Educating for an Instructional Design and Instructional Technology Future

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Abstract
The instructional design profession is evolving, and the way in which instructional designers and instructional technologists are educated will benefit from a reconsideration of the manner in which it is accomplished. A synthesis of recent thinking by professionals and educators is presented as perspectives for a possible career continuum and delineation of competencies and paradigms for the profession. A relationship to complex problem solving processes, and focus on learning and a career continuum are offered for consideration.

Keywords
instructional design; instructional technology; problem solving; education of instructional designers; instructional design processes; learning sciences; instructional design paradigms; instructional design competencies; career development.
Educators and professionals in instructional design and technology are acknowledging an emerging message that instructional design is changing as a profession. As the ideas around this change continue to grow, questions arise about what is being taught and how it should be taught to up and coming professionals. This article explores the changing landscape of instructional design / instructional technology which may prompt others to reflect in order to craft strategies that ensure accurate information is shared with learners regarding currency, vibrancy, and effectiveness of instructional design / technology theories and practices. What are some changes appearing in practices of instructional design and technology as they relate to learning, ways in which learning is offered, and various levels of expertise required of evolving instructional design and technology professionals? For purposes of this article and to promote discussion, the phrase, instructional design and instructional technology, will be shortened to instructional design. As opportunities for learning and performance expand, “it is becoming clearer within the instructional design community that modifications can enhance traditional design approaches in meeting the demands and opportunities of … learning environments” (Irlbeck, Jones, Kayes, Sims, 2006, p. 171). The goal of this article is to begin a conversation about changes in the ways instructional design concepts are taught and the possible career path for those in the instructional design profession.

The Past informs the Future

Professionals who have contributed much to the idea of the changing profession (Dijkstra, 2000; Jonassen, 1997; Reigeluth, 1999, 2009; Silber, 2007) echo the message that instructional design is a form of problem solving. Is instructional design a specific application of problem solving or a general approach to complex problem solving?

Silber (2007) claimed that “ID should be taught as ill-structured problem solving rather than as a procedure, using appropriate methods” (p. 13). Christensen and Osguthorpe (2004) expressed the concern that it is not known how instructional designers actually make instructional design decisions, raising doubts about whether ID processes are as procedural or prescriptive as once thought. Ertmer and Stepich (2005) referenced a key point by Jonassen that “ID is a complex, ill-defined skill that is largely (perhaps entirely) dependent on the context in which it is done” (p. 38). Christensen and Osguthorpe acknowledged Reigeluth, in that he “emphasized that prescriptive theory concerns what the instruction should be like, while the ID process outlines how to plan and prepare the instruction” (p. 46). Kim, Lee, Merrill, Spector, & van Merriënboer (2008) indicated that “Content has become readily available and rich in representational formats” which is creating a shift “from a content-centric perspective to a user-centric perspective” (p. 808), resulting in a shift from what is done with the content, away from the content itself, with greater awareness of context and process.

This shift away from having content presented is true for how instructional designers and technologists work as well, in that interventions are designed and created rather than content being presented. If teaching and learning paradigms are changing, instructional design approaches need to change, and this implies a need for a change in the way instructional designers are taught. If the learning paradigm is changing, then logically it is time for ID performance and teaching about instructional design and technology to change as well. The time has come to explore inventive approaches to educating ID professionals to think about and propose creative approaches in ever-changing content-rich environments.

Framework to Guide Reflection

Understanding ideas related to instructional design, principles, learning, problems, and problem solving set the stage for thoughts presented in this paper. What it means to be an instructional designer has changed from earlier times (1950s definition) to more current understanding of the role. An instructional designer
• “invents, conceptualizes or creates concrete products or materials for instructional or educational purposes …

• is responsible for the educational, instructional, or pedagogical aspects of the product…

• is able to reflect on his or her work” (Visscher-Voerman & Gustafson, 2004, p. 70).

The Association of Educational Communications and Technology (AECT) defines instructional technology as “the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning … a discipline devoted to techniques or ways to make learning more efficient based on theory but theory in its broadest sense, not just scientific theory” (AECT: 2. What is the Knowledge Base?, para. 4). These concepts – design, development, evaluation, processes, learning – are akin to the terms used by Visscher-Voerman & Gustafson to describe the role of an instructional designer.

