DEVELOPMENT ARTICLE

Towards an understanding of instructional design heuristics: an exploratory Delphi study

Cindy S. York · Peggy A. Ertmer

Abstract Evidence suggests that experienced instructional designers often use heuristics and adapted models when engaged in the instructional design problem-solving process. This study used the Delphi technique to identify a core set of heuristics designers reported as being important to the success of the design process. The overarching purpose of the study was: (1) to examine and describe the heuristics that guided instructional designers' practice and (2) to identify the relationship between these heuristics and key competencies of the discipline, as outlined by the International Board of Standards for Training, Performance, and Instruction. Sixty-one heuristics were ultimately identified (reached consensus). All 61 aligned with at least one of the four categories of IBSTPI, with some aligning with more than one. More specifically, 17 heuristics aligned with Professional Foundations competencies, 17 aligned with Planning and Analysis competencies, 18 aligned with Design and Development competencies and 10 aligned with Implementation and Management competencies. By examining instructional design heuristics, we hope to better understand the potential genesis and/or future application of each heuristic. Results provide insights into the specific heuristics experienced designers perceive as being effective during the ID process.

Keywords Instructional design · Heuristics · IBSTPI competencies for instructional designers · Delphi

Introduction

For over 20 years researchers have been trying to capture/understand how experienced instructional designers apply their knowledge and skill to solve complex problems of practice (Ertmer et al. 2008; Ertmer et al. 2009; Eseryel 2006; LeMaistre 1998; Rowland

C. S. York (✉)
Northern Illinois University, Gabel Hall 208, DeKalb, IL 60115, USA
e-mail: cindy.york@gmail.com

P. A. Ertmer
Purdue University, 100 N. University Street, West Lafayette, IN 47907-2098, USA

1992; Wedman and Tessmer 1993). Among these efforts, researchers have examined how the design problem-solving process differs among experts and novices (Ertmer et al. 2008; Hardré et al. 2006; LeMaistre 1998; Rowland 1992), as well as the extent to which experienced designers use the instructional design (ID) model and/or its components in their work (Wedman and Tessmer 1993; York et al. 2009).

Although there is some evidence to suggest that experienced designers apply ID models in their practice (York et al. 2009), they typically report *adapting* these models to their specific situations, using them heuristically rather than algorithmically (Kirschner et al. 2002; Nelson 1988; Romiszowski 1981). According to Dudczak (1995), heuristics are general guidelines that experienced designers apply when making decisions under uncertain conditions, thus "minimiz[ing] cognitive expenditure" (Lewis 2006, p. 264) during ill-structured problem solving. Based on principles similar to those espoused by cognitive load theory (which suggests that working memory has a finite amount of processing capacity; Sweller et al. 1998), heuristics may offer one means for reducing the cognitive load experienced while solving difficult or complex problems (Lewis 2006).

Recently, Silber (2007) suggested that, when solving ID problems, instructional designers follow a set of heuristic principles, rather than procedural ID models: "ID, as experts do it, is a problem-solving process, not a procedure, made up of a thinking process and a set of underlying principles" (p. 6). This is similar to what Kirschner et al. (2002) reported, "While ID models often *inspire* designers, their activities typically don't reflect the systematic, step-by-step approach as prescribed in traditional ID models" (p. 91, emphasis added) and thus, "designers' implicit cognitive strategies and rules-of-thumb heavily influence the design process" (p. 87).

However, despite this acknowledgement in the literature, we actually know very little about the heuristics designers use, what they look like, or how they relate to key ID competencies. As noted by Gero (cited in Kirschner et al. 2002), "Given the large body of research design it is surprising how little we know about designing" (p. 61). This study was designed to fill that gap, that is, to identify a set of common heuristics experienced designers report as being important to the instructional design process. Furthermore, we hoped to understand how these heuristics related to key competencies expected of practitioners, as outlined by the International Board of Standards for Training, Performance, and Instruction (IBSTPI 2000) (see Table 1).

Where do heuristics come from?

According to Kirschner et al. (2002), "In most design projects, deviations and discrepancies from the general ISD model occur as design practitioners selectively follow ID model prescriptions" (p. 93). While many of these deviations are likely due to specific project constraints, such as time and budget (Wedman and Tessmer 1993), they also can be attributed to the unique set of design experiences the practitioner brings to the table. Jonassen (1997) explained that because of the uncertainty encountered during the problem-solving process, experts tend to rely on knowledge gained from past experiences rather than on that learned from textbooks.

The results from two studies by Perez and his colleagues support this suggestion. In their first study (Perez and Emery 1995), five experts and four novice designers were provided with a troubleshooting problem and asked to think aloud during the design problem-solving process. In their results, Perez and Emery reported that experts and novices used different types of knowledge; that is, whereas novices used theoretical knowledge (such as ID models), experts also used strategic knowledge, which was based

Table 1 IBSTPI instructional design competencies

Professional Foundations

1. Communicate effectively in visual, oral and written form (essential)
2. Apply current research and theory to the practice of instructional design (advanced)
3. Update and improve one's knowledge, skills and attitudes pertaining to instructional design and related fields (essential)
4. Apply fundamental research skills to instructional design projects (advanced)
5. Identify and resolve ethical and legal implications of design in the work place (advanced)

Planning and Analysis

6. Conduct a needs assessment (essential)
7. Design a curriculum or program (essential)
8. Select and use a variety of techniques for determining instructional content (essential)
9. Identify and describe target population characteristics (essential)
10. Analyze the characteristics of the environment (essential)
11. Analyze the characteristics of existing and emerging technologies and their use in an instructional environment (essential)
12. Reflect upon the elements of a situation before finalizing design solutions and strategies (essential)

Design and Development

13. Select, modify, or create a design and development model appropriate for a given project (advanced)
14. Select and use a variety of techniques to define and sequence the instructional content and strategies (essential)
15. Select or modify existing instructional materials (essential)
16. Develop instructional materials (essential)
17. Design instruction that reflects an understanding of the diversity of learners and groups of learners (essential)
18. Evaluate and assess instruction and its impact (essential)

Implementation and Management

19. Plan and manage instructional design projects (advanced)
20. Promote collaboration, partnerships and relationships among the participants in a design project (advanced)
21. Apply business skills to managing instructional design (advanced)
22. Design instructional management systems (advanced)
23. Provide for the effective implementation of instructional products and programs (essential)

on experience. In a follow-up article with the same participants, Perez et al. (1995) described how their expert instructional designers used ID principles or heuristics during the design process. For example, one of their participants "suggested that his practice was to treat theoretical principles as heuristics" (p. 340).

Given this, it seems reasonable to expect that the core knowledge and/or competencies of the field provide the foundation from which ID heuristics are derived. According to Romiszowski (1981), experienced designers apply heuristics during ill-structured problem solving, based on the ID models taught in school. This idea was supported by results reported by Ertmer et al. (2008) in their study of seven expert designers who engaged in a think-aloud process while reading and analyzing a complex ID case narrative: "…[participants] did not follow their models on a one-to-one basis like a recipe. Instead they used their models more broadly and heuristically" (p. 30).

Based on her research with 24 expert instructional designers, Visscher-Voerman (1999) identified 11 design principles, or heuristics, on which there was at least a 75% positive agreement among the participants. While some of the principles related to successfully implementing specific steps in the ID model (e.g., "An essential part of the analysis phase is a consideration of possible pitfalls and problems during the design and implementation phases," p. 173), others related to professional and managerial competencies such as securing stakeholder buy-in (e.g., "During the design process, designers should pay as much attention to creating ownership with clients and stakeholders, as to reaching theoretical or internal quality of the design," p. 173), and overseeing the entire design project (e.g., "Designers should share the responsibility for creating favorable conditions for the implementation of a design," p. 173). This suggests that ID principles, or heuristics, stem, not solely from the ID theories or models learned in school, but from the entire set of responsibilities involved in designers' practice.

What do heuristics look like?

Because heuristics are based, at least to some extent, on an individual designer's unique experiences, the expectation is that they would be fairly idiosyncratic (Ertmer et al. 2009). According to Visscher-Voerman (1999), one of the factors that influences experts' design processes and solutions is the designers' *frames of reference*, which are comprised of their experiences, perspectives, and ideas from previous projects on which they had worked. Similarly, Ertmer et al. (2008) described how the frames of reference used by their seven experts to solve the given ID problem related primarily to their current roles in the field (e.g., administrator, consultant).

