

# **TCSL-70130 Lecture 04: Digital Technologies for Modern Instructional Design**

## **數位科技與當代教學設計**

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## **Lecture Topics**

- What is instructional design?
- Modern instructional design models
- Tools for instructional design
- Learning technologies
- Emerging technologies for modern instructional design and learning

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## What is Instructional Design?

- **Instructional design (ID)**, also known as **instructional systems design (ISD)**, is the practice of **systematically designing, developing and delivering instructional products and experiences**, both digital and physical, in a consistent and reliable fashion toward an **efficient, effective, appealing, engaging and inspiring acquisition** of knowledge.

— Wikipedia

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## What is Instructional Design?

- In short, instructional design is the **process** by which **learning products and experiences** are **designed, developed, and delivered**.

— Instructional Design Central

- Instructional design is the **creation** of **learning experiences and materials** in a manner that results in the **acquisition and application** of **knowledge and skills**.

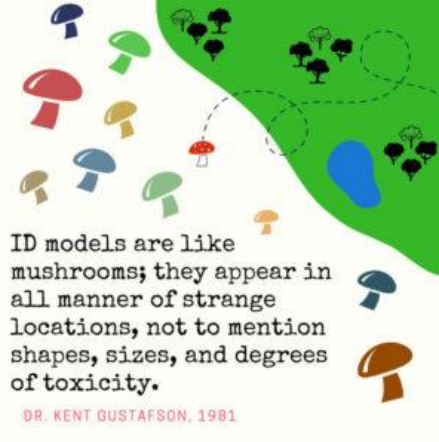
— Association for Talent Development

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## Instructional Design Models

- To define and create **improve instruction** (:
- But generalizing any potentially be **hazardous** **disastrous** at worst.



ID models are like mushrooms; they appear in all manner of strange locations, not to mention shapes, sizes, and degrees of toxicity.

DR. KENT GUSTAFSON, 1981

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## The ID Surveys Book

- Branch, Robert & Dousay, Tonia. (2015). *Survey of Instructional Design Models, 5<sup>th</sup> Ed.* Association for Educational Communications & Technology(AECT).
  - Brief overviews of instructional design models
  - Classification within the context of classroom product- and process-oriented instructional problems.
  - A concise summary to help beginning instructional designers visualize the different design approaches
  - Assist more advanced instructional designers.
  - <https://aect.org/docs/SurveyofInstructionalDesignModels.pdf?pdf=SurveyofInstructionalDesignModels>

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## 7 Models in the ID Survey Book

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				

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## 8 Models in the ID Survey Book

Model Name	1st Ed 1981	2nd Ed 1991	3rd Ed 1997	4th Ed 2002	5th Ed 2015
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

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## 9 Models in the ID Survey Book

Model Name	1st Ed 1981	2nd Ed 1991	3rd Ed 1997	4th Ed 2002	5th Ed 2015	
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	
<b>TOTAL</b>		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.

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## 10 The ADDIE Model

► First created for the U.S. Military during the 1970s by Florida State University.

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

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## The SAM Model

- Addresses the performance need through iterations, repeated small steps.
  - **Preparation**: gather information and get all the background knowledge (a quick phase)
  - **Iterative Design**: begin with the **Savvy Start** (the initial collaborative brainstorming kickoff meeting), then iterate through **design**, **prototype**, and **review**.
  - **Iterative Development**: iterate through **develop**, **implement**, and **evaluate**. From design proof, to Alpha, Beta, and rolling out the Gold

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## The SAM Model

<http://www.alleninteractions.com/sam-process>

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**13** **Learning Circle Framework**

Proposed by the Instructional Design Central (IDC)

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**14** **Merrill's First Principles of Instruction**

Problem-based model with **4 phases**: (1) **activation** of prior experience, (2) **demonstration** of skills, (3) **application** of skills, and (4) **integration** or these skills into real world activities.

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## First Principles

- Learning is facilitated when learners are engaged in **solving real-world problems**.
- Learning is facilitated when **existing knowledge is activated** as a foundation for new knowledge.
- Learning is facilitated when **new knowledge is demonstrated** to the learner.
- Learning is facilitated when **new knowledge is applied** by the learner
- Learning is facilitated when **new knowledge is integrated** into the learner's world.

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## Gagne's 9 Events of Instruction

➤ Behaviorist **Robert Gagné** focused on the **outcomes (behaviors)** resulting from learning.

```

graph TD
    A[Gain Attention  
Present the learner with an introductory activity that engages the learner] --> B[Inform learners of Objectives  
Present the learner with the learning objectives]
    B --> C[Stimulate recall of prior learning  
Present the learner with an experience that stimulates their prior knowledge]
    C --> D[Present Stimulus  
Present the learner with the content materials]
    D --> E[Provide Learner Guidance  
Present the learner with examples]
    E --> F[Elicit Performance  
Present the learner with practice activities]
    F --> G[Provide Feedback  
Present the learner with practice and feedback]
    G --> H[Assess Performance  
Present the learner with post-assessment items]
    H --> I[Enhance Retention and Transfer  
Present the learner with resources that enhance retention and transfer of knowledge]
            
```

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## Bloom's Taxonomy

➔ Benjamin Bloom(1956) proposed the levels of intellectual behavior in learning.

