Instructional Design Models

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Design | Instructional Design | Instructional Design Models

Phases of rapid development in the field of learning and instructional design technology have given way to dozens of instructional design models. These models often form the foundation of instructional design courses, introducing students to the field. However, broad and specific misconceptions often drive new designers to overly rely on models to guide them through an applied instructional design process. 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 development process.

Researchers and practitioners have spent the past 60 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. While the project report provides a guiding definition to frame and study instructional design (ID), it also cautions that many different conditions influence learning, including the use of media and the hazards of generalizing any sort of model. This caution continues to serve as a limitation on ID practice and research, as evidenced by current and past ID models.

Soon after World Wars I and II, experts in the field recognized that systematic approaches to developing instruction were a popular idea, highlighting that ID methods vary from simple to complex (Twelker et al., 1972). These historical observations predicted the reality where every instructional design project is always unique, with no two projects progressing through the design process the same way. The differences, sometimes subtle while at other times significant, have given way to dozens of different models used with varying popularity in a wide variety of learning contexts.

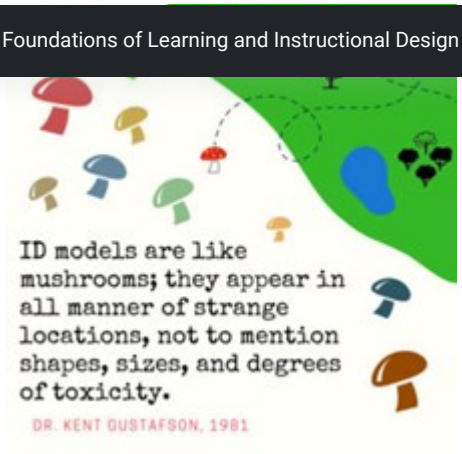

Figure 1. Mushrooms

In the midst of an explosion of models and theories, Gustafson (1991) drafted his first monograph that would 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. Also known as "the pencils book," this resource provides a concise summary to help novice instructional designers visualize different design approaches. It also assists more advanced instructional designers with an annotated bibliography on current practice and research. However, this text is just one of many often used in the study and practice of instructional design. Those seeking to expand their knowledge of design processes can learn much from the rich history and theoretical development over decades in the field. (See the Additional 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 experienced 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 literature between 1970 and 2005 (Branch & Dousay, 2015; Gustafson, 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. However, Molenda (2017) observed that standardization of processes and terminology triggered interest in the field. This presents an interesting relationship 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. This relationship contributes to contentions when teaching and practicing ID.

Differences exist between academic instructional design and industry expectations when it comes to how instructional design models are referenced and used. Many introductory instructional design courses introduce students to models and rely on models to guide students through an applied instructional design process. Within these introductory courses, students who are new to the field have an opportunity to navigate the instructional design process in a scaffolded manner led by their instructor.

More specifically, coursework can use models as a mechanism to explore ID aptitudes. Several studies conducted over the last decade examined competencies expected of instructional designers (Ritzhaupt & Kumar, 2015; Ritzhaupt & Martin, 2014). These studies support the need for instructional designers to be knowledgeable of design and commonly recognized design processes. Further, context analysis studies of instructional design job postings reveal that employers expect instructional designers to be knowledgeable about a variety of processes and models such as ADDIE, Agile, SAM, Rapid deployment, Bloom's taxonomy, ARCS, and Gagne's Conditions of Learning (Kang & Ritzhaupt, 2015; Klein & Kelly, 2018; Raynis, 2018; Wang et al., 2021). Recognizing that job postings explicitly ask instructional designers to demonstrate knowledge and application of instructional design models, we suggest that instructional design programs prepare students to recognize multiple instructional design models in addition to understanding how to navigate through the instructional design process while using a systemic lens.

Learn More

Listen to Dr. Jill Stefaniak discuss the systemic consequences of the models designers use in the real world:

https://open.spotify.com/episode/303XBqCaMKGNV0YkEwKpIz

Systemic Nature

In addition to criticisms that ID models do not accurately convey the iterative nature of design, others denounce models for a lack of systemic implications. In a systematic review examining the systemic reach of ID models, Stefaniak and Xu (2020) found that a majority of studies did not address the interrelationships between instructional processes and activities related to instructional design. Rather, applications rely heavily on using a model to guide the design and development of a product. Thus, we must attend to the systemic implications of learning and applying models.

Systems are dynamic, in nature, and constantly changing as new information and inputs to the system become available (Richardson & Chemero, 2014). Gibbons (2003) argued that the field's existing ID models focus on the medium rather than the design process. Treating models in this way places emphasis on the product, relegating the steps conveyed within an ID model to **prescriptive** or procedural-based actions or steps. However, such an approach does not reflect the complexities that exist with systems, including **learning design** (Gibbons, 2014).