Yet, given the potential link between heuristics and the core knowledge and competencies of the field (York et al. 2009; Perez et al. 1995; Visscher-Voerman 1999), it may be possible to identify those heuristics that are shared and commonly applied by designers across a variety of contexts. Indeed, this was the purpose of the study conducted by Kirschner et al. (2002). Starting with the heuristics originally identified by Visscher-Voerman (1999), Kirschner et al. asked 15 expert designers to identify the "top 3 design principles" that were most important to the success of a design project. The results demonstrated strong agreement among the designers in both studies. This suggests that while heuristics may stem from a unique set of design experiences, they often have a universal quality to them as well (York et al. 2009). As such, it may be possible to identify those that are commonly applied by many different designers.

Purpose

Researchers generally agree that when individuals are making decisions or solving problems under uncertain conditions, they rely on heuristics derived from both past experiences and previous knowledge (Kirschner et al. 2002; Nelson 1988; Visscher-Voerman 1999). This study was designed to build on the findings of Visscher-Voerman and Kirschner et al., as well as on the results of a preliminary study we conducted with 16 experienced designers (York et al. 2009). Through our previous qualitative analyses of the practitioners' design "stories," we identified 59 heuristics expressed by one or more of the designers. Thus, the goal of the current study was to verify this initial list of heuristics by including a larger number of participants, working in a wider range of contexts. Furthermore, we hoped to identify the relative importance of each heuristic to the ID process by examining participants' ratings of agreement (i.e., on a scale from 1- not at all important to 6 - very

important) related to each heuristic. Finally, we examined the extent to which the identified heuristics related to core ID competencies, as outlined by the International Board of Standards for Training, Performance, and Instruction (IBSTPI 2000). This last action was performed as a first step in understanding the potential genesis and/or future application of each heuristic.

Method

The Delphi technique (Linstone and Turoff 1975), consisting of a series of questionnaires and feedback used to gather the collective judgment of a panel of experts (Dalkey and Helmer 1963), was used to verify the heuristics identified in the 2009 study (York et al. 2009) by a new panel of experienced instructional designers ($n = 31$). In the 2009 study, 16 experienced professionals were interviewed and asked to tell a story in which a complex or challenging instructional design problem was solved. From these stories, 59 heuristics emerged. In the current study, three successive Delphi rounds were conducted with a panel of 31 practicing instructional designers until consensus was reached.

Selection of participants

An email was sent to 54 experienced instructional designers requesting their participation in a Delphi study examining ID heuristics. After receiving only 14 responses, we posted a request on LinkedIn.com seeking additional participants. Eighty people responded for a total of 94. A demographic survey requested the following information: name, email, gender, age range, current position and title, formal education, summary of instructional design background, and instructional delivery formats currently used in their practice. From the demographic survey, a convenience sample (Patton 1990) of the 50 most experienced designers was selected, using criteria published in the ID and expertise literature (Eseryel 2006; LeMaistre 1998; Perez et al. 1995; Rowland 1992). This criteria included: (1) minimum of 10 years of hands-on experience, (2) currently practicing ID, (3) number and level of educational degrees, (4) nominated or recognized by peers, (5) diverse experiences, (6) on-going training/education/certification, and (7) manager/trainer (for apprentice instructional designers). The selected 50 designers were emailed an invitation to participate on the Delphi panel. Thirty-five responded positively. However, from Round I to Round II, 4 withdrew, leaving a panel of 31 participants who completed all three surveys.

The final panel consisted of 18 females (58%) and 13 males (42%). Ages were listed by range: 31–40 years ($n = 5$; 16%), 41–50 ($n = 14$; 45%), 51–60 ($n = 10$; 32%), and 61+ ($n = 2$; 7%). The panel members averaged 19.7 years of ID experience, ranging from 10 to 43 years. The highest degree earned by participants included technical diploma ($n = 1$), Associate's degree ($n = 1$), Bachelor's degree ($n = 2$), MBA ($n = 4$), M.Ed. ($n = 2$), Master's degree ($n = 14$), Ed.D. ($n = 3$), and Ph.D. ($n = 4$). Although 4 of the panel members had less than a Master's degree per criterion 3, their on-the-job training and experiences made up for the lack of a formal degree. For example, the participant with the technical diploma had over 22 years of experience and had earned a number of training certificates, including the ID Certificate from Darryl L. Sink, Dale Carnegie Certified Coach, and more, which meets criterion 7. The participant with the Associate's degree had 25 years of instructional design experience as well as one-third of that time spent managing other instructional designers, which also meets criterion 7. All panel members were

currently practicing instructional design, with a range of job titles. The primary job title of participants was instructional designer ($n = 11$). The second most frequent job title was consultant ($n = 6$).

Delphi process and timeline

The three Delphi rounds were conducted over a 2-month period. Surveys were provided online, hosted on a secure server. An email was sent to participants describing the Delphi procedure as well as how to access the surveys. Follow-up emails were sent to participants if they had not responded during the open period. Following the third survey, an email was sent to inform participants that the Delphi rounds had ended.

The Round I survey contained specific instructions as to how to access the survey, rate heuristics, and provide open-ended comments. The survey contained three parts: (a) a list of the 59 heuristics (identified in the previous study; York et al. 2009) to be rated on a 6-point Likert-scale (from 1 = strongly disagree to 6 = strongly agree), as to their importance to the success of the ID process, (b) a space for comments after each heuristic, and (c) a space to add additional heuristics. Participants were asked to include comments to justify their ratings, to question or clarify a given heuristic, or to elaborate on a heuristic (see Appendix for survey instrument). Panel ratings were analyzed using mean, median, mode, standard deviation, plus interquartile range (IQR). Frequency distributions and graphical representations were created for each heuristic. Heuristics that reached panel consensus in Round I were not included in Round II (Anderson-Woo 2008). A heuristic reached consensus in Round I if either of the following two conditions were met:

1. IQR less than/equal to 1 AND 75% agreement on a rating of 5 and 6 (agree, strongly agree) OR 1 and 2 (disagree, strongly disagree).
2. A 97% frequency rating in the 4, 5, 6 (mildly agree, agree, strongly agree) categories OR in the 1, 2, 3 (mildly disagree, disagree, strongly disagree) categories (97% indicated all but 1 participant).

After the first round, 30 were removed—29 based on the first condition and 1 based on the second condition. Thus, the panel agreed that 29 of the original 59 heuristics were important to the success of their ID practice. For these remaining 29 heuristics, statistical measures (e.g., mean, median, mode, frequency, standard deviation) were included in Round II as well as panel comments made during Round I, allowing participants to reflect on others' justifications for their ratings. Participants also were presented with their original responses to Round I and asked to either retain their original ratings or modify them based on the new information. Finally, 15 new heuristics were added to the Round II survey, based on suggestions made by the panel during Round I. Thus, in this round, participants rated 44 heuristics and provided comments to support their ratings.

In Round II, the criteria for determining level of consensus were not as restrictive as Round I. That is, we decided to retain the first criterion but to lower the second criterion from 97% to 80% as this seemed more reasonable than the high level set for Round I. In addition, if a heuristic received a 20% or less stable rating from Round I to Round II, it was an indication that participants were not likely to change their ratings enough to come to consensus. To calculate stability, the frequencies of Round I and Round II responses were determined. Following this, the net person-changes (total units of change/2) for a particular question was divided by the number of participants (Scheibe et al. 1975). Using this criterion, seven heuristics were eliminated before the Round III survey. In addition, one of the newly added 15 was split into two statements based on participant comments.

Ultimately, 10 heuristics from Round II were included in Round III. No new heuristics were added to Round III.

The Round III survey was created, reviewed, and disseminated to the panel. As before, participants were provided statistical measures such as mean, median, mode, frequency, and standard deviation as well as their original responses. In addition, they could view all panel comments made on the previous survey for each of the 10 remaining heuristics in the survey. Participants were asked to retain or revise their original ratings based on the new information. Consensus and stability criteria remained the same as that used for Round II. Five heuristics reached consensus in Round III.

