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Instructional Design Models

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Researchers and practitioners have spent the past 50 years attempting to define and create models of design with the intent to improve instruction. As part of a joint, inter-university project, Barson (1967) defined instructional development as the systematic process for improving instruction. Perhaps most interesting about this project and subsequent report is the caution that many different conditions influence learning, including the use of media, and that generalizing any sort of model would potentially be hazardous at best and disastrous at worst. Shortly thereafter, however, Twelker, Urbach, and Buck (1972) noted that a systematic approach to developing instruction was an increasingly popular idea, but cautioned that instructional design (ID) methods varied from simple to complex. These historical observations predicted the reality that every instructional design project is unique every time with no two projects ever progressing through the process identically. These differences, sometimes subtle while at other times significant, have given way to literally dozens of different models used with varying popularity in a wide variety of learning contexts.

Figure 1. Mushrooms

In the midst of this explosion of models and theories, Gustafson (1991) drafted his first monograph that would go on to become the Survey of Instructional Development Models, now in its fifth edition (Branch & Dousay, 2015). The book provides brief overviews of instructional design models, classifying them within the context of classroom product- and process-oriented instructional problems. The Surveys book provides a concise summary to help beginning instructional designers visualize the different design approaches as well as assist more advanced instructional designers. However, this text is just one of many often used in the study and practice of instructional design, and those seeking to expand their knowledge of design process can learn much from the rich history and theoretical development over decades in our field. (See Resources section for suggestions.) In this chapter, we explore a brief history of instructional design models, common components of models, commonly referenced models, and resources and advice for instructional designers as they engage in the instructional design process.

Historical Context

The field of Learning and Instructional Design Technology (LIDT) has had many periods of rapid development. Reiser (2001) noted that training programs during World War II sparked the efforts to identify efficient, systematic approaches

to learning and instructional design. It would be another 20 years before the first models emerged, but the 1960s and 1970s gave way to extracting instructional technology and design processes from conversations about multimedia development (Reiser, 2017), which in turn produced more than three dozen different instructional design models referenced in the literature between 1970 and 2005 (Branch & Dousay, 2015; Gustafson, 1991, 1991; Gustafson & Branch, 1997, 2002). These models help designers, and sometimes educational stakeholders, simplify the complex reality of instructional design and apply generic components across multiple contexts (Gustafson & Branch, 2002), thus creating standardized approaches to design within an organization. In turn, Molenda (2017) noted that the standardization of processes and terminology triggered interest in the field. Thus, an interesting relationship exists between defining the field of instructional design and perpetuating its existence. As designers seek to justify their role in education–whether K-12, higher education, or industry–they often refer to existing models or generate a new model to fit their context. These new models then become a reference point for other designers and/or organizations.

But Where Do We Go From Here?

Despite some claims that classic instructional design is dead, or at least seriously ill (Gordon & Zemke, 2000), there remains considerable interest in and enthusiasm for its application (Beckschi & Doty, 2000). This dichotomous view situates the perceived ongoing debate between the theory of instructional design and its practice and application. On one hand, scholars and faculty in higher education often continue to research and practice based upon historical foundations. On the other hand,

scholars and practitioners in industry often eschew the traditional literature, favoring instead more business-oriented practices. Looking at the authors of various texts consulted in higher education (see Branch, 2009; Carr-Chellman & Rowland, 2017; Richey, Klein, & Tracey, 2010 for examples) versus those consulted in industry (see Allen & Seaman, 2013; Biech, 2014; Carliner, 2015; Hodell, 2015 for examples) confirms this dichotomy. New professionals entering the field, should be aware of this tension and how they may help mitigate potential pitfalls from focusing either too much on foundational theory or too much on practitioner wisdom. Both are essential to understanding how to design instruction for any given audience.

Process vs. Models

The progression of analyzing, designing, developing, implementing, and evaluating (ADDIE) forms the basic underlying process (illustrated in Figure 2) that is a distinct component of instructional design regardless of which model is used (Gustafson & Branch, 1997). Branch (2009) said it well when he conceptualized the phases of the ADDIE process as follows:

Figure 2. The ADDIE Model

1. Analyze – identify the probable causes for a performance gap,

2. Design –verify the desired performances and appropriate testing methods,
3. Develop – generate and validate the learning resources,
4. Implement – prepare the learning environment and engage the students,
5. Evaluate – assess the quality of the instructional products and processes, both before and after implementation (p. 3).

Notice the use of the phrase process rather than model. For instructional design purposes, a process is defined as a series of steps necessary to reach an end result. Similarly, a model is defined as a specific instance of a process that can be imitated or emulated. In other words, a model seeks to personalize the generic into distinct functions for a specific context. Thus, when discussing the instructional design process, we often refer to ADDIE as the overarching paradigm or framework by which we can explain individual models. The prescribed steps of a model can be mapped or aligned back to the phases of the ADDIE process.