**Evaluation**  
**Synthesis**  
**Analysis**  
**Application**  
**Comprehension**  
**Knowledge**

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## Revised Bloom's Taxonomy

➔ Revised by Anderson and Krathwohl (2001)

**BLOOM'S TAXONOMY (REVISED)**  
**CREATING**  
**EVALUATING**  
**ANALYZING**  
**APPLYING**  
**UNDERSTANDING**  
**REMEMBERING**

Bloom's Taxonomy, revised in 2001 by Anderson and Krathwohl, defines the six levels of cognitive learning, with the simplest at the bottom up to the most complex, or deepest learning. As an instructional design framework, Bloom's Taxonomy ensures that learners push through the lower levels of remembering and understanding new information, to being able to apply it, analyze it, evaluate its impact, and ultimately to solve unique problems by creating solutions that would not have been possible without the new knowledge.

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## Dick and Carey Model

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➤ The Dick and Carey Systems Approach Model was published in 1978 by Walter Dick and Lou Carey.

```

    graph TD
      A[Identifying instructional goals] --> B[Writing performance objectives]
      C[Analyzing learners, and contexts] --> B
      B --> D[Developing assessment instrument]
      D --> E[Developing instructional strategy]
      E --> F[Developing and selecting instructional materials]
      F --> G[Designing and conducting formative evaluation]
      G --> H[Designing and conducting summative evaluation]
      G --> I[Revising instruction]
      I --> B
      I --> D
      I --> E
      I --> F
      I --> G
      I --> H
      I --> J[Conducting instructional analysis]
      J --> A
      J --> B
  
```

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## Kemp's Design Model

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➤ Jerold Kemp defines 9 components and a continuous implementation/evaluation model.


Planning  
 Revision  
 Instructional Problems  
 Evaluation Instruments  
 Learners Characteristics  
 Instructional Delivery  
 Task Analysis  
 Designing the Message  
 Instructional Objectives  
 Instructional Strategies  
 Content Sequencing  
 Formative Evaluation  
 Project Management

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## Kirkpatrick's 4 Levels of Training Evaluation

- The Kirkpatrick Model is the worldwide standard for evaluating the effectiveness of training.




Level 1	Level 2	Level 3	Level 4
Reaction	Learning	Behavior	Results
Response	actually learned	use learned on job	positive impact

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## Cathy Moore's Action Mapping

- A quick, effective, and visual way to design compelling learning experiences



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## The ASSURE Model

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➔ An ID model for more effective teaching and learning.

- A** • Analyze Learners
- S** • State Objectives
- S** • Select Methods, Media and Materials
- U** • Utilize Technology, Media and Materials
- R** • Require Learner Participation
- E** • Evaluate and Revise

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## Tools for Instructional Design

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Many tools are available for instructional designers to carry their ID plan.

1. **eLearning Authoring Tools:** iSpring Suite, Articulate 360, Adobe Captivate, ...
2. **eLearning Templates:** eLearning Brothers, Faster Course, eLearning.net, ...
3. **Mind Mapping Tools:** XMind, iMindMap, ...
4. **Presentation Tools:** PowerPoint, Prezi, ...
5. **Graphics and Infographics Tools:** Canva, Paint.net, Infogram, ...

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## Tools for Instructional Design

6. **Image & Photo Sharing Platforms:** Unsplash, Microsoft Clipart Library, Google Fonts, ...
7. **Video Tools:** Free Cam, iSpring Cam Pro, ...
8. **Audio Tools and Samples:** Audacity, BBC Sound Effects, ...
9. **Interactive Learning Tools:** Kahoot, QuizGame, ...
10. **Survey Tools:** Surveymonkey, ...

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## Tools for Instructional Design

11. **Writing Tools:** Grammarly, Google Docs, ...
12. **Project Management Tools:** Trello, Google Calendar, ...
13. **Communication & Sharing Tools:** Skype, Google Drive, GoToMeeting, ...
14. **Online Resources:** eLearning Industry, The eLearning Guild, ...

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## 27 Learning Technologies

- **Learning technology** is the application of technology for the **enhancement** of **teaching, learning** and **assessment**.
- Many related terms:
  - **CAI** (Computer Aided Instruction)
  - **CAL** (Computer Aided Learning)
  - **CBL** (Computer Based Learning)
  - **CBT** (Computer Based Training)
  - **CAA** (Computer Aided Assessment)
  - **CMC** (Computer Mediated Communications)
  - **HCI** (Human-Computer Interface)

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## 28 Emerging Technologies for ID

Many technologies emerge as promising tech for ID and learning:

1. **AI & ML (Artificial Intelligence & Machine Learning)**: Chatbots, recommenders, deep learning, ...
2. **Mobile Learning**: learning through wireless, smartpone, LBS, ...
3. **Gamification**: learning through gaming
4. **Storytelling**: using **narratives** to elicit creativity and transfer knowledge

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## Emerging Technologies for ID

5. **Multimedia**: audio, video, HCI, ...
6. **VR/AR/MR**: Virtual/Augmented/Mixed Reality
7. **Cloud Computing**: SAAS, PAAS, IAAS, ...
8. **Big Data**: processing, analyzing, visualizing, ...
9. **Hybrid Learning**: allows participants to access learning in a **variety of formats**
10. **Learning Management Systems(LMS)**: systems to put them all together

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## Lectures to Come

- We will select a set of emerging technologies
- For each technology, we will:
  - Provide an overview of the technology
  - Discuss the application of the tech in learning
  - Case studies
- To have hands on experience, we will use the open-source learning platform Moodle for practicing ID with modern tools.

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