Data analysis

To compare the relative strength of agreement among the identified heuristics, we compiled all 61 into a rank-ordered list, based on mean ratings. In order to determine the extent to which the final set of 61 heuristics represented core competencies of the field, as identified by IBSTPI (2000), the two researchers independently sorted the heuristics into each category, while also identifying which specific competency (within each category) was best represented by each heuristic (e.g., Professional Foundations—Communication). Heuristics were dual-coded if they seemed to fit more than one category. The researchers then shared their categorizations of each heuristic with each other. Through discussion, consensus was reached on those that initially had been coded differently (18%).

Results and discussion

This study was designed to verify the list of 59 heuristics that emerged from the 2009 study (York et al. 2009) by including a larger number of participants who were working in a wider range of contexts. In addition, we hoped to identify the relative importance of each heuristic to the design process by examining the level of agreement among the participants. Finally, we classified the identified heuristics into the four main categories of IBSTPI competencies (2000) as one way to examine the relationship between the heuristics and key ID competencies.

Heuristics identified as important to ID process

Three rounds of the Delphi process resulted in panel consensus on 61/75 instructional design heuristics (see Table 2), 47 from the 2009 study and 14 added by the panel during Round I. Consensus means that the majority of the panel agreed or strongly agreed that the specific heuristic under consideration was important to the practice of instructional design. Interestingly, of the 16 new heuristics from suggestions by panel members in Round I (15 were suggested and one was split into two), 14 reached panel consensus. It should be noted that the panel identified the various heuristics after being prompted to reflect on each. This does not necessarily mean that these heuristics already existed within the designers' repertoires of heuristics or even that these were the only heuristics within their repertoires. It is also important to note that agreeing that an heuristic was important did not mean the designers actually applied it in his/her practice. Determining which heuristics were actually used in practice was beyond the scope of this study, but is an important area for future research.

Table 2 Heuristic order based on mean rating of agreement (1–6) as to its importance to the ID process

Rank order	Heuristic	M
1	Know your learners/target audience	5.88
1	Determine what it is you want your learners to perform after the instructional experience What is the criterion for successful performance?	5.88
3	There are things that need to be determined at the front end in order to make you successful at the back end	5.80
4	Be honest with the client	5.71
5	*When designing instruction, consider the context in which the learning will be applied. Ask yourself, "How can I put learning into context?"*	5.68
6	Negotiate the scope of the project with the client and create a statement of work upfront	5.66
7	*When designing instruction, consider active learning. Ask yourself, "How can I make learners more actively engaged?"*	5.65
8	You have to be sensitive to the context and the culture of the client	5.63
9	Approach the design problem with the end in mind. What are the deliverables? What are the learning/performance outcomes?	5.60
10	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	5.51
11	Figure out who all the stakeholders are in the room. And figure out who is not in the room that is still a stakeholder	5.49
12	The team is critical. Involve the right people at the right time	5.46
13	As a designer you need to listen more than you talk	5.43
13	Know your learners' prerequisite knowledge	5.43
13	You need to manage the client's expectations	5.43
16	When verifying information, you often will learn more information	5.41
16	Consider utilizing scaffolding in your instructional experience Give the learner the tools they need to succeed	5.41
18	You may have to mock up something to show the client to make sure that you get all of the desired outcomes right	5.40
18	Determine what will keep the learner motivated during the instructional experience	5.40
18	Ask yourself, "Is instruction the solution to this problem?"	5.40
21	Verify all the information you receive from the client to prevent miscommunication	5.31
22	Sometimes the client will not tell you all there is to know about a problem	5.29
23	The client thinks it is much easier to move from the conceptualization to the implementation than it actually is	5.24
24	*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*	5.23
25	You have to determine if the client really knows what they want	5.19
26	When communicating with the client, use visuals and documents in order to prevent miscommunication	5.17
26	You need to understand and speak the language of your client	5.17
28	*When possible, have a subject matter expert AND a non-subject matter expert review the final product*	5.16
29	When faced with something complex, look for previous examples that have characteristics you can draw upon, that can give you ideas on how to solve the problem	5.14
29	Understand the learning associated with the technology	5.14
31	Be prepared to think abstractly	5.11

Table 2 continued

Rank order	Heuristic	M
32	Constraints are a key to design. Look for constraints that have been placed on a project	5.10
33	*Needs analysis is the foundation for evaluation*	*5.03*
33	*Subject matter expert's documentation often fails to provide the necessary critical thinking. The SME forgets to tell you basic steps and concepts he forgot he once learned*	*5.03*
33	Don't let technology drive the design	5.03
33	*Resist the technical expert's propensity to focus on the most complex or innovative aspects of a product. Remember the novice learner who needs to build basic skills*	*5.03*
33	It is the instructional designer's job to press for quality in the design	5.03
33	Use previous experiences, if possible, as a starting point for new projects	5.03
39	Be sure the instruction gives learners the opportunity to make choices	4.97
40	Don't use technical instructional design terminology with the client unless you have to	4.94
40	You are rarely going to collect all the desired outcomes with just one interview with the client	4.94
42	*Always conduct a pilot*	*4.90*
42	*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, etc.*	*4.90*
44	Technology can get in your way, and if you don't deal with it you can get yourself into trouble	4.88
45	You need to know the theories. You need to know the models. You need to have that foundation	4.84
45	Understand that every design situation is unique	4.84
47	You often don't get to do the best instructional design you want due to constraints, resources, time, budget, etc.	4.74
47	Design is a people process	4.74
47	*Resist the SME's (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*	*4.74*
50	*Allow the content to guide how users interact with the training (linear, user-driven, etc.)—not the tools used to develop the training*	*4.73*
51	*Bring together the client and other stakeholders for synchronous meetings at each "gate" in a phased process*	*4.71*
52	*When designing instruction, think about Elaboration Theory. Ask yourself, "What's the 'big picture' to which the components are attached?"*	*4.70*
53	Prepare to do a lot of work that is never going to show up in the final product	4.68
54	*The instructional designer should take prodigious notes during meetings. Do not rely purely on documentation or the SME*	*4.61*
55	Invest as much time as you can in your audience analysis	4.55
56	Never look at the problem at face value. You have to get to the core of the problem and solve all of the subproblems	4.52
57	Generate multiple possible solutions that will solve the problem	4.50
58	Acknowledge your limitations. Don't accept a job that is outside of your expertise	4.48
59	Make every effort to be part of the production process	4.45
60	Design continues through the delivery or implementation phase	4.40
61	Ask all possible relevant questions throughout the entire design process	4.26

Note Italicized heuristics emerged from Delphi study

Relative importance of identified heuristics

Although participants were not asked to rank-order the heuristics according to importance, a rank order was determined based on the mean ratings of agreement from the Delphi surveys. The means for the 61 heuristics ranged from 4.26 to 5.88 (out of 6.0). The means for the top ten heuristics ranged from 5.51 to 5.88 (all were within 0.3 of a point).

Among the top 10 heuristics, participant agreement was equally high (M = 5.88) for the first two: "Know your learners/target audience," and "Determine what it is you want your learners to perform after the instructional experience. What is the criterion for successful performance?" Of the top 10 heuristics, three related to analyzing the learner/audience, which is a key component of most, if not all, ID models (Gustafson and Branch 2002).

An additional four of the top ten heuristics related to client interaction. Working with a client is one of the major responsibilities of an instructional designer (Liu et al. 2002; Rowland 1993). The most highly rated heuristic regarding client interaction, according to mean rankings, was, "Be honest with the client." Professional ethics seemed to underscore that heuristic as well as this one, "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." Liang and Schwen (1997) discussed the importance of professional ethics among designers, noting, "expert practitioners consistently demonstrate high ethical standards, which guide their personal and professional conduct" (p. 44). This relates to the definition of educational technology proposed by Reiser (2007), which contains the word *ethics*, and describes how instructional designers need to "maintain a high level of professional conduct" (p. 6).