Figure 3. The PIE Model

Consider the following examples. The Plan, Implement, Evaluate (PIE) model from Newby, Stepich, Lehman, and Russell (1996) encourages an emphasis on considering how technology assists with instructional design, focusing on the what, when, why, and how. This phase produces an artifact or plan that is then put into action during implementation followed

by evaluating both learner performance and instruction effectiveness. During planning, designers work through a series of questions related to the teacher, learner, and technology resources. The questions are answered while also taking into consideration the implementation and evaluation components of the instructional problem. When considered through the lens of the ADDIE process, PIE combines the analyzing, designing, and developing phases into a singular focus area, which is somewhat illustrated by the depiction in Figure 3. Similarly, the Diamond (1989) model prescribes two phases: "Project Selection and Design" and "Production, Implementation, and Evaluation for Each Unit." Phase I of the Diamond model essentially combines analyzing and designing, while Phase II combines developing, implementing, and evaluating. (See Figure 4 for a depiction of the model.) Diamond placed an emphasis on the second phase of the model by prescribing an in-depth, parallel development system to write objectives, design evaluation instruments, select instructional strategies, and evaluate existing resources. Then, as new resources are produced, they are done so with consideration to the previously designed evaluation instruments. The evaluation is again consulted during the implementation, summative evaluation, and revision of the instructional system. These two examples help demonstrate what is meant by ADDIE being the general process and models being specific applications. (For further discussion of how aspects of specific models align with the ADDIE process, see Dousay and Logan (2011).)

Figure 4. The Diamond Model

This discussion might also be facilitated with a business example. Consider the concept of process mapping; it helps organizations assess operational procedures as they are currently practiced (Hunt, 1996). Mapping the process analytically to identify the steps carried out in practice leads to process modeling, an exercise in optimization. In other words, modeling helps move processes to a desired state tailored to the unique needs of an organization. Many businesses of a similar type find that they have similar processes. However, through process modeling, their processes are customized to meet their needs.

The relationship between ADDIE and instructional design models functions much like this business world scenario. As instructional designers, we often follow the same process (ADDIE). However, through modeling, we customize the process to meet the needs of our instructional context and of our learners, stakeholders, resources, and modes of delivery. Models assist us in selecting or developing appropriate operational tools and techniques as we design.

Finally, models serve as a source of research questions as we

seek to develop a comprehensive theory of instructional development. Rarely are these models tested through rigorous assessment of their results against predetermined criteria. Rather, those ID models with wide distribution and acceptance gain their credibility by being found useful by practitioners, who frequently adapt and modify them to match specific conditions (Branch & Dousay, 2015, p. 24). Thus, popularity serves as a form of validation for these design models, but a wise instructional designer knows when to use, adapt, or create a new model of instructional design to fit their purposes.

Models

Because there are so many different ID models, how do we choose which one to use? In framing this conversation, the Survey of ID models (Branch & Dousay, 2015) serves as a foundation, but by no means should be the sole reference. A total of 34 different instructional design models (see Table 1 for a summary) have been covered in the Survey text since its first edition, and this list does not include every model. Still, this list of models is useful in providing a concise guide to some of the more common approaches to instructional design.

Table 1

Instructional Design Models included in editions of the Survey text

Model Name	1st Ed 1981	2nd Ed 1991	3rd Ed 1997	4th Ed 2002	5th Ed 2015
Banathy (1968)	x				

DeCecco (1968)	x				
Blake & Mouton (1971)	x				
Briggs (1970)	x				
Baker & Schutz (1971)	x				
Gerlach & Ely (1971)	x	x	x	x	x
Instructional Development Institute (Twelker et al., 1972)	x	x	x		
Learning Systems Design (Davis, Alexander, & Yelon, 1974)	x				
IPISD (Branson, Rayner, Cox, Furman, & King, 1975)	x	x	x	x	x
Blondin (1977)	x				
Morrison, Ross, Kemp, & Kalman (Kemp, 1977)	x	x	x	x	x
Dick, Carey, & Carey (Dick & Carey, 1978)		x	x	x	x
Gilbert (1978) Front End Analysis	x				
Courseware Development Process (Control Data Corporation, 1979)	x				
ASSURE (Heinich, Molenda, & Russell, 1982)		x	x	x	x
Diamond (1989)		x	x	x	x
Dick & Reiser (1989)		x	x		
Van Patten (1989)		x	x		
Bergman & Moore (1990)		x	x	x	x
Leshin, Pollock, & Reigeluth, (1992)		x	x		