Learning as depicted by Merrill (2002) is involvement of students in four phases, including “activation of prior experience, demonstration of skills, application of skills, and integration of these skills into real-world activities” (p. 44). This recent definition is a vastly different visualization than that of pouring knowledge into a learner’s head. A principle is “a relationship that is always true under appropriate conditions regardless of program or practice” (Merrill, 2002, p. 43). The idea of principle as Merrill used the term is related to instruction or Reigeluth’s ideas of basic instructional methods (1999). A principle describes a relationship that is stable under most conditions. Instructional designers strive to design effective interventions based on stable principles. A problem is “an unknown entity in some situation….finding or solving for the unknown must have some social, cultural, or intellectual value” (Jonassen, 2000, p. 65) – i.e., some reason for learning must exist. Jonassen explored complexity as it relates to instructional design and determined that “Problem solving is not … a uniform activity” (p. 110). Absent the premise of uniformity in instructional design processes, how can one determine skills and principles that instructional designers need to know in order to practice their profession? If a principle is a relationship that remains true under particular conditions, how does a principle-based approach help solve instructional design related problems? The challenge for the instructional design profession is to find ways to help instructional designers learn (ala Merrill’s previous definition), that is to rely on early experience, demonstrate skills, apply and integrate – to integrate stable principles and problem solving to reach an instructional design solution.

**Relationship of Instructional Design Principles and Problem Solving Processes**

Given the multiple premises that content is changing, context is important, and instructional design is about problem solving, one begins to adapt to the idea that “there isn’t a single set of principles and procedures that can be applied in the same way in every situation” (Ertmer & Stepich, 2005, p. 38). Indeed, Ertmer and Stepich proposed that instructional design is composed of two main tasks, problem finding and problem solving. If instructional design is an application of problem solving skills, how does this relate to the time-worn framework from the 1950s, ADDIE (analysis, design, development, implementation and evaluation)? Newell & Simon (1972) outlined four steps related to problem solving and Jonassen (1997) proposed a seven step process for problem solving. More recently Dijkstra (2000) identified five steps to a problem solving process as it relates to instructional design, while Ertmer and Stepich (2005) opened the discussion to a problem-solving framework. A comparison of these various instructional design problem solving processes is shared in Table 1.
Table 1. Comparing problem solving processes, expert thinking and instructional design processes.

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<tbody>
<tr>
<td><strong>Analysis</strong></td>
<td>Recognition of the existence of a problem and establishment of the goal state</td>
<td>1. Articulate problem space and contextual constraints 2. Learners articulate problem space and contextual constraints</td>
<td>1. Recognize original problem situation</td>
<td>- Problem finding - Synthesizing - Relationships</td>
</tr>
<tr>
<td><strong>Design</strong></td>
<td>Construction or evocation of appropriate problem space</td>
<td>3. Generate possible problem solutions. 4. Assess the viability of alternative solutions</td>
<td>2. Develop situations. 4. Decide whether to operate on reality or on a representation of reality.</td>
<td>- Synthesizing - Relationships - Underlying principles</td>
</tr>
<tr>
<td><strong>Development</strong></td>
<td>Selection and application of operators, actions or decisions that...</td>
<td>5. Monitor the problem space and solution options.</td>
<td>3. Find a balance between tutorial and experiential activities</td>
<td>- Problem solving - Implications</td>
</tr>
<tr>
<td><strong>Implementation</strong></td>
<td>Move the problem through the problem space</td>
<td>6. Implement and ...</td>
<td>5. After solving a number of problems, desired knowledge and skills should develop and new problems attempted.</td>
<td>- Implications - Reflections - Flexibility</td>
</tr>
<tr>
<td><strong>Evaluation</strong></td>
<td>Evaluate the new knowledge state attained</td>
<td>… monitor the solution. 7. Adapt the solution.</td>
<td></td>
<td>- Reflections</td>
</tr>
</tbody>
</table>

While one can see commonalities across instructional design and problem solving processes as depicted in Table 1, the positioning of the concepts related to problem solving compared to creating instructional solutions creates opportunities to explore learning and teaching in new ways. These opportunities help advanced instructional designers focus on a variety of solutions and approaches to enhance learning (divergence) rather than strive to have the learner achieve a predefined goal (convergence). The change in focus from convergence to divergence for advanced instructional designers brings a change in considerations of possible outcomes. Not all problem solving steps described in Table 1 were framed in terms of instructional design. Some were suggested for learners and others for designers. One alluded to the need to consider revision or adaptation of an earlier problem solution (Jonassen, 1997), which has been an important part of past instructional design processes, where the product or intervention is evaluated with the idea of revising in order to improve outcomes. This will still be an important element of learning design processes. By reviewing various problem solving processes, one begins to sense that instructional design activities are loosely aligned with generic steps for problem solving strategies. These are skills that will enable advanced instructional designers to understand and implement complex learning interventions. How do advanced instructional designers go about creating innovative solutions to complex learning challenges? Problem solving skills should become a part of the advanced instructional designer’s toolkit.
Expertise at the Heart of the Discussion