Relationship between heuristics and IBSTPI competencies

The IBSTPI instructional design competencies are divided into four categories: Professional Foundations, Planning and Analysis, Design and Development, and Implementation and Management (2000). Divided among these four categories are 23 competencies (see Table 1). In this section we describe how the 61 heuristics, identified by the Delphi panel, align with the IBSTPI competencies (see Table 3). In general, the heuristics identified by the panel were fairly evenly distributed across the four IBSTPI categories (17, 17, 18, and 10 heuristics classified into each, respectively), suggesting that these categories of competencies were considered equally important to the success of the ID process. We discuss each of these categories in greater depth.

Professional Foundations

Seventeen of the 61 heuristics aligned with the Professional Foundations competencies, with the majority aligning with the competency, "Communicate effectively in visual, oral and written form." Communication is an important component in the instructional design process. The designer must have interpersonal skills that enable him/her to communicate with a number of different stakeholders including the client, design team members, production personnel, and others, all of whom may use different terminology. Communication is an ongoing process. The communication heuristics emphasize how important it is for an instructional designer to know how to communicate with all the people involved in the instructional design process and to do so throughout the lifecycle of the project (McDonald 2008).

Interestingly, none of the heuristics aligned with the fourth competency, "Apply fundamental research skills to instructional design projects." This suggests that the panel

Table 3 Heuristic comparison to IBSTPI competencies

Heuristic		IBSTPI competency
1	Be honest with the client	PF1
2	As a designer you need to listen more than you talk	PF1
3	When verifying information, you often will learn more information	PF1
4	Verify all the information you receive from the client to prevent miscommunication	PF1
5	You need to understand and speak the language of your client	PF1
6	Don't use technical instructional design terminology with the client unless you have to	PF1
7	Ask all possible relevant questions throughout the entire design process	PF1
8	You are rarely going to collect all the desired outcomes with just one interview with the client	PF1
9	When communicating with the client, use visuals and documents in order to prevent miscommunication	PF1
10	You need to know the theories. You need to know the models. You need to have that foundation	PF2
11	Acknowledge your limitations. Don't accept a job that is outside of your expertise	PF5
12	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	PF1
13	*The instructional designer should take prodigious notes during meetings. Do not rely purely on documentation or the SME*	*PF1*
14	You may have to mock up something to show the client to make sure that you get all of the desired outcomes right	PF1
15	Negotiate the scope of the project with the client and create a statement of work upfront	PF1
16	Be prepared to think abstractly	PF3
17	It is the instructional designer's job to press for quality in the design	PF5
18	Sometimes the client will not tell you all there is to know about a problem	PA6
19	You often don't get to do the best instructional design you want due to constraints, resources, time, budget, etc.	PA6, PA10
20	Ask yourself, "Is instruction the solution to this problem?"	PA6
21	Never look at the problem at face value. You have to get to the core of the problem and solve all of the subproblems	PA6
22	Know your learners/target audience	PA9
23	Know your learners' prerequisite knowledge	PA9
24	There are things that need to be determined at the front end in order to make you successful at the back end	PA6
25	Constraints are a key to design. Look for constraints that have been placed on a project	PA6
26	*Needs analysis is the foundation for evaluation*	*PA6, DD18*
27	Invest as much time as you can in your audience analysis	PA9
28	You have to determine if the client really knows what they want	PA6
29	*Subject matter expert's documentation often fails to provide the necessary critical thinking. The SME forgets to tell you basic steps and concepts he forgot he once learned*	*PA6, PA8*
30	Determine what it is you want your learners to perform after the instructional experience. What is the criterion for successful performance?	PA6, PA7
31	Understand that every design situation is unique	PA12
32	Don't let technology drive the design	PA11, PA12
33	Understand the learning associated with the technology	PA11
34	Technology can get in your way, and if you don't deal with it you can get yourself into trouble	PA11

Table 3 continued

Heuristic	IBSTPI competency
35 When faced with something complex, look for previous examples that have characteristics you can draw upon, that can give you ideas on how to solve the problem	DD15
36 Use previous experiences, if possible, as a starting point for new projects	DD15
37 Generate multiple possible solutions that will solve the problem	DD13
38 *When designing instruction, consider the context in which the learning will be applied. Ask yourself, "How can I put learning into context?"*	DD13
39 *When designing instruction, consider active learning. Ask yourself, "How can I make learners more actively engaged?"*	DD14, DD17
40 Determine what will keep the learner motivated during the instructional experience	DD14, DD17
41 Approach the design problem with the end in mind. What are the deliverables? What are the learning/performance outcomes?	DD13, DD17
42 Consider utilizing scaffolding in your instructional experience. Give the learner the tools they need to succeed	DD17
43 *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*	DD13
44 *Resist the technical expert's propensity to focus on the most complex or innovative aspects of a product. Remember the novice learner who needs to build basic skills*	DD17
45 Be sure the instruction gives learners the opportunity to make choices	DD17
46 *Resist the SME's (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*	DD13
47 Prepare to do a lot of work that is never going to show up in the final product	DD13
48 *When designing instruction, think about Elaboration Theory. Ask yourself, "What's the 'big picture' to which the components are attached?"*	DD13, DD14
49 *Allow the content to guide how users interact with the training (linear, user-driven, etc.)—not the tools used to develop the training*	DD14, DD17
50 Make every effort to be part of the production process	DD16
51 *Always conduct a pilot*	*DD18*
52 Figure out who all the stakeholders are in the room. And figure out who is not in the room that is still a stakeholder	IM20
53 You have to be sensitive to the context and the culture of the client	IM20
54 The team is critical. Involve the right people at the right time	IM20
55 *When possible, have a subject matter expert AND a non-subject matter expert review the final product*	*IM19, IM20*
56 *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, etc.*	*IM19*
57 You need to manage the client's expectations	IM20
58 *Bring together the client and other stakeholders for synchronous meetings at each "gate" in a phased process*	*IM20*
59 The client thinks it is much easier to move from the conceptualization to the implementation than it actually is	IM20
60 Design is a people process	IM20
61 Design continues through the delivery or implementation phase	IM23

PF Professional Foundations, *PA* Planning and Analysis, *DD* Design and Development, *IM* Implementation and Management

participants either did not engage in the research process or perhaps did not recognize that they used research skills when conducting ID. This does not negate the importance of the fourth competency but simply means that it either did not emerge from the original interviews in the 2009 study or was not suggested as a new heuristic by the panel. Perhaps if it had been included on the original list the panel would have been prompted to consider the importance of applying research skills to ID projects. Future research is needed to determine practitioners' perceptions of the importance of this IBSTPI competency.

Planning and Analysis

Of the 17 heuristics that aligned with the Planning and Analysis competencies, 10 were associated with the competency, "Conduct a needs assessment," which is one of the foundations of the instructional design process. This heuristic supports the findings of Rowland and DiVasto (2001) who stated that analysis is one of the "'big ideas' that designers use when engaging in design work. The 14 experts in the Rowland and DiVasto study all agreed that the instructional design process includes "thorough analysis, for example, of learners, task, and setting" (p. 14). In addition, three of their experts claimed that, in general, not enough analysis takes place. Their statement is supported by the heuristic, "Invest as much time as you can in your audience analysis." The heuristic, "Ask yourself, 'Is instruction the solution to this problem?'" also supports Rowland and DiVasto's (2001) findings that designers use needs analyses to determine "when instruction was the right answer" (p. 15). This heuristic is supported by the general ID literature (Gustafson and Branch 2002). Determining if instruction is necessary tends to be one of the key things a designer must do after first meeting with the client.

Design and Development

Among the 18 heuristics that aligned with the Design and Development competencies, 7 aligned with competency 13, "Select, modify, or create a design and development model appropriate for a given project" as well as competency 17, "Design instruction that reflects an understanding of the diversity of learners and groups of learners." The heuristic, "Generate multiple possible solutions that will solve the problem," supports findings of Liu et al. (2002) who suggested that instructional designers must use their best judgment in creating a solution for the client. While Lui et al. did not specifically mention developing *multiple solutions*, because ill-structured problems typically have multiple solutions, the designer needs to decide which is the best to recommend to the client (Jonassen 1997). The heuristic, "When designing instruction, consider active learning," supports Mayer's (2003) recommendation for using different methods to promote active learning, even when using non-interactive media. Participants also agreed that scaffolding was needed, but disagreed as to the timing and quantity of the scaffolding. One participant felt scaffolding should be used in the beginning and tapered off near the end, while another participant felt it was necessary to hold off on using scaffolding in the beginning. The instructional design literature supports the concept of using scaffolding, but the use of it depends on the context (Van Merriënboer et al. 2003).