The pencils book emphasizes that models should be used to "serve as conceptual, management, and communication tools" (Branch & Dousay, 2015, p. 23) for supporting instructional design efforts. Thus, we strongly recommend that instructional designers approach the use of ID models by thinking of them as blueprints to frame design activities within the overarching system. By shifting focus on the design process as opposed to the development of a product, instructional designers may be more apt to embrace the iterative nature of design and integrate design decisions that consider the dynamic complexities of the system.

Consider the blueprint analogy described here and pretend that you are a builder who has been contracted to design and build a single-story house for a multi-generational family. The preliminary meeting with the client reveals a need for a four-bedroom/two-bathroom home with a kitchen, living area, and detached garage. Based on these needs, your architect produces a blueprint of a two-story residence. The bathrooms are designed for shower-bathtub combinations using curtains and rods. One bedroom is located on the main floor while the other three are located on the second floor. Notes for flooring indicate using tile or hardwood throughout the residence.

As your crew raises the exterior and interior walls and supports, you share the blueprint with the clients and invite them to walk through the home. During the conversation, you learn that the eldest member of the family has accessibility needs. They are unable to walk without assistance and do not do well on slippery surfaces. Their bedroom will need to be on the main floor, and they need an Americans with Disabilities Act (ADA)-compliant bathroom with space for a walker to turn around and an open entry shower.

What do you do? How do you modify the blueprint to account for these accommodations?

Reflect on how the builder has to modify their blueprint to accommodate the needs of their client and meet ADA standards. Think about how this might relate to how an instructional designer may be required to adapt and modify their instructional design blueprints as information becomes available throughout a design project.

Process vs. Models

The process of analyzing, designing, developing, implementing, and evaluating (ADDIE) forms the basic underlying procedure (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 Process

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).

Learn More

Watch Dr. Rob Branch chat with *Off-the-Cuff*: ADDIE is not a model:

https://www.youtube.com/watch?v=DfQvTMxTDds

Notice the use of the term "process" rather than "model." For ID purposes, we define a process as a series of steps necessary to reach an end result. Similarly, we define a model as the 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.

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). Analytically mapping the process to identify the steps carried out in practice leads to process modeling, an exercise in optimization. In other words, modeling helps move processes to the 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 (i.e., 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.

Modeling the Process

Consider the following examples. The plan, implement, evaluate (PIE) model from Newby, Stepich, Lehman, and Russell (1996) encourages designers to consider 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 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.

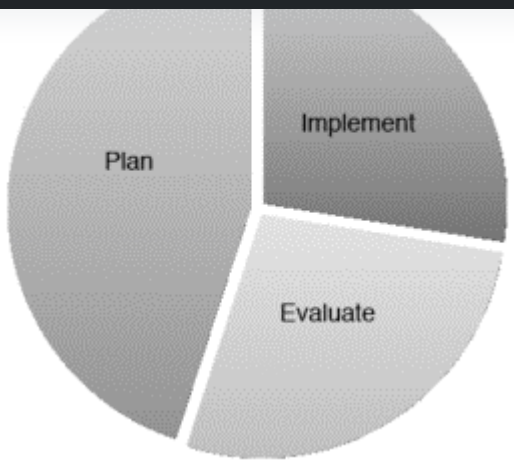

Figure 3. The PIE Model

Similarly, the Diamond (1989) model prescribes Phase I "Project Selection and Design" and Phase II "Production, Implementation, and Evaluation for Each Unit." Phase I of the Diamond model combines analyzing and designing, while Phase II combines developing, implementing, and evaluating. Robert 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. As a result, new resources consider 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 meaning is behind 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.)

ID Models in Practice

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 a rigorous assessment of their results against predetermined criteria. Rather, 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. However, a wise instructional designer knows when to use, adapt, or create a new model of instructional design to fit their purposes.

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 36 different instructional design models (see Table 1 for a summary) have been covered in the pencils book since its first edition, and this list does not include every model created or used. Still, this list of models is useful in providing a concise guide to some of the more common approaches to instructional design.

