

Good morning and welcome to the "Becoming and Instructional Design Specialist: A confluence of learning theory and instructional sciences online graduate seminar for students at Central China Normal University!

My self-introduction... 36+ years in practice, dozen years as designer in corporate environments, over 23 in academics and research. My scholarship is in the intersections among learning – design of instruction – technology.

This session is designed to help you develop a basic understanding of the Instructional Designer profession and a key theories and practices that informs the work of instructional designers.

Seminar goals include:

- Provide a foundational overview of the instructional designer profession
- Respond to the questions:
 - What is instructional design and what do instructional designer do?
 - How do instructional designers practice their science, art, and craft?
- Describe the connections among learning theory and instructional sciences



Becoming an Instructional Design Specialists

My job is to put a spotlight on our profession as instructional designers... To clarify what it is, how instructional designers and educational technologist work in this field... what they do, what they know, and what they achieve... I am going to do my best to get you excited about this field ... About preparing yourself to enter into this community of practice. I have been a member for over 35 years and I love it! I hope this session will clarify to you the importance and value of instructional designers in today's world.



Creating instruction

Instructional designers analyze performance problems to identify those associated with knowledge, skill, or attitude gaps. Then, create instruction that helps performers go through a learning transformation to narrow or close gaps in knowledge, skills, and attitudes.

To be clear... Instruction is "the intentional arrangement of experiences, leading to learners acquiring particular capabilities" (Smith & Ragan, 2005, p. 5). Such experiences include interactions and engagement with instructional resources and activities that may be used in formal courses, training, webinars, lectures, master classes, or informal learning environments. Formal and informal instruction may be in a wide variety of contexts like: education, STEM, healthcare, sports, manufacturing, media, business, aviation, industry, Research and Development, government, military, NGOs, or any other context where there is human performance.

Instruction is purposeful, **not accidental**—its purpose is to facilitate learning toward specified learning objectives. The best design instruction is effective, efficient, engaging, usable, and accessible.



Let us be clear about the profession of instructional designers... sometimes confused with the profession of teachers.

- Teachers focus on pedagogy for instruction while IDs focus on skills and knowledge gaps before and after instruction
- Competent teachers are subject matter experts and experts in current topics and issues while competent IDs are not necessarily experts in content of subject, rather are experts in the instructional design domain
- Teachers work predominantly in educational institutions while IDs work in corporate, NGO, education, military, space, healthcare, government, sports, and many other contexts
- Teacher primarily use disciplinary thinking where as IDs use systems thinking
- Teachers practice classroom management and IDs practice project management
- Teachers use instructional materials in their work whereas IDs create and evaluate instructional materials
- And teachers represent the institution & field of expertise while IDs consult on effective and efficient learning.

There are several overlaps in these professions... both are

- Concerned with knowledge, skills, and attitudes of learners
- Use educational psychology to inform practice
- Prepare and plan for educational settings
- · And participate in professional meetings and exchanges

Thus both have some similar, however many different competency requirements to be successful in their work



How Instructional Designers work

Using theories, processes, and tools to design instruction... To create welldesigned instruction, competent instructional designers use ...

... instructional design theories and research-based principles of instruction and learning to inform their design thinking...

... instructional design processes to inform their strategic work processes and activities

... technical tools or equipment that best support learning and delivery of instruction.

Instructional designers may not necessarily be the subject-matter expert, or technical expert for the instruction they are creating, thus they often collaborate with a variety of specialists to design, create, implement, and evaluate the best instructional solution. An ID generally is a specialist in learning and instructional sciences and in how to apply these sciences into the creation of instruction. Content is usually the domain of subject-matter experts (SMEs). Thus, IDs often collaborate with SMEs and other specialists in evaluation, technology, teaching. However, IDs may have the subject matter expertise and technical expertise to complete all design and development steps, depending on their training and expertise.



Learning and Instructional Design Theories

Remember-the purpose of instruction is to facilitate learning.

Instructional designers thus need to understand learning

- What it is define and describe when and how they see it
- Its mechanisms describe how it works

... Using this description of results and mechanism to determine how to best design supporting instruction

Together - learning theory helps IDs ..