Implementation and Management

Among the 10 heuristics that aligned with the Implementation and Management competencies, 8 supported competency 20, "Promote collaboration, partnerships and

relationships among the participants in a design project." The panel strongly supported the idea that design is a *people process* (as one participant stated). "The team is critical. Involve the right people at the right time" ranked 12th among the 61 heuristics. A great deal of the instructional design literature supports the notion that instructional design is a team process (Greer 1992; Liu et al. 2002; Rowland 1993). The most highly rated heuristic related to the design team was, "Figure out who all the stakeholders are in the room. And figure out who is not in the room that is still a stakeholder." This heuristic supports Cox's (2009) suggestion that the designer needs to conduct a stakeholder analysis to determine who the stakeholders are throughout the project. Carroll (2000) elaborated on the purpose for a stakeholder analysis: "Various stakeholders or team members may change their interests or priorities, or may even leave the team. Others with unknown interests and priorities may join" (p. 47). These statements suggest that the designer needs to continually reassess who the stakeholders are throughout the project.

The heuristic that proposed that reviews by subject matter experts were a necessary component of the instructional design process supports Keppell's (2001) findings. Often, the content being designed is quite unfamiliar to the designer, whereas the subject matter expert brings that specialized knowledge to the table. Keppell described an iterative process of explanation and clarification that occurs between the designer and the subject matter expert throughout the design process.

Implications and conclusions

Recent conversations among ID scholars and practitioners have questioned the efficacy of teaching ID models to novice designers, based on the fact that, in practice, models are applied neither consistently nor uniformly (Wedman and Tessmer 1993; Dick 1996). While some have argued that we should continue to teach models to novice designers due to the foundational knowledge they provide (Dick 1996), others believe we should be teaching relevant skills, such as problem solving (Jonassen 2008), communication (Summers et al. 2002), and project management (Williams van Rooij 2011). Yet, what are the specific skills that students should learn? Although this question is likely to engender a great deal of debate among ID professionals, the results of this study suggest that the heuristics practitioners believe to be important to the ID process are relatively well aligned with the IBSTPI competencies. So, while these *include* a number of competencies that relate to steps in ID procedural models (learner analysis, design strategies, etc.), the focus is broadened to include a larger group of skills such as those related to communication and management.

Participants in our study did not suggest adding any heuristics that related directly to an ID model. Instead, participants seemed to focus more on the practice of ID and what it takes to be successful, which of course, goes beyond applying the steps in an ID model. This is similar to what Ertmer et al. (2008) found: although the participants in their study did not talk specifically about ID models, they applied these mental models to their practice. Still, it is important to remember that we did not ask participants if they learned about or used a specific model in their practice. Different heuristics may have emerged had we asked participants to rate the importance of completing various steps in the ID model. In future research we should consider determining if and to what extent practitioners use/consider a specific model (or steps in the model) when working on design projects.

To address our research question, "How do heuristics relate to key ID competencies," we considered how the heuristics identified by the Delphi panel related to essential knowledge and skills needed to be successful in the field, as identified by IBSTPI (2000). We chose these competencies because they appeared to be generally recognized by our professional organizations (e.g., AECT and ISPI), as being important to our graduate education programs. As such, we made the assumption that our panel participants had learned at least some of these skills during their graduate programs. As noted earlier, practitioners have reported that they tend to "treat theoretical principles as heuristics" (Perez et al. 1995, p. 340). However, it's important to consider that the opposite may be true. That is, the IBSTPI competencies (2001) may simply capture, rather than prescribe, what practitioners need to know and be able to do. If this is true, then the heuristics identified in this study and the IBSTPI competencies might be expected to look very similar. In other words, both the heuristics and the IBSTPI competencies may be capturing common knowledge shared by practitioners. However, given that we did not probe into the actual source of these heuristics, additional research is needed to sort through these various possibilities.

In this study, our participants did not mention specific ID models or refer to the IBSTPI (2000) competencies by name. Instead, they appeared to approach their task of identifying important ID heuristics from a very practical perspective: What does it take to be successful in this field? This is also supported by Visscher-Voerman's (1999) findings. That is, of the 16 principles identified by her participants, only one mentioned the use of design models: "Successful design is served by the use of step-by-step schemes and design models, provided that they are adapted" (p. 173). And similar to what others have reported (Wedman and Tessmer 1993), the practitioners in her study also emphasized the need to adapt the models learned in school.

Although in this study we examined how the 61 heuristics identified by the Delphi panel aligned with the IBSTPI competencies, this is not to suggest they don't incorporate steps from ID models, as well. It is not our intent to discount using ID models in the education of our students. Models provide novice designers with a starting point when beginning a new project. However, it also might be useful for novice designers to understand how experienced practitioners translate these models and competencies into practice. Heuristics appear to offer one possibility; that is, heuristics could potentially serve as scaffolds for novices who are unsure how to translate their textbook knowledge into practice. Furthermore, if these heuristics appeared in the form of stories, they could, as Jonassen and Hernandez-Serrano (2002) noted, "support a broader range of problem solving than any other strategy or tactic" (p. 65).

Limitations and suggestions for future research

This study is based on the assumption that designing involves the application of heuristics. However, we did not ask the panel members to report their frequency of use for each heuristic, nor did we ask about the context in which they used the heuristics. Believing a heuristic is important does not mean, necessarily, that it is applied in practice. It is important to determine which heuristics are being used and in what context. This will comprise our future research.

The heuristics identified in this study aligned relatively well with the IBSTPI competencies (2000). Although some competencies were not represented by the set of heuristics

identified by our Delphi panel, this does not negate their importance. It simply means they did not emerge from this panel's deliberations. Future research is needed to determine practitioners' perceptions of the importance of all of the IBSTPI competencies.

In addition, the relative importance of different heuristics to the instructional design process (as well as to instructional design field) needs to be examined. A more thorough examination of importance of the different heuristics should be undertaken. Perhaps a Delphi panel could rank order the current heuristics as to their importance to the instructional design process. It could also be productive to ask new instructional designers questions about their experiences such as: (a) What was the most important thing you learned, and (b) About what do you wish you learned more? From this we could tailor our graduate education to include elements practitioners find important versus what the instructor or textbook emphasizes as important.

This study was designed to generate a thoughtful analysis of heuristics used by experienced instructional designers. However, one limitation to this study was that the fields in which the instructional designers worked did not represent all possible areas of work for instructional designers; for example, designers working in the military were not included because we did not have access to any. Future research will provide military instructional designers with heuristics to determine if designers in different ID fields have the same perceptions about which heuristics are important to the design process.

Future research will also focus on determining the best methods for sharing the resulting heuristics with novice designers and whether it impacts their initial experiences as instructional designers. Some questions we plan to pursue are: (a) Can we teach heuristics to novice instructional designers? (b) What methods should we use to provide this information (stories, cases, guest speakers)? and (c) How does this impact their practice?

Appendix

ROUND I QUESTIONNAIRE

Heuristics Used by Practicing Instructional Designers – Round 1

The purpose of this study is to determine the heuristics (rules of thumb) used by practicing instructional designers.

Thank you for participating in this survey of ID heuristics. Your input is important.

Please respond to each heuristic, indicating your level of agreement as to its importance to the success of instructional design. Each heuristic is followed by a 6-point Likert-scale ranging from strongly disagree to strongly agree. You may make comments to justify your rating, to question or clarify the heuristic, or to elaborate on the concept. You may suggest additional heuristics in the final comment box.

It is important that you respond to each heuristic. If for some reason, you do not wish to respond to a heuristic, please indicate this in the comment box that follows that heuristic.

You will have until July 2nd to respond to this survey. Unfortunately the survey will have to be completed in one sitting as there is no way to save your answers and continue later. If you accidentally submit before completing the survey, please enter it again and pick up where you left off and send me an email to combine the responses.