Sims & Koszalka (2008) began to address advanced roles and skills instructional designers may need with the point that it “may no longer be the instructional designer’s role to define, but rather … to enable [emphasis added] the individual participants to adapt the learning environment to their individual and contextual needs” (p. 573). Current thinking may be moving toward the idea that instructional design is a field of learning sciences as suggested by Jonassen, Cernusca, & Ionas, (2007). More than a decade earlier, Jonassen (1997) made the point that instructional design is a problem solving process, and ill-structured problem solving can be thought of as a design process, rather than a systematic procedure for problem solutions (p. 79), ala the instructional design systems approach of the past; and Dijkstra (2000) made the point that design problems are “more challenging than more directive and confined learning tasks and goals” (p. 218). Jonassen, Cernusca and Ionas (2007) concurred that theories guiding the profession are changing. Sims et al. (2008) increased the volume of the message by claiming that “it becomes imperative to reposition the roles and skill sets of instructional designers to the extent that the term instructional design might even be replaced by learner/learning design” (p. 574), carrying forward the idea of learning sciences suggested by Jonassen, et al. and focusing attention on learning rather than instruction. Sims (2008) is carrying these ideas forward via an exploration of an instructional design model that begins to focus on strategic, team-based, interactive, personalized, and emergent approaches of proactive learning design.

A strong theoretical foundation is needed to support this potential transition and promote further discussion by the instructional design profession. Instructional design was and is informed by cognitive psychology literature where the premise is that teaching involves well-structured procedures (Silber, 2007, p. 11)... but a significant development in the past five years has resulted in a move away from the cognitive psychology literature and/or information processing theories as evidenced by ideas that “Content has become readily available and rich in representational formats” (Kim, et al., 2008, p. 808), which is creating a shift “from a content-centric perspective to a user-centric perspective” (p. 808). This shift results in a change for considering what is done with the content, not the content itself; and this shift begins to change theories and foundations of instructional design practices. As Kim et al. (2008) emphasized, “…learning tools are changing. Learning tasks are changing. Learning perspectives are changing” (p. 811). Changes regarding learning as acquisition of artifacts and the ways in which learning is beginning to occur need to inform the ways in which instructional designers begin the transition and growth from the historical beginning stages to more advanced stages of thinking about learning interventions.

Jonassen, Cernusca, and Ionas (2007) explored the emergence of a new academic discipline, the “learning sciences” (p. 45), of which constructivism is a foundation, and emphasized constructivism as an epistemology. Gall, Gall and Borg (2003) defined epistemology as a “branch of philosophy that studies the nature of knowledge and the process by which knowledge is acquired and validated” (p. 13) and continue the concepts of a paradigm shift with a discussion of postpositivism where “individuals construct their selves and the features of their social environment” (p. 16). Constructivism as an epistemology provides a strong basis for the field of instructional design and thinking about learning and performance interventions. To emphasize this, Jonassen, Cernusca and Ionas pointed out that “Constructivism is primarily an epistemological and ontological conception of what reality, knowledge, the mind, thought, and meaning are … constructivists … believe that reality is constructed by individuals and social groups based on their experiences with and interpretations of the world” (p. 46). Siemens (2005) and Downes (2005) explore the concept of connectivism, “a theoretical framework for understanding learning … the starting point for learning occurs when knowledge is actuated through the process of a learner connecting to and feeding information into a learning community” (Kop & Hill, 2008, p. 2). Embracing these ideas moves thinking about instructional design solutions away from communicating with learners and toward engaging learners in a learning process. Constructivism is changing the emphasis of instructional design, resulting in a shift from attempts to communicate to students about the world in efficient ways to attempts to create learning situations that promote the efficient engagement or immersion of learners in the practice of their fields … and fields of
practice. (Jonassen, Cernusca, & Iona, 2007, p. 46-47). Sims and Stork (2009) reinforce this concept when they emphasize that “the role of instructional design needs to be repurposed so that pre-defined assumptions about the learner are struck from the design process and replaced with an emphasis on what a learner might or could do with the content and activities to achieve course objectives as well as their own educational goals. … instructional designers must create plans that allow learners to impose their own socio-cultural contexts to the course strategies and content” (p. 1). This is indeed a paradigm shift from the traditional approach to instructional design for learning.