- Think about learning as a function of improving performance,
- design for learning,
- focus on enhancing knowledge, skills and attitudes
- Use research-based ideas and best practices to inform their work

These are at the heart of the science, art and craft of instructional designers' profession



The foundations of learning

Start with Sensory Reception - see, hear, feel, taste, smell

Philosophies develop a view of learning

- From an empiricist perspective, knowledge is acquired from experiences we call this an Objectivist philosophy
- From a rationalist perspectives, Knowledge is constructed through thought we call this a Constructivist philosophy

However, we cannot test a philosophy for truth, philosophy is an observation of the world. Therefore learning theories emerged as a way to describe learning – and test the descriptions

- From the Objectivist side knowledge is acquired ... one learning theory on this side is Cognitive Development learning theory
- From the Constructivist side knowledge is constructed ... one learning theory here Social / cognitive learning theory

However, learning theory only DESCRIBES learning, Therefore instructional design theories emerged to PRESCRIBE learning – and test the prescriptions or prescribed instructional strategies for their abilities to facilitate learning under specific conditions

Instruction is therefore is purposive in that it facilitate learning.

From a foundational perspective.. we move from belief to describing to designing to activating and engaging learning - - Philosophies provide a basis for understanding knowledge and learning that informs... learning theory (DESCRIPTION) that informs... Instructional Design theory (PRESCRIPTIONS) that facilitate learning.

8

1



In thinking, or as we called it earlier, cognition, levels of learning are pictured as a pyramid indicating that you must master the lower levels of thinking to prepare you for the higher levels of thinking ... doing so indicates that you move from a cursory or lower or surface level of knowledge, skill, or affect to a deeper level of knowledge, skill or affect of the content.

Bloom created a taxonomy of the cognitive aspects of learning that was later updated by Anderson... at the bottom, the foundational skills are those in which learners demonstrate recall of information... this continues to learners understanding or being able to explain new information... And up towards higher order thinking like applying, analyzing, evaluating, and creating new information.

The questions on the side of the pyramid help to clarify that types of questions you are asking of your students in their learning... and can provide a guideline for creating sound learning objectives.

Adapted From: (Lorin Anderson) http://www.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm

Remembering: can the student recall or remember the information? Sample verbs: define, duplicate, list, memorize, recall, repeat, reproduce, state.

Understanding: can the student explain ideas or concepts? Sample verbs: classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase.

Applying: can the student use the information in a new way? Sample verbs: choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write.

Analyzing: can the student distinguish between the different parts? Sample verbs: appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.

Evaluating: can the student justify a stand or decision? Sample verbs: appraise, argue, defend, judge, select, support, value, evaluate.

Creating: can the student create a new product or point of view? Sample verbs: assemble, construct, create, design, develop, formulate, write.



Similar pyramids were developed to show lower to higher levels of affect and psychomotor development.

Affective learning... levels include:

Receiving (low) - Awareness and willingness to pay attention to learning

Responding - Active participation in instructional activities, awareness and willingness to respond. **Valuing** - Accepting or rejecting the worth or attaching value to a particular object, phenomenon, or behavior.

Organizing and Conceptualizing - Organize values into priorities, then create own value system by comparing different values.

Characterizing/ **Internalizing** (high) - Make behaviors consistent with value system. Adapted From: *Krathwohl, Bloom, & Masia, 1964*

Psychomotor learning ... levels include:

Imitation (low) - Observe and imitate behaviors from others
Manipulation - Perform behaviors according to previous experiences or instructions
Precision - Refine behaviors through paying attention to details
Articulation - Combine a series of behaviors to finish a new task
Naturalization (high) - Master a high level performance and do it naturally
Adapted From: Dave, 1971

These breakdowns in level help to guide the development of instruction that helps learners progress from low levels of knowledge, affect, or skill to higher levels or depth of knowledge in the instructional content.



Summary: Levels of Learning

Each type of learning is defined with a progression of learning from lower order to higher order thinking, affect or skills development.