Please indicate your level of agreement with the following heuristics. You may make comments to justify your rating, to question or clarify each heuristic, or to elaborate on the concept.

Strongly Disagree = SD, Disagree = D, Mildly Disagree = MD, Mildly Agree = MA, Agree = A, Strongly Agree = SA

#	Statement	SD	D	MD	MA	A	SA
1.	As a designer you need to listen more than you talk.	SD	D	MD	MA	A	SA
2.	When communicating with the client, use visuals and documents in order to prevent miscommunication.	SD	D	MD	MA	A	SA
3.	You need to understand and speak the language of your client.	SD	D	MD	MA	A	SA
4.	Don't use technical instructional design terminology with the client unless you have to.	SD	D	MD	MA	A	SA
5.	Verify all the information you receive from the client to prevent miscommunication.	SD	D	MD	MA	A	SA
6.	Be honest with the client.	SD	D	MD	MA	A	SA
7.	Acknowledge your limitations. Don't accept a job that is outside of your expertise.	SD	D	MD	MA	A	SA
8.	You may have to mock up something to show the client to make sure that you get all of the desired outcomes right.	SD	D	MD	MA	A	SA
9.	You have to make sure that you have asked all the questions that you possibly could have so that you do not leave anything important out.	SD	D	MD	MA	A	SA
10.	Sometimes the client will not tell you all there is to know about a problem.	SD	D	MD	MA	A	SA
11.	Know your learners' prerequisite knowledge.	SD	D	MD	MA	A	SA
12.	Design first, and then figure out the technology later. Really think about those learning outcomes first and then figure out how to go about reaching them.	SD	D	MD	MA	A	SA
13.	When verifying information, you often will learn more information.	SD	D	MD	MA	A	SA
14.	When working with an instructional design team, it is hard to get internal consistency.	SD	D	MD	MA	A	SA
15.	It's hard to get everybody on an instructional design team to come to an agreement on what it is that you're doing.	SD	D	MD	MA	A	SA
16.	Don't try to do any instructional design in the first meeting with the client.	SD	D	MD	MA	A	SA
17.	Constraints are a key to design. Look for constraints that have been placed on a project.	SD	D	MD	MA	A	SA
18.	Negotiate the scope of the project with the client and create a statement of work upfront.	SD	D	MD	MA	A	SA
19.	You often don't get to do the best instructional design you want due to constraints, resources, time, budget, etc.	SD	D	MD	MA	A	SA
20.	It is the instructional designer's job to press for quality in the design.	SD	D	MD	MA	A	SA
21.	Use previous experiences, if possible, as a starting point for new projects.	SD	D	MD	MA	A	SA
22.	Design is a people process.	SD	D	MD	MA	A	SA
23.	The team is critical. Involve the right people at the right time.	SD	D	MD	MA	A	SA
24.	Figure out who all the stakeholders are in the room. And figure out who is not in the room that is still a stakeholder.	SD	D	MD	MA	A	SA
25.	Prepare to do a lot of work that is never going to show up in the final product.	SD	D	MD	MA	A	SA
26.	Don't just copy old solutions. Try to add something new in every design.	SD	D	MD	MA	A	SA
27.	You can never do enough analysis. Make sure as you move through the instructional design process, you come back to the analysis component again and again.	SD	D	MD	MA	A	SA
28.	You need to know the theories. You need to know the models. You need to have that foundation.	SD	D	MD	MA	A	SA
29.	When faced with something complex, look for previous examples that have characteristics you can draw upon, that can give you ideas on how to solve the problem.	SD	D	MD	MA	A	SA
30.	Be prepared to think abstractly.	SD	D	MD	MA	A	SA

	SD	D	MD	MA	A	SA
31. There are things that need to be determined at the front end in order to make you successful at the back end.	SD	D	MD	MA	A	SA
32. Design continues through the delivery or implementation phase.	SD	D	MD	MA	A	SA
33. There is a tendency to neglect the delivery or implementation phase. We tend to think of instruction as happening prior to delivery.	SD	D	MD	MA	A	SA
34. The first thing you do when you get a project is review previous designs you've done.	SD	D	MD	MA	A	SA
35. In the beginning of a project you think about models for instructional design.	SD	D	MD	MA	A	SA
36. Make every effort to be part of the production process.	SD	D	MD	MA	A	SA
37. Know your learners/target audience.	SD	D	MD	MA	A	SA
38. Invest as much time as you can in your audience analysis.	SD	D	MD	MA	A	SA
39. Determine what it is you want your learners to perform after the instructional experience. What is the criterion for successful performance?	SD	D	MD	MA	A	SA
40. Consider utilizing scaffolding in your instructional experience. Give the learner the tools they need to succeed.	SD	D	MD	MA	A	SA
41. Be sure the instruction gives learners the opportunity to make choices.	SD	D	MD	MA	A	SA
42. Determine what will keep the learner motivated during the instructional experience.	SD	D	MD	MA	A	SA
43. It's easy to not think enough about the learner.	SD	D	MD	MA	A	SA
44. If time is of the essence, direct instruction is the way to go. It takes the least amount of time and it gets the instruction out there and you know it can be done independently.	SD	D	MD	MA	A	SA
45. Ask yourself, "Is instruction the solution to this problem?"	SD	D	MD	MA	A	SA
46. Approach the design problem with the end in mind. What are the deliverables? What are the learning/performance outcomes?	SD	D	MD	MA	A	SA
47. Generate multiple possible solutions that will solve the problem.	SD	D	MD	MA	A	SA
48. If you give the client multiple solutions, don't tell them which you think is best. Let them decide which one they want.	SD	D	MD	MA	A	SA
49. You are not going to collect all the desired outcomes with just one interview with the client.	SD	D	MD	MA	A	SA
50. Never look at the problem at face value. You have to get to the core of the problem and solve all of the subproblems.	SD	D	MD	MA	A	SA
51. Understand that every design situation is unique.	SD	D	MD	MA	A	SA
52. You have to determine if the client really knows what they want.	SD	D	MD	MA	A	SA
53. You need to manage the client's expectations.	SD	D	MD	MA	A	SA
54. You have to be sensitive to the context and the culture of the client.	SD	D	MD	MA	A	SA
55. 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.	SD	D	MD	MA	A	SA
56. The client thinks it is much easier to move from the conceptualization to the implementation than it actually is.	SD	D	MD	MA	A	SA
57. Don't let technology drive the design.	SD	D	MD	MA	A	SA
58. Understand the learning associated with the technology.	SD	D	MD	MA	A	SA
59. Technology can get in your way, and if you don't deal with it you can get yourself into trouble.	SD	D	MD	MA	A	SA

Are there any additional heuristics you use? Please list the heuristic and a brief description for clarification purposes.	

<u>Sample from Round II Questionnaire</u>

Heuristics Used by Practicing Instructional Designers – Round 2

The purpose of this study is to determine a set of heuristics (rules of thumb) used by practicing instructional designers.

The results from Round 1 are in!

Please review the compiled results from Round 1. Heuristics that reached group consensus in Round 1 are not included in Round 2. I have included statistical results about each remaining heuristic from Round 1 as well as your individual response from Round 1. Using the panel's comments as input, please re-rate your level of agreement as to the importance of each heuristic to the success of instructional design. Each heuristic is followed by a 6-point Likert-scale ranging from strongly disagree (1) to strongly agree (6). You are encouraged to provide reasons for retaining or revising any of your ratings. If your rating stays the same as Round 1, please mark it as such.

1. Carefully read each statement. A few have been changed based on your input and are identified as having been reworded.
2. Review your original position and the statements of other panelists. Then, rate each statement. Feel free to revise or retain your rating from the Round 1 survey.
3. *Please provide supportive rationale for your position and clarification if your new rating varies by two or more points from the mode reported for that statement.*
4. There are 15 new heuristics that emerged from Round 1. Please rate these as well and provide comments if necessary.

You will have until July 23rd to respond to this survey.

Unfortunately the survey will have to be completed in one sitting as there is no way to save your answers and continue later. If you accidentally submit before completing the survey, please send me an email.