IPDM (Gentry, 1993)			x	x	x
Smith & Ragan (1993)			x	x	x
de Hoog, de Jong, & de Vries (1994)				x	x
Bates (1995)				x	x
PIE (Newby et al., 1996)				x	x
4C/ID (van Merriënboer, 1997)					x
ISD Model 2 (Seels & Glasgow, 1997)		x		x	x
CASCADE (Nieveen, 1997)				x	x
Rapid Collaborative Prototyping (Dorsey, Goodrum, & Schwen, 1997)				x	x
UbD (Wiggins & McTigue, 2000)					x
Agile (Beck et al., 2001)					x
3PD (Sims & Jones, 2002)					x
Pebble in the Pond (Merrill, 2002)					x
ILDF (Dabbagh & Bannan-Ritland, 2004)					x
TOTAL	13	12	13	15	21

Note. All references refer to the original or first edition of a model; however, the current name of the model as well as current scholars affiliated with the model may vary from the original iteration.

When considering the models featured in Table 1, determining which one to use might best be decided by taking into account a few factors. First, what is the anticipated delivery format? Will the instruction be synchronous online, synchronous face to face, asynchronous online, or some combination of these formats? Some models are better tailored for online contexts, such as Dick and Carey (1978); Bates (1995); Dabbagh and Bannan-Ritland (2004); or Morrison, Ross, Kemp, Kalman, and Kemp (2012). Another way to think about how to select a model involves accounting for the context or anticipated output. Is the instruction intended for a classroom? In that case, consider Gerlach and Ely (1971); ASSURE (Smaldino, Lowther, Mims, & Russell, 2015); PIE (Newby et al., 1996); UbD (Wiggins & McTigue, 2000); 4C/ID (van Merriënboer & Kirschner, 2007); or 3PD (Sims & Jones, 2002). Perhaps the instructional context involves producing an instructional product handed over to another organization or group. In this case, consider Bergman and Moore (1990); de Hoog et al. (1994); Nieveen (1997); Seels and Glasgow (1997); or Agile (Beck et al., 2001). Lastly, perhaps your context prescribes developing a system, such as a full-scale curriculum. These instructional projects may benefit from the IPISD (Branson et al., 1975); Gentry (1993); Dorsey et al. (1997); Diamond (1989); Smith and Ragan (2004); or Pebble in the Pond (Merrill, 2002) models. Deciding which model to use need not be a cumbersome or overwhelming process. So long as a designer can align components of an instructional problem with the priorities of a particular model, they will likely be met with success through the systematic process.

Other ID Models

Figure 5. Plompt's OKT Model

While we cannot possibly discuss all of the ID models used in practice and/or referenced in the literature, there are a few other instructional design models that are useful to mention because of their unique approaches to design. For example, Plomp's (1982) OKT model (see Figure 5), which is taught at the University of Twente in The Netherlands, looks quite similar to the ADDIE process, but adds testing/revising the instructional solution prior to full implementation. When OKT was initially introduced, online or web-based instructional design had not yet become part of the conversation. Yet, his model astutely factors in the technology component not yet commonly seen in other ID models referenced at the time. Notice how the OKT process calls for a close relationship between implementation and the other phases as well as alignment between evaluation and the other phases. This design facilitates internal consistency in decision making. The intent here was to ensure that design decisions relating to technology-based resources were consistently applied across the instructional problem.

At their core, instructional design models seek to help designers overcome gaps in what is learned due to either instruction, motivation, or resources. Thus, some models seek to address non-instructional gaps, like motivation. See Keller's (2016) work on motivational design targeting learner attention,

relevance, confidence, satisfaction, and volition (ARCS-V). Other models examine strategies related to resources, like technology or media integration. Examples here include Action Mapping (Moore, 2016); Substitution, Augmentation, Modification, Redefinition (SAMR) Model (see Hamilton, Rosenberg, & Akcaoglu, 2016 for a discussion); and TPACK-IDDIRR model (Lee & Kim, 2014). And still other models consider other gaps and needs like rapid development. (See the Successive Approximation Model (SAM) from Allen Interaction, n.d.)

Recently, many instructional designers have emphasized the design gaps in ID, drawing upon the broader field of design theory to guide how designers select and arrange constructs or components. One model, known as Design Layers (Gibbons, 2013), helps designers prioritize concerns encountered during the ID process and may overlay with an existing or adapted ID model being followed. In other words, a designer may use design layers to organize the problems to be addressed, but still use other models based on ADDIE processes to solve some of these problems. While unintentional, the field of instructional design often focuses on corporate and adult learning contexts, sometimes feeling exclusionary to the K-12 instructional designer (note: UbD, Wiggins & McTigue, 2000, is one of the more well-known ID models also used by K-12 teachers and instructional facilitators). Carr-Chellman's (2015) Instructional Design for Teachers (ID4T) model and Larson and Lockee's (2013) Streamlined ID represent attempts to break down some of the complex perceptions of ID, making it more accessible for K-12 teachers and newer instructional designers.