**Emerging Career Ladder for the Instructional Design Profession**

Based on the previous points, the time has come 1) “for reinventing common instructional design practices by advocating an approach where design focuses on the individual learner achieving meaningful and situated outcomes from their engagement and encounters with a course of study … through the creation of relevance taken up by the learner….” (Sims & Stork, 2008, p. 6); and 2) for considering a continuum of instructional design professions, skills, and areas of influence. By way of comparison, consider another profession that extensively uses problem solving skills. In the medical profession, one finds general practitioners, physicians’ assistants, and specialists, nurse practitioners and other medical personnel. Regarding instructional design, Kim, et al. (2008) made the point that “At the master’s level, the emphasis should shift from training students to be users of instructional technology to preparing them to manage, supervise, and inspire those who use instructional technology…” (p. 814). Does this make the master’s level student the general practitioner of the instructional design field and those who use instructional technology the physicians’ assistants and/or the nurse practitioners? Further, Kim, et al. make the point that

A doctoral student in instructional design should be able to identify, modify, and develop an instructional design theory (this corresponds to an advanced instructional design competency….). … should conduct extensive product and research literature reviews related to the theory of interest…. Conduct additional original empirical research related to the theory development…. Also develop tools that implement the theory in an appropriate context or setting…. Demonstrate use of … tools for the design of instruction and evaluate or supervise the evaluation of instructional products developed by the use of these tools in a field setting (p. 814).

Given the analogy of the medical profession and the recent expectations related to highly trained instructional designers, an instructional design professional with an advanced degree may be considered equivalent to a medical specialist with the additional training and experience required to participate in higher level problem solving activities espoused by experts in the field. A continuum of education and experience in instructional design needs to be explored that helps move an instructional design professional from early practitioner stages to the later scholarly and visionary stages.

Ertmer, Stepich, York, Stockman, Wu, Zurek and Goktas (2008) completed a study that “examined how instructional design (ID) experts used their prior knowledge and previous experiences to solve an ill structured instructional design problem” (p. 17). Based on results of their study, three specific strategies were suggested for educating designers:

(1) helping students conceptualize the key issues in an ill-structured problem by scaffolding their analysis efforts to be more expertlike; (2) helping students accumulate a variety of ID experiences, directly or vicariously, that they can draw on when faced with an unfamiliar design situation; and (3) enabling students to index these experiences in a way that facilitates efficient recall of relevant cases and principles when solving future ID problems (p. 38).
Sims and Koszalka (2008) maintain that

“… the next generation of designers, instructors, and educators needs to develop competencies that expand upon or even replace those that have been considered essential (Richey, et al., 2001). Certainly these competencies should emphasize that technologies are tools to think and learn with rather than objects to engage with and possibly learn from. (p. 571)

The implication is that education and professional development of instructional designers moves from a focus on technology and process to ideas related to principles and learning sciences, strategizing and complex problem solving. The challenge for the profession is to consider the continuum of knowledge and practices that depict the journey from novice to advanced instructional designer. This continuum is now in the beginning stages of development as denoted by recent terms and descriptions such as designer by assignment, faculty designer, web designer, instructional technologist and others.

Merrill (2002) coined the term, designer by assignment, to denote someone who has content expertise and is given the role of designing and developing a learning intervention for a specific situation, content area, and/or industry. This designer by assignment may align with earlier described practitioner roles of instructional design, similar to the earlier medical analogy of the intern, nurse practitioner or physician’s assistant role in relation to the general practitioner. Designers by assignment have knowledge of their field and some specific skills to help them accomplish limited design and development. What are the educational and experiential requirements to move beyond this level? There is both room for and a need for various levels of instructional design expertise and practice within the instructional design profession.

The rungs of this future career ladder are also reflected in numerous paradigms in which instructional designers find their work. How does the instructional design profession relate to career ladders in other problem solving professions? Vischer-Voerman and Gustafson (2004) described four paradigms indicating that “Philosophy provided a useful background for helping trace back the origins of the different design approaches to different basic types of design paradigms, each reflecting different stances toward the world in general, and toward design in particular” (p. 76). The four paradigms were

- Instrumental paradigm: planning-by-objectives.
- Communicative paradigm: communication to reach consensus.
- Pragmatic paradigm: interactive and repeated tryout and revision.
- Artistic paradigm: creation of products based on connoisseurship. (p. 76).

These paradigms are reminiscent of various work-related environments and build one upon another from the designer by assignment to the high level instructional design problem solver. Table 2 provides a point of reference to begin exploring ideas about how the paradigms fit into levels of specialities or roles related to instructional design.