Please indicate your level of agreement with the following heuristics. You may make comments to justify your rating, to question or clarify each heuristic, or to elaborate on the concept.
Strongly Disagree = SD, Disagree = D, Mildly Disagree = MD, Mildly Agree = MA, Agree = A, Strongly Agree = SA

Heuristic 4: Don't use technical instructional design terminology with the client unless you have to.

Panel median (5), mode (5), mean (4.86), standard deviation (.974)
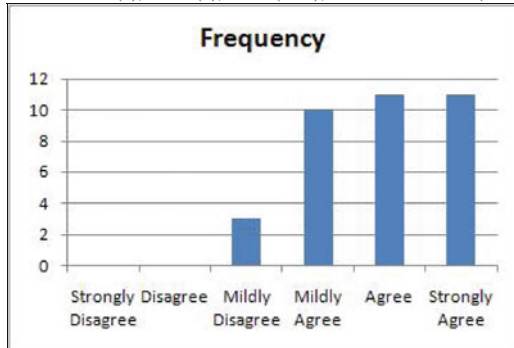
Panel comments from Round 1:

- Practically, ID terminology is jargon; at its worst it assaults a client's ideas of what need to happen -- call it intellectual imperialism
- They want it plain and simple in a way they can understand. They don't care about ISD language
- For the most part yes - however sometimes it is useful to build credibility so if you do use terminology, define it in lay terms.
- Of course it depends on the client!
- They don't speak that language
- While you want to appear knowledgeable to your client, using terms like "level 4 evaluation" may mean nothing and could be mistaken for arrogance.
- Sometimes you need to drop a little jargon on them to remind them that you're a professional with specific skills.

- Of course, it depends on who the client is. Most of my clients are subject matter experts and not instructional designers - so speaking in my terms does nothing to further the conversation
- I wouldn't use too much jargon that isn't necessary, but some things are worth explaining at a higher level. For example, design, development, evaluation, pilot testing...etc... the customer needs to know what that is in layman terms and how/why it's important to complete for the success of the project.
- It is usually not necessary to go into too much depth with terminology, but it can appear condescending if you completely try to shut the client off.
- Education to what design is and why it is important and how effective it is, is important. It will help build long relationships and better communication when they understand your process and terms. Just as you should understand them they should understand you and not be a magical box that creates solution.
- It's OK to do so if you explain what you mean.
- It depends on the client. Some look for you to through around some terms to establish credibility. Mostly, it is better to be clear in layman's terms.
- I believe educating the clients in our process involves using some of the terminology and language
- If 3 [You need to understand and speak the language of your client] is true then the converse is also true. The customer needs to understand what they are agreeing to and what the process is. I agree that the detailed jargon is not always necessary, but let the client help determine the terminology used in discussion
- At times, ID concepts are helpful.
- Sometimes it helps to explain the process to get compliance. Especially if you need to work with SME on multiple occasions.

4. Don't use technical instructional design terminology with the client unless you have to.	SD	D	MD	MA	A	SA

The following are NEW heuristics that emerged from Round 1. Please indicate your level of agreement with them. You may make comments to justify your rating, to question or clarify each heuristic, or to elaborate on the concept.

	SD	D	MD	MA	A	SA
60. Always have a subject matter expert AND a non-subject matter expert review the design.	SD	D	MD	MA	A	SA
61. Always conduct a pilot.	SD	D	MD	MA	A	SA
62. Methodical design process ensures some degree of quality control, but following the methodology should be somewhat invisible to the client.	SD	D	MD	MA	A	SA
63. When designing instruction, consider the context in which the learning will be applied. Ask yourself, "How can I put learning into context?"	SD	D	MD	MA	A	SA
64. When designing instruction, consider active learning. Ask yourself, "How can I make learners more actively engaged?"	SD	D	MD	MA	A	SA
65. When designing instruction, think about Elaboration Theory. Ask yourself, "What's the 'big picture' to which the components are attached?"	SD	D	MD	MA	A	SA
66. 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.	SD	D	MD	MA	A	SA
67. Needs analysis is the foundation for evaluation. (Identify on the front end what success looks like at all 4 levels [Kirkpatrick - Reaction, Learning, Behavior, Results]; design to meet those goals; then measure at the 4 levels).	SD	D	MD	MA	A	SA
68. Resist the technical expert's propensity to focus on the most complex or innovative aspects of a product. Remember the novice learner who needs to build basic skills.	SD	D	MD	MA	A	SA
69. Resist the SME's (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.	SD	D	MD	MA	A	SA
70. Don't let the flow of the content be constrained by the software. Instead focus on the flow of the job, even if it forces learners to skip madly around the software.	SD	D	MD	MA	A	SA
71. The instructional designer should take prodigious notes during meetings. Do not rely purely on documentation or the SME.	SD	D	MD	MA	A	SA
72. Subject matter expert's documentation often fails to provide the necessary critical thinking. The SME forgets to tell you basic steps and concepts he forgot he once learned.	SD	D	MD	MA	A	SA
73. Bring together the client and other stakeholders for synchronous meetings at each "gate" in a phased process.	SD	D	MD	MA	A	SA
74. 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, etc.	SD	D	MD	MA	A	SA

<u>Sample from Round III Questionnaire</u>

Heuristics Used by Practicing Instructional Designers – Round 3

The purpose of this study is to determine a set of heuristics (rules of thumb) used by practicing instructional designers.

The results from Round 2 are in!

Please review the compiled results from Round 2. Heuristics that reached group consensus or stability in Round 2 are not included in Round 3. I have included statistical results about each remaining heuristic from Round 2 as well as your individual response from Round 2. Using the panel's comments as input, please re-rate your level of agreement as to the importance of each heuristic to the success of instructional design. Each heuristic is followed by a 6-point Likert-scale ranging from strongly disagree (1) to strongly agree (6). You are encouraged to provide reasons for retaining or revising any of your ratings. If your rating stays the same as Round 2, please mark it as such.

1. Carefully read each statement. A few have been changed based on your input and are identified as having been reworded.
2. Review your original position and the statements of other panelists. Then, rate each statement. Feel free to revise or retain your rating from the Round 2 survey.
3. *Please provide supportive rationale for your position and clarification if your new rating varies by two or more points from the mode reported for that statement.*

You will have until August 13th to respond to this survey.

Unfortunately the survey will have to be completed in one sitting as there is no way to save your answers and continue later. If you accidentally submit before completing the survey, please send me an email.

Please indicate your level of agreement with the following heuristics. You may make comments to justify your rating, to question or clarify each heuristic, or to elaborate on the concept.
Strongly Disagree = SD, Disagree = D, Mildly Disagree = MD, Mildly Agree = MA, Agree = A, Strongly Agree = SA

Heuristic 9: Ask all possible relevant questions throughout all phases of the design process. (Reworded)
Panel median (4), mode (4), mean (3.903), standard deviation (1.165)
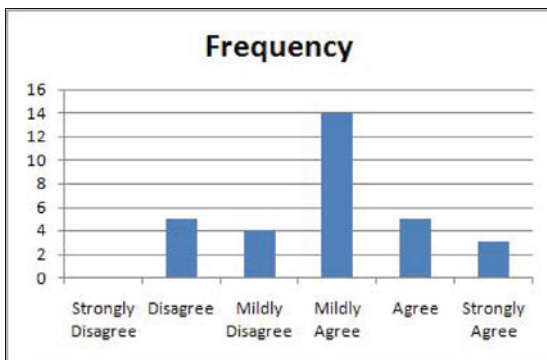
Panel comments from Round 2:
- You should be strategic and ask the questions that are most important for the phase of the project that you are in. Ask enough to move forward. Ask enough to minimize the risk of making a costly strategic or tactical error. Asking all possible questions is for philosophers and Kindergartners.
- It's the phrase "all of the questions" that makes me move to mildly disagree because I doubt it's humanly possible.
- You don't want to overwhelm the client. Ask what you need to get started or at least complete an initial proposal. Other phases of the project will require different sets of questions that you can ask at that time.