As indicated by their presentation in a pyramid shape, learners progress from the lower levels of the learning domain or type, toward the higher levels with continued interaction, practice, feedback, and expectation for higher levels of performance. As one moves toward the higher levels, the content knowledge, affect, or skills become deeper and stronger. In order words, the more the instruction engages learners in progressively expert levels of the content, the more effort learners put into learning at progressively higher orders and the more depth of understanding or performance they will gain.

Instruction should fully engage learners with content based on expected type AND expected level of learning... The goal is for the learners to be able to demonstrate and apply new knowledge, affect, or skills based on moving from foundational knowledge, affect, or skills toward expert knowledge, affect, or skills by participating in the instruction.



To be clear, Cognitive Development Researchers describe learning as a result...

Definition of learning ... RESULT

 a relatively permanent change in mental representations or associations due to experience

Mechanism of learning ... PROCESS leading to results

• Receiving information, building connections in schema through the information processes of assimilation and accommodation

Learning is a process of sensory inputs, processing and storing inputs into mental representations or schema and retrieving knowledge when it is required.

	Encoding Long-term
An internal proc	Cess . Short-term False .
Ĩ	memory
views learning	as T
	the most crucial is
Cognitivism	is concerned with Mental processes
Cognitivish	. Mentar processes:
	such as
	Ļ
	attention
	expectations
	perceptions
	reasoning
	problem solving

Cognitive Development is a complex topic with many contributing factors.

Overall, cognitivism views learning as an internal process.

Cognitivism is concerned with mental processes such as attention, expectation, perception, reasoning, problem solving and others.

Most crucial to these processes are concepts of memory and how memory works ... including short- and long-term memory, encoding, retrieval, and false memory.



Nine events of information / cognitive processing: Dual coding model of learning

Begins with information bombarding our senses.... Millions per second.

In reception (1) When we do not recognize or pay attention some are drop out of processing ... The ones we attend through selective perception (4) to are sent into short term memory for further processing and retrieval of prior knowledge (3) .. Only a few seconds to determine if they stay in process or are dropped.

When they stay they continue into working memory for a few more seconds, responding to information (6), we start processing with reinforcement (7) and encoding (5); this is where they are starting to be connected to already learned information in our schema. Those not processed (6) are dropped – lost data.

More attention and processing occurs to encode (5) with connecting prior knowledge (3) and responding (6) to new information to encode into long-term memory (where is becomes knowledge) that can be retrieved (8) and generalizes to new information (9) later when needed.

The executive control (or meta cognitive functions) plays a major role in expectancy (2), retrieval of prior knowledge (3), and reinforcement (7) by helping us to determine what is important or different that needs to be processed into long term memory.

Each of these I events occur or re-occur during the entire process of ... INPUT – PROCESSING – OUTPUT / RETREIVAL

-	to 9 Cognitive processes
ID Theory - Instructional Events	Internal Cognitive Processes - LEARNING
1. Gain attention	Activating receptors based on stimuli
2. Inform learners of objectives	Creating levels of expectation for learning
3. Stimulate recall of prior learning	Activating short-term memory and retrieving information
4. Present the content	Perceiving and organizing content materials
5. Provide 'learning guidance'	Semantic encoding for storage in long-term memor
6. Elicit performance (practice)	Responding to questions to enhance encoding, reinforce associations & verify interpretations
7. Provide feedback	Reinforcing, monitoring and assessing performance
8. Assess performance	Retrieving content and reinforcing performance
9. Enhance retention &transfer	Retrieving and generalizing learned skills to new situations

Aligning 9 Cognitive Processes... to 9 Instructional Events

Instructional events are included that align with cognitive processes in this way:

- · Gain attention aligns with activate receptors based on stimuli
- Inform learner of objectives aligns with create expectations for learning
- Stimulate recall of prior learning aligns with Activate short-term memory and retrieving of memory
- Present the content aligns with Perceiving and Organizing content materials
- Provide learning guidance aligns with Semantic encoding for storage in long-term memory
- Elicit performance (practice) aligns with Responding to questions to enhance encoding
- Provide feedback aligns with reinforcing, monitoring, assessing performance
- Assess performance aligns with retrieving content, reinforcing performance
- Enhance retention and transfer aligns with Retrieving and generalizing learned skills to new situations

Best designed instruction include all 9 events; they may be in any order, activities may include more than one event



What are the characteristics of instruction inspired by cognitivism?