Table 2. Potential Instructional design professional levels and paradigms

<table>
<thead>
<tr>
<th>ID paradigms ala Vischer-Voerman &amp; Gustafson (2004)</th>
<th>Level of specialization</th>
<th>Professional contexts</th>
<th>Education levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumental paradigm</td>
<td>Designer by assignment</td>
<td>Public school teachers; Curriculum and development leaders; Manufacturing/task</td>
<td>Bachelors Content expertise in a field (experience or</td>
</tr>
<tr>
<td>ID paradigms ala Vischer-Voerman &amp; Gustafson (2004)</td>
<td>Level of specialization</td>
<td>Professional contexts</td>
<td>Education levels</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
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</tr>
<tr>
<td>Communicative paradigm</td>
<td>Human performance improvement professionals; Technology specialists</td>
<td>Human performance technologists; Business analysts; Curriculum specialists; Instructional designers; Project managers; Process improvement specialists</td>
<td>Masters</td>
</tr>
<tr>
<td>Pragmatic paradigm</td>
<td>Efficiency consultants; process improvement specialists; Training directors</td>
<td>Human performance technologists; Course development leaders; Managers of online course development; College faculty</td>
<td>Masters and Doctorate</td>
</tr>
<tr>
<td>Artistic paradigm</td>
<td>Cutting edge of thinking about web-based learning; new technologies; new paradigms about learning</td>
<td>Higher education; Education entrepreneurs; Visionary education leaders; Advanced instructional designers</td>
<td>Doctorate</td>
</tr>
</tbody>
</table>

The role descriptions in Table 2 could be presented as continuing rather than discrete contexts, giving credence to the idea of a continuum or career ladder, indicating novice to expert and laying the foundation for the notion of beginning to more advanced skill requirements and theoretical foundations. Considering these contexts brings one back to the more recent definition of instructional designer (Vischer-Voerman & Gustafson, 2004) as one who creates instructional interventions, needing to clearly understand and provide direction for educational, instructional, and/or pedagogical aspects of the intervention, and able to reflect upon and improve one’s work. The three elements of the definition about what an instructional designer does can occur at various levels of effort within various settings and for various outcomes. Each level, setting and outcome calls for a different set of competencies. Each rung of the career ladder implies that earlier skills inform skills needed on the higher/more advanced rungs. Smith (2008) noted that there are few if any institutions that prepare bachelor’s level skilled instructional designers. It may be time to focus attention on both the lower rungs and upper rungs of the career ladder as certain skills benefit various levels of specialization. If – as Ertmer and Stepich and other experts maintain – there is no one standard package of principles and procedures to apply for every situation, now may be the time to consider a system where early competencies are shown to be mastered as one moves on to more advanced levels of instructional design expertise.

**A Call for Further Reflection**

Sims and Koszalka (2008) emphasized that

… when considering existing sets of competencies for the instructional designer, we also must be very aware that significant social and technological changes are impacting the way we teach and the way we learn. As a consequence, it is essential that those who practice instructional design build new understandings of emergent learning environments to ensure that their practice is current and relevant. (p. 574)
Sims’ and Koszalka’s perspectives lend credence to the idea of higher level scholarly and strategic thinking by advanced instructional designers which implies skills to be gained through experience and higher education. The concept also brings one full circle to skills and competencies needed by both beginning and more experienced and highly educated instructional designers. Is it time to move away from emphasizing the time-worn ADDIE framework and various procedural approaches for instructional design toward an instructional design world that emphasizes an epistemological approach of constructivism and a focus on problem solving skills and principles, creating effective learning and performance outcomes? The time has come for the instructional design profession to determine how to achieve what Kim, et al. (2008) described as performance and “instructional models [that] will become more flexible with regard to time, place, and content and will also allow for richer varieties and mixes of learning support, including more support for guided and self-directed learning” (p. 810).

The instructional design profession has the expertise to devise ways to begin to migrate procedure-based approaches to the foundational archives and historical roots of instructional design and begin to help emerging instructional design professionals focus on complex problem-solving approaches, consider learning sciences, re-focus on learning (rather than teaching), and promote a shift in paradigms for the instructional design profession. Reflecting on visions articulated by professionals who have “lived” the early years of instructional design (Jonassen, Merrill, Moore, Reigeluth, Silber and others) will help create a path toward principle-based instructional design and high level performance-based problem solving, integrating the use of technology to further impact performance and learning.
References


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