- I am keeping my original rating of 4 (mildly agree) because of the same trepidation I felt originally on this question: it was not clear enough for me to know what I was answering. I think the way the question is worded is part of the problem in the broad range of answers. It is possible to interpret the verbiage "all the questions that you possibly could have" as meaning "All POSSIBLE questions" (on which I DISAGREE because in business you have to solve the problem, not do research) or "all possible RELEVANT questions" (on which I AGREE because part of our skill set is identifying the key questions). Also, the question could be interpreted as meaning you should ask all the questions at one time (to which I STRONGLY DISAGREE, because many questions present themselves as the process continues). Or, conversely, if the question is interpreted as meaning all questions over the length of the entire iterative process, I would STRONGLY AGREE.
- Like others have said, it is difficult based on the way this is worded to determine if this is a one shot expectation. You will have additional questions as part of the iterative process as development occurs.
- I like the comment -- this is a dialogue. Design is iterative.
- Of course you won't have all the answers in round 1 but you need to do your due diligence to aim high then be communicative throughout the process. But if don't get enough info at first, you're liable to go off track quickly from expectations.

9. Ask all possible relevant questions throughout the entire design process.

SD	D	MD	MA	A	SA

References

Anderson-Woo, C. (2008). Developing an expert model of academic language using a Delphi process. *Dissertation Abstracts International, 69*(11). (UMI No. 3337997).

Carroll, J. M. (2000). Five reasons for scenario-based design. *Interacting with Computers, 13*(1), 43–60.

Cox, D. M. T. (2009). *Project management skills for instructional designers: A practical guide.* Bloomington, IN: iUniverse.

Dalkey, N., & Helmer, O. (1963). An experimental application of the Delphi method to the use of experts. *Management Science, 9*, 458–467.

Dick, W. (1996). The Dick and Carey model: Will it survive the decade? *Educational Technology Research and Development, 44*(3), 55–63.

Dudczak, C. A. (1995, November). *Heuristic elements of plausible reasoning.* Paper presented at the Annual Meeting of the Speech Communication Association. San Antonio, TX.

Ertmer, P. A., Stepich, D. A., York, C. S., Stickman, A., Wu, X., Zurek, S., et al. (2008). How instructional design experts use knowledge and experience to solve ill-structured problems. *Performance Improvement Quarterly, 21*(1), 17–42.

Ertmer, P. A., York, C. S., & Gedik, N. (2009). Learning from the pros: How experienced designers translate instructional design models into practice. *Educational Technology, 49*(1), 19–26.

Eseryel, D. (2006). Expert conceptualizations of the domain of instructional design: An investigative study on the deep assessment methodology for complex problem-solving outcomes. *Dissertation Abstracts International, 67*(11). (UMI No. 3241853).

Greer, M. (1992). *ID project management: Tools and techniques for instructional designers and developers.* Englewood Cliffs, NJ: Educational Technology.

Gustafson, K. L., & Branch, R. M. (2002). *Survey of instructional development models* (4th ed.). Syracuse, NY: ERIC.

Hardré, P. L., Ge, X., & Thomas, M. K. (2006). An investigation of development toward instructional design expertise. *Performance Improvement Quarterly, 19*(4), 63–90.

International Board of Standards for Training, Performance, and Instruction. (2000). *Instructional design competencies.* Retrieved February 12, 2011, from http://www.ibstpi.org/Competencies/instruct_design_competencies.htm.

Jonassen, D. H. (1997). Instructional design models for well-structured and ill-structured problem-solving learning outcomes. *Educational Technology Research and Development, 45*(1), 65–94.

Jonassen, D. H. (2008). Instructional design as design problem solving: An iterative process. *Educational Technology, 48*(3), 21–26.

Jonassen, D. H., & Hernandez-Serrano, J. (2002). Case-based reasoning and instructional design: Using stories to support problem solving. *Educational Technology Research and Development, 50*(2), 65–77.

Keppell, M. (2001). Optimizing instructional designer-subject matter expert communication in the design and development of multimedia projects. *Journal of Interactive Learning Research, 12*(2/3), 209–227.

Kirschner, P., Carr, C., van Merriënboer, J., & Sloep, P. (2002). How expert designers design. *Performance Improvement Quarterly, 15*(4), 86–104.

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.

Lewis, T. (2006). Design and inquiry: Bases for an accommodation between science and technology education in the curriculum? *Journal of Research in Science Teaching, 43*, 255–281.

Liang, C. C., & Schwen, T. (1997). A framework for instructional development in corporate education. *Educational Technology, 37*(4), 42–45.

Linstone, H. A., & Turoff, M. (1975). Introduction. In H. A. Linstone & M. Turoff (Eds.), *The Delphi method: Techniques and applications* (pp. 3–12). Reading, MA: Addison-Wesley.

Liu, M., Gibby, S., Quiros, O., & Demps, E. (2002). Challenges of being an instructional designer for new media development. *Journal of Educational Multimedia and Hypermedia, 11*, 195–219.

Mayer, R. E. (2003). The promise of multimedia learning: Using the same instructional design methods across different media. *Learning and Instruction, 13*, 125–139.

McDonald, J. K. (2008). Translate to communicate: Facilitating client understanding of design languages. In L. Botturi & T. Stubbs (Eds.), *Handbook of visual languages for instructional design: Theories and practices* (pp. 18–32). Hershey, PA: Information Science Reference.

Nelson, W. A. (1988). Selection and utilization of problem information by instructional designers. *Dissertation Abstracts International*, *50*(04), 866. (UMI No. 8913753).

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Thousand Oaks, CA: Sage.

Perez, R. S., & Emery, C. D. (1995). Designer thinking: How novices and experts think about instructional design. *Performance Improvement Quarterly, 8*(3), 80–95.

Perez, R. S., Johnson, J. F., & Emery, C. D. (1995). Instructional design expertise: A cognitive model of design. *Instructional Science, 23*, 321–349.

Reiser, R. A. (2007). What field did you say you were in? Defining and naming our field. In R. A. Reiser & J. V. Dempsy (Eds.), *Trends and issues in instructional design and technology* (2nd ed., pp. 2–9). Upper Saddle River, NJ: Pearson.

Romiszowski, A. J. (1981). *Designing instructional systems: Decision making in course planning and curriculum design*. New York: Kogan Page.

Rowland, G. (1992). What do instructional designers actually do? An initial investigation of expert practice. *Performance Improvement Quarterly, 5*(2), 65–86.

Rowland, G. (1993). Designing and instructional design. *Educational Technology Research and Development, 41*(1), 79–91.

Rowland, G., & DiVasto, T. (2001). Instructional design and powerful learning. *Performance Improvement Quarterly, 14*(2), 7–36.

Scheibe, M., Skutsch, M., & Schofer, J. (1975). Experiments in Delphi methodology. In H. A. Linstone & M. Turoff (Eds.), *The Delphi method: Techniques and applications* (pp. 262–287). Reading, MA: Addison-Wesley.

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.

Summers, L., Lohr, L., & O'Neil, C. (2002). Building instructional design credibility through communication competency. *Tech Trends, 46*(1), 26–32.

Sweller, J., van Merriënboer, J., & Paas, F. (1998). Cognitive architecture and instructional design. *Educational Psychology Review, 10*, 251–296.

Van Merriënboer, J. J. G., Kirschner, P. A., & Kester, L. (2003). Taking the load off a learner's mind: Instructional design for complex learning. *Educational Psychologist, 38*(1), 5–13.

Visscher-Voerman, J. I. A. (1999). *Design approaches in training and education: A reconstructive study*. Doctoral Dissertation, University of Twente, Enschede, The Netherlands.

Wedman, J., & Tessmer, M. (1993). Instructional designers' decisions and priorities: A survey of design practice. *Performance Improvement Quarterly, 6*(2), 43–57.

Williams van Rooij, S. (2011). Instructional design and project management: Complementary or divergent? *Educational Technology Research and Development, 59*, 139–158.

York, C. S., Ertmer, P. A., & Gedik, N. (2009). Extracting heuristics from expert instructional designers. In *Proceedings of the Association for Educational Communications and Technology* (Vol. 1, pp. 496–510), Louisville, KY.

Cindy S. York is an Assistant Professor of Educational Technology, Research & Assessment at Northern Illinois University. Her focus is on instructional design, online education, and teacher education.

Peggy A. Ertmer is a Professor of Learning Design and Technology at Purdue University. Her interests relate to helping students become expert instructional designers, specifically through the use of case- and problem-based learning methods.