complete ID tasks with a degree of quality.*

Read the ID disposition items below. Use the check the box to answer the following questions:

- Does the item fit in its respective category (e.g., category fit)?
- Is the item relevant to the construct/category?
- Is the item clearly worded and unambiguous?
- Is the item appropriate for a range of instructional designers (e.g., novice, competent, expert)?
- Is the item appropriate for instructional designers working in a variety of contexts (e.g., education, industry?)

Provide any feedback or suggested revisions in the final column. Feel free to add comments or use track changes as desired.

IDDEI Item	Category Fit		Relevant to Construct		Clearly Worded		Range of Designers		Range of ID Contexts		Feedback & Revisions
When engaged in instructional design work...											
41. I am aware of relevant knowledge and experience which I use as a starting point for new projects.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
42. I flexibly apply ID knowledge based on the needs of each project.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
43. I intentionally draw upon previous experience, or examples from others, to help me solve a novel or complex problem.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

44. I am aware of and sensitive to the needs of learners.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
45. I am aware of and sensitive to the culture and context of the client.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
46. I am flexible in negotiating scope and timeline with a client who may believe it is easier to move from conceptualization to implementation that it actually is.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
47. I am intentional about seeking information at different points as a client won't always tell me all I need to know about a problem during one session.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
48. I adapt ID terminology into language my client can understand.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
49. I am open and honest with the client.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
50. I am intentional and make strategic design decisions.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

51. I am intentional and align goals and strategies with desired outcomes.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
52. I adapt decisions about technology integration based on the unique needs of each project.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
53. I am aware you often don't get to do the best ID you want to because of constraints, such as resources, time, and budget.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
54. I am open to diverse views or solutions.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
55. I am open to new information.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
56. I adapt ideas, designs, and solutions based on feedback from others (e.g., subject-matter experts, clients, etc.).	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
57. I am aware of my limitations as a designer.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
58. I adapt my approach to each unique design situation.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
59. I am aware of my role in the instructional design process.	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	
60. I work to create a quality product even if some of	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>	

my work/intentions aren't represented in the final deliverable.											
-----------------------------------------------------------------------------	--	--	--	--	--	--	--	--	--	--	--

ID Dispositions Reflection

5. Are there any disposition items missing that should be added?
6. Are there any redundant items that could be deleted?

Final Reflection

Review the instrument holistically thinking about content coverage.

7. Are there any constructs or items missing that should be added to more adequately represent ID expertise?
8. Are there any redundant items that could be deleted to ensure a more parsimonious instrument?
9. Provide any final thoughts or comments about the instrument.

Think-Aloud: Pre-Survey

Before our think-aloud session, please take a few minutes to respond to these questions which will help us create an anonymous designer profile for you in our write up. Thank you.

Question	Response
7. Preferred gender identifier.	
8. Preferred ethnic identifier.	
9. Describe your educational background including degree(s) earned and/or in process.	
10. Describe your instructional design experience including number of years, type of experience, etc.	
11. Describe additional related experience (e.g., teaching, training, etc.).	

A review of instructional design (ID) expertise literature proposed the following definition:

Instructional design expertise involves the integration of knowledge, skills, and dispositions to consistently execute a high-quality design process across a variety of settings.

12. Do you agree each of the traits identified in this definition (i.e., knowledge, skills, and dispositions) are an important component of ID expertise?	<u>Explain your response in this open text area.</u>
-----------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------