- Organized environment and information
- Meaningful learning
- Use of advance organizers and learning objectives
- Incorporates concept maps & other organizing tools
- Signals help learners recall and activate previous knowledge
- Prompts verbalization (oral or written), rehearsal, repetition, review, enacting new information



In Summary

- Learning IS change in mental representation
- Learning mechanisms include: perceiving, organizing, encoding, retrieving
- Knowledge is represented in memory structures schema
- Schema structure can indicate surface and deep levels of learning
- · Learning is through dual coding that engages 9-events of cognitive processing



In summary ..

- ID Theories prescribe instructional and learning activities based on a specific definition of learning
- The characteristics of these ID theories include providing organized environments in which learners are provided with new information and tools & strategies to help them attend to, integrate, and organize new information in existing memory structures
- The 9-events of instruction (ID theory) prescribes activities that activate 9 cognitive events of learning



Instructional Design Process

ADDIE is a generic problem-solving process that is at the root of Instructional Design and all of its models for approaching human performance problem solutions

Instructional design is problem-solving at its core. It involves a systematic, systemic, reflective, and iterative process that includes ...

- Analyzing an observed performance problem....
- Designing an instructional solution to the problems...
- Developing the solution ...
- And implementing and evaluating the solution to see if it closed the gap.

This is an exciting and ever-changing career, applicable to any context with human performers ... never boring, rather it is challenging, requires problem-solving skills, and traits of life-long learners.

This Instructional Design framework is called ADDIE.... Analyze, Design, Develop, Implement, Evaluate.

Although **ADDIE** is often shown and **described in a linear format**, the **process is flexible** and instructional design can begin in any of the phases, combine phases, increase or reduce the formality of each phase, or use any combination of phases depending on the problem being investigated.

However, like all problem solving, it is important for the ID to analyze and understand the performance problem, design an appropriate solution using the tools of the trade, create a solution that is predicted to close the gap, and implement and evaluate the solution to see how well the instruction worked in closing the performance gap.

ID work is never boring, always challenging, applicable to multiple contexts, requires problem solving attitudes and skills, is adaptable to solve many performance problems, required flexible thinking and those who think about learning as a life long effort..

These characteristics are at the heart of the science, art, and craft of instructional designers – we use theories and best practices to inform our work - SCIENCE... we think and problem solve in creative ways – ART... and we focus on becoming better and more expert like as the world changes –CRAFT.



ADDIE phases

Each phase in the ADDIE process has a purpose.

During **Analysis**, instructional designers analyze the job tasks, stakeholders and performers, and environment where a performance problem was observed. At the end of Analysis the ID decides whether there is indeed a gap in human performance that can be resolved with instruction.

During **Design**, instructional goals and learning outcomes are developed and then aligned with learning assessments, instructional strategies, and media in a blueprint of the future instruction. Blueprints are also developed for the implementation and evaluation phases

During **Development**, the activities and resources are developed and pilot tested to ensure they will work. Logistics and materials for implementation and evaluation are also developed.

During **Implementation**, instruction goes live. This may include instruction to prepare instructors, notifications to target audience, and employment of evaluation data collection instruments.

During **Evaluation**, collected data are analyzed to demonstrate value of instruction and determine if the gaps is closing, if modifications are required, if the instruction should continue to be used, or other strategic decisions.

Overall, ADDIE is about identifying and resolving human performance problems.



Instructional Designer – Tools or Equipment

REMEMBER: The **purpose** of instruction is to *facilitate learning*

Well-designed instruction: effective, efficient, engaging, usable, accessible

- Thinking tools models, theories, research results
 - Like the Learning pyramid, dual code theory, ADDIE framework... these all help IDs reflect on instruction and how well it is designed to facilitate learning
- Digital and Non-Digital tools
 - Like Virtual Reality, manipulatives, web-based resources, texts and papers (paper or digital), sounds/narration, posters/graphics/diagrams, working models or model kits, presentations, etc. all provide different types of features than can help with different types and levels of learning

Media is a complex choice that should be weighted carefully to give the right types of experiences to learners to facilitate, NOT inhibit or confuse, learning.