Model Name[a]	1st Ed 1981	2nd Ed 1991	3rd Ed 1997	4th Ed 2002	5th Ed 2015	6th Ed 2022
Organization Development[b]						
Blake & Mouton (1971)		x				
Blondin (1977)		x				

Model Name[a]	1st Ed 1981	2nd Ed 1991	3rd Ed 1997	4th Ed 2002	5th Ed 2015	6th Ed 2022
Classroom-Oriented						
3PD (Sims & Jones, 2002)					x	
4C/ID (van Merriënboer, 1997)					x	x
ASSURE (Heinich, Molenda, & Russell, 1982)		x	x	x	x	x
Briggs (1970)	x					
DeCecco (1968)	x					
Dick & Reiser (1989)		x	x			
Gerlach & Ely (1971)	x	x	x	x	x	x
Learning Systems Design (Davis, Alexander, & Yelon, 1974)	x					
Morrison, Ross, Kemp, & Kalman (Kemp, 1977)	x	x	x	x	x	x
PIE (Newby et al., 1996)				x	x	
UbD (Wiggins & McTigue, 2000)					x	x
Model Name[a]	**1st Ed 1981**	**2nd Ed 1991**	**3rd Ed 1997**	**4th Ed 2002**	**5th Ed 2015**	**6th Ed 2022**
Product-Oriented						
Agile (Beck et al., 2001)					x	x
Baker & Schutz (1971)	x					

Banathy (1968)	x					
Bates (1995)				x	x	
Bergman & Moore (1990)		x	x	x	x	
CASCADE (Nieveen, 1997)				x	x	
de Hoog, de Jong, & de Vries (1994)				x	x	
Leshin, Pollock, & Reigeluth (1992)		x	x			
Van Patten (1989)		x	x			
Model Name[a]	**1st Ed 1981**	**2nd Ed 1991**	**3rd Ed 1997**	**4th Ed 2002**	**5th Ed 2015**	**6th Ed 2022**
Systems-Oriented						
Courseware Development Process (Control Data Corporation, 1979)	x					
Culture Based Model (Young, 2008)						x
Diamond (1989)		x	x	x	x	x
Dick, Carey, & Carey (Dick & Carey, 1978)		x	x	x	x	x
Gilbert (1978) Front End Analysis	x					
Instructional Development Institute (Twelker et al., 1972)	x	x	x			

ILDF (Dabbagh & Bannan-Ritland, 2004)					x	
IPISD (Branson, Rayner, Cox, Furman, & King, 1975)	x	x	x	x	x	x
IPDM (Gentry, 1993)			x	x	x	x
ISD Model 2 (Seels & Glasgow, 1997)		x		x	x	x
Layers of Necessity (Tessmer & Wedman, 1990)						x
Pebble in the Pond (Merrill, 2002)					x	x
Rapid Collaborative Prototyping (Dorsey, Goodrum, & Schwen, 1997)				x	x	
Smith & Ragan (1993)			x	x	x	x
TOTAL	**13**	**12**	**13**	**15**	**21**	**15**

Table 1. Instructional Design Models included in editions of the Survey text

[a] 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.

[b] Organization development was removed from the pencils book in the 2nd edition.

[b] The orientation categories (classroom, product, and systems) were removed from the pencils book in the 6th edition.

Determining which ID model 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? Additionally, 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 3PD (Sims & Jones, 2002); 4C/ID (van Merriënboer, 1997);

(Wiggins & McTigue, 2000). Perhaps the instructional context involves producing an instructional product handed over to another organization or group. In this case, consider Agile (Beck et al., 2001); Baker & Schutz (1971); Banathy (1968); Bates (1995); Bergman & Moore (1990); CASCADE (Nieveen, 1997); de Hoog, de Jong, & de Vries (1994); Leshin, Pollock, & Reigeluth (1992); or Van Patten (1989). Lastly, perhaps your context prescribes developing a system, such as a full-scale curriculum. These instructional projects may benefit from the courseware development process (Control Data Corporation, 1979); culture based model (Young, 2008); Diamond (1989); Dick, Carey, & Carey (Dick & Carey, 1978); Gilbert (1978) front end analysis; Instructional Development Institute (Twelker et al., 1972); ILDF (Dabbagh & Bannan-Ritland, 2004); IPISD (Branson et al., 1975); IPDM (Gentry, 1993); ISD model 2 (Seels & Glasgow, 1997); layers of necessity (Tessmer & Wedman, 1990); pebble in the pond (Merrill, 2002); rapid collaborative **prototyping** (Dorsey et al., 1997); or Smith & Ragan (1993) models.

Conclusion

This chapter synthesizes nearly 60 years of practice and study of ID models. From K-12 to higher education and industry, dozens of models continue to guide efforts that systematically design learning. However, when learning and practicing ID, it is easy to become constrained by models or lose sight of their role in systemic applications. Thus, we strongly recommend developing ID competencies indicative of design processes. Deciding which model to use does not need to 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 a systems thinking approach.

Think About It!

- 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? Are there particular models you have used for specific projects?
- Think about a recent instructional design project you completed. Make a list of items you were required to modify or adjust throughout the project. How many times did you have to revisit certain phases of the instructional design process?

Editor's Note

To read more on this topic, see the chapter titled "Instructional Design Models" published in the first edition of this textbook.

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Additional Resources

The following resources 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 provided here as a starting point for individuals or organizations seeking to learn more about the field and how models are developed and implemented.

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