The primary takeaway from this entire discussion should be

that ID is rarely a simple process. In practice, designers often draw upon personal experience and the wide variety of models, strategies, and theories to customize each instance of instructional design.

Tips From the Field

While working on this chapter, I thought it might be interesting to crowdsource advice and tips. We live, research, and teach in the age of social constructivism. So, why not apply the theory in a way that might have a far reaching and lasting impact? The following short quotes about the practice of ID and ID models from scholars, students, and (above all) practitioners provide focused advice that are good tips for the beginning designer and great reminders for the more advanced designer.

- Focus on the systematic and iterative process of instructional design. Models are not discrete steps to be checked off. [Kay Persichitte, University of Wyoming]
- The ADDIE paradigm is fundamental to most models, with appropriate evaluation of each step implied. [Jon Anderle, University of Wyoming]
- Be aware of the tension in the field between theory and practice. [Tara Buñag, University of the Pacific]
- Practicing ID means considering all of the available tools. It’s too easy for a designer to fixate on a single instructional technique as a panacea. [Rhonda Gamble, Sweetwater County School District #1]
- In addition to the regular resources often referenced, don’t forget to look at the works of Robert F. Mager. They are foundational to the field. [Landra Rezabek, retired University of Wyoming]

- It bears repeating often; the reality of the instructional design practice is unique and complex each and every time. [Camille Dickson-Deane, University of Melbourne]
- Careful and purposeful instructional design brings an inherent positivity to learning. [Terry Callaghan, Albany County School District #1]
- A dollar spent on formative evaluation pays off tenfold when it comes to implementation of a new course or program. [Tom Reeves, retired The University of Georgia]
- Consider Robert Mager's performance analysis flowchart or Ruth Clark's Content-Performance Matrices for teaching procedures, processes, facts, concepts, and principles. All are brilliant! [Marcy Brown, The CE Shop, Inc.]
- When building out your toolbox, take a look at Cathy Moore and her Action Mapping. [David Glow, Restaurant Magic Software]
- Build opportunities into online courses to collect data and conduct research about the course design, organization, assessments, and teaching effectiveness. This can be used for iterative enhancements. [Athena Kennedy, ASU Online]
- Educate stakeholders involved in the ID process on what you do and why you do it. This is crucial for successful collaboration in design and development. [Megan C. Murtaugh, IDT Consultant]
- Instructional design is a creative process. [Rob Branch, The University of Georgia]
- Understand the systemic implications of what you propose. If you don't know the difference between systemic and systematic, please familiarize yourself—it will have vast implications. Please know that models of ID

are specifically pedagogical in purpose. They teach you the basics, but the real ID process is not captured by a model. Instead you have to approach it more as art, as a holistic process. [Ali Carr-Chellman, University of Idaho]

- Think about what good instruction means. Are you following a sound design procedure, e.g., ADDIE? Are you adhering to best practices of the professional community? Are your strategies supported by learning theory? Are design decisions validated by demonstrated gains on pre- and post- measures? Each of these has a role in creating good instruction, but don't forget to meet the needs of learners, especially those at the margins. [Brent Wilson, University of Colorado Denver]
- Robert F. Mager (1968) once noted that, "If telling were teaching, we'd all be so smart we could hardly stand it." When working on the phase of any model that involves material development, designers must be careful with overloading learners with information. Further, presenting information must consider what Hugh Gardner, a professor at the University of Georgia, used to call the "COIK" phenomenon; Clear Only If Known. This phenomenon encourages breaking down complex language, avoiding jargon, and making expert knowledge accessible. These tasks are not easy, but must be part of the process. [Marshall Jones, Winthrop University]

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Application Exercises

- While processes and models can be useful, why do you think it is important to maintain flexibility in designing instruction?
- What are some things to consider when selecting an instructional design model?

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Further Resources

The following textbooks, chapters, and articles represent a broad collection of discussion, debate, and

research in the field of learning and instructional design. The list has been compiled from resources such as the Survey of Instructional Design Models (Branch & Dousay, 2015), reading lists from graduate programs in LIDT, and publications sponsored by the Association for Educational Communications & Technology. However, the list should not be considered exhaustive. It is merely provided here as a possible starting point for individuals or organizations seeking to learn more about the field and how models are developed and implemented.

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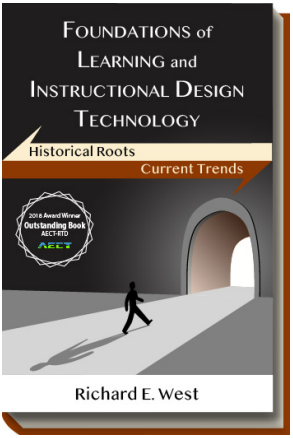

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