<p>d) ID Knowledge: an awareness of learning theories, ID models and processes, ID theories, and emerging educational technologies.</p> <p>e) ID Skills: the ability to complete ID tasks with a degree of quality (e.g., effectiveness and efficiency).</p> <p>f) ID Dispositions: are attributes (e.g., adaptability, flexibility) demonstrated in practice describing how designers complete ID tasks with a degree of quality.</p>	<p><u><i>Then review the definitions and rate your agreement.</i></u></p> <p>ID Knowledge is an important component of ID expertise.</p> <p><input type="checkbox"/> Strongly Agree</p> <p><input type="checkbox"/> Agree</p> <p><input type="checkbox"/> Neutral</p> <p><input type="checkbox"/> Disagree</p> <p><input type="checkbox"/> Strongly Disagree</p> <p>ID Skills are an important component of ID expertise.</p> <p><input type="checkbox"/> Strongly Agree</p> <p><input type="checkbox"/> Agree</p> <p><input type="checkbox"/> Neutral</p> <p><input type="checkbox"/> Disagree</p> <p><input type="checkbox"/> Strongly Disagree</p> <p>ID Dispositions are an important component of ID expertise.</p> <p><input type="checkbox"/> Strongly Agree</p> <p><input type="checkbox"/> Agree</p> <p><input type="checkbox"/> Neutral</p> <p><input type="checkbox"/> Disagree</p> <p><input type="checkbox"/> Strongly Disagree</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Designer Think-Aloud: Preface

The purpose of the Instructional Design Dispositions and Expertise Index is to evaluate how frequently designers apply knowledge, skills, and dispositions in practice. This think-aloud session is designed to capture your experience with items which consider a wide range of ID abilities (e.g., novice, competent, expert). Please respond as accurately as possible and share your thoughts and feedback aloud as you progress.

Key terms are defined as follows:

Instructional design (ID) knowledge is an awareness of learning theories, ID models and processes, ID theories, and emerging educational technologies.

Instructional design skills are the ability to complete ID tasks (e.g., analysis, design, management) with a degree of quality (e.g., effectiveness and efficiency).

Instructional design dispositions are attributes (e.g., awareness, adaptability, flexibility) demonstrated in practice describing how designers complete ID tasks with a degree of quality.

Instructional design expertise integrates knowledge, skills, and dispositions to consistently execute a high-quality design process across a variety of ID settings.

As you begin, please start by reading the question aloud. Then voice your thoughts as you experience the items.

These questions may guide you as you get started:

- Is the item clear and easy to understand?
- Do you feel uncertain about how to respond to the item?
- Do the options represent your ideal response?
- Is there anything noteworthy about why you responded the way you did?

As you respond to the items below keep this phrase in mind: "When engaged in instructional design work..."

APPENDIX C INTER-ITEM CORRELATION MATRIX

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Q1	1								
Q2	.352"	1							
Q3	.371"	.355"	1						
Q4	.395"	.373"	.388"	1					
Q5	.335"	.291"	.346"	.493"	1				
Q6	.239"	.435"	.211"	.332"	.418"	1			
Q7	.280"	.290"	.271"	.281"	.348"	.339"	1		
Q8	.421"	.441"	.387"	.328"	.243"	.362"	.324"	1	
Q9	.347"	.401"	.413"	.545"	.414"	.414"	.331"	.346"	1
Q10	.359"	.274"	.327"	.242"	.318"	.245"	.249"	.229"	.248"
Q11	.319"	.243"	.390"	.221"	.314"	.170"	.260"	.335"	.299"
Q12	.213"	.270"	.382"	.165"	.155"	.223"	.151"	.354"	.219"
Q13	.410"	.371"	.484"	.412"	.437"	.293"	.403"	.481"	.470"
Q14	.387"	.389"	.447"	.593"	.552"	.326"	.356"	.361"	.399"
Q15	.387"	.353"	.471"	.400"	.355"	.306"	.331"	.373"	.497"
Q16	.228"	.304"	.305"	.235"	.250"	.161"	.200"	.316"	.214"
Q17	.318"	.209"	.239"	.241"	.238"	.259"	.224"	.304"	.283"
Q18	.357"	.294"	.323"	.257"	.268"	.269"	.243"	.315"	.286"
Q19	.353"	.260"	.305"	.226"	.276"	.157"	.354"	.326"	0.134
Q20	.378"	.202"	.342"	.245"	.291"	0.130	.244"	.257"	.190"
Q21	.557"	.429"	.305"	.308"	.255"	.283"	.182"	.359"	.308"
Q22	.254"	.386"	.270"	.259"	.228"	.373"	.286"	.316"	.236"
Q23	.319"	.287"	.306"	.255"	.386"	.229"	.268"	.296"	.187"
Q24	.202"	0.103	.209"	.286"	.212"	.259"	.281"	.226"	.268"
Q25	.288"	.311"	.215"	.392"	.390"	.316"	.307"	.250"	.277"
Q26	.403"	.219"	.260"	.311"	.325"	.296"	.293"	.353"	.292"
Q27	.174"	.182"	.154"	0.106	.161"	.177"	.190"	.268"	.165"
Q28	.229"	.152"	.196"	.158"	.181"	.165"	.238"	.237"	.197"
Q29	.227"	.293"	.211"	.310"	.311"	.247"	.255"	.328"	.208"
Q30	.146"	.182"	0.109	0.091	0.034	0.111	.156"	.270"	0.114
Q31	.341"	.307"	.279"	.333"	.362"	.254"	.268"	.397"	.319"
Q32	0.067	0.078	0.045	-0.020	0.006	0.090	-0.036	0.062	0.098
Q33	.435"	.250"	.329"	.347"	.365"	.358"	.265"	.256"	.279"
Q34	.322"	.383"	.285"	.311"	.385"	.255"	.305"	.326"	.384"
Q35	.242"	.290"	.267"	.275"	.288"	.331"	.274"	.222"	.309"
Q36	.362"	.269"	.285"	.439"	.378"	.269"	.248"	.332"	.372"
Q37	.357"	.322"	.275"	.375"	.338"	.247"	.208"	.363"	.343"
Q38	.297"	.283"	.274"	.250"	.380"	.221"	.319"	.401"	.218"
Q39	.372"	.364"	.347"	.378"	.378"	.309"	.411"	.305"	.351"
Q40	.326"	.332"	.312"	.306"	.257"	.293"	.287"	.176"	.240"
Q41	.578"	.307"	.298"	.347"	.386"	.272"	.355"	.403"	.366"
Q42	.414"	.302"	.308"	.369"	.470"	.308"	.369"	.359"	.374"
Q43	.373"	.372"	.255"	.361"	.310"	.196"	.273"	.226"	.301"
Q44	.380"	.374"	.385"	.472"	.448"	.311"	.405"	.294"	.369"
Q45	.221"	.318"	.193"	.316"	.403"	.362"	.426"	.268"	.243"
Q46	.304"	.221"	.241"	.314"	.358"	.395"	.328"	.189"	.338"
Q47	.356"	.364"	.254"	.292"	.409"	.298"	.293"	.361"	.215"
Q48	.232"	.281"	.249"	.350"	.367"	.265"	.322"	.257"	.268"
Q49	.276"	.345"	.226"	.412"	.351"	.272"	.285"	.260"	.268"
Q50	.378"	.290"	.149"	.375"	.337"	.370"	.379"	.324"	.371"
Q51	.400"	.337"	.270"	.370"	.396"	.342"	.339"	.402"	.391"
Q52	.323"	.299"	.320"	.333"	.295"	.362"	.352"	.373"	.344"
Q53	.332"	.317"	.177"	.313"	.300"	.302"	.388"	.263"	.235"
Q54	.341"	.306"	.278"	.325"	.333"	.338"	.345"	.279"	.375"
Q55	.304"	.291"	.206"	.335"	.359"	.281"	.256"	.310"	.288"
Q56	.245"	.282"	.288"	.373"	.479"	.360"	.361"	.245"	.261"
Q57	.236"	.183"	.173"	.255"	.329"	.249"	.291"	.256"	.232"
Q58	.317"	.203"	.277"	.353"	.364"	.277"	.284"	.237"	.343"
Q59	.354"	.359"	.258"	.318"	.420"	.391"	.323"	.330"	.343"
Q60	.488"	.382"	.332"	.443"	.439"	.318"	.364"	.334"	.427"

[illegible]

[illegible]

[illegible]

97