There are many sets of standards and guiding principles that can be used to support both the decision of which media and technology resources are best for given situations and then how to design the instruction with the technology.

One must also consider the cost and benefit of the media, the acceptableness and availability of the media / technology for any given context or environment.

These characteristics are also at the heart of the science, art, and craft of instructional designers – we use theories and best practices to inform our work - SCIENCE... we think and problem solve in creative ways – ART... and we focus on becoming better and more expert like as the world changes – CRAFT.



Instructional Design: A collaborative Process

Instructional designers may not necessarily be the subject-matter expert, or technical expert for the instruction they are creating, thus they often collaborate with a variety of specialists to design, create, implement, and evaluate the best instructional solution. An ID generally is a specialist in learning and instructional sciences and in how to apply these sciences into the creation of instruction. Content is usually the domain of subject-matter experts (SMEs). Thus, IDs often collaborate with SMEs and other specialists in evaluation, technology, teaching. However, IDs may have the subject matter expertise and technical expertise to complete all design and development steps, depending on their training and expertise.

IDs work in collaborators in many ways:

- Collaborative
- systemic views
- reflective processes
- iterative pathways

Thus, professionally IDs are

- Consultative
- Team-based
- Focused problem solving

• Develop strong professional skills (interpersonal, ethical, etc.)

These are also at the heart of the science, art, and craft of instructional designers



Summary – bringing these characteristics of the profession together. IDs... A confluence of learning and design thinking

Use theories, processes, and tools to design instruction... To create welldesigned instruction, competent instructional designers use ...

... instructional design theories and research-based principles of instruction and learning to inform their design thinking...

... instructional design processes to inform their strategic work processes and activities

... technical tools or equipment that best support learning and delivery of instruction.

Instructional designers may not necessarily be the subject-matter expert, or technical expert for the instruction they are creating, thus they often collaborate with a variety of specialists to design, create, implement, and evaluate the best instructional solution. An ID generally is a specialist in learning and instructional sciences and in how to apply these sciences into the creation of instruction. Content is usually the domain of subject-matter experts (SMEs). Thus, IDs often collaborate with SMEs and other specialists in evaluation, technology, teaching. However, IDs may have the subject matter expertise and technical expertise to complete all design and development steps, depending on their training and expertise.

In the end IDs produce sound instructional spaces, resources, and activities that facilitate learning.



An exciting, adaptable, and valuable career – helping other succeed.. Find the gap, mind the map, close the gap...

Instructional designers **analyze gaps** in human performance, **create instructional solutions** to close the gaps, and determine that gaps are narrowed or closed.

The instructional Design profession is focused on **investigating and resolving** human performance gaps

Instructional designers develop **competencies** in **instructional design and learning** models and theories, instructional design and development **processes**, and instructional **technologies and tools**

Instructional designers **practices** using systematic, systemic, reflective, and iterative processes that generally flow from an ADDIE framework

ADDIE includes analysis, design, development, implementation, and evaluation to analyze a performance gap, create instruction that will help resolve identified gaps, and determine how well the instruction did indeed work

Keep these points in mind as you move forward in your coursework.



ID as Research and Development specialist – as scholar

Research and Development opportunities for undergraduate, master's, and doctoral students... through RIDLR Research in Designing Learning Resources... based on the theories of generative learning, cognitive flexibility, and reflections the RIDLR teams design, build, and study resources that support the design process or are learning resources for use in instruction.

Students can work on course projects or other projects of interests under the supervision of faculty and advanced doctoral students... to gain design and research experiences:

- Engage in developing digital learning resources
- Learn about and apply design principles to enhance deep learning
- Validate & use tools to support design decisions and to critique products
- Collaborate with peers and faculty to plan and conduct research studies
- · Conduct data analysis and prepare publications

To help prepare for careers in ID and Educational Technology



What questions do you have?



Designed and Developed by Tiffany A. Koszalka

All pictures in this presentation were either created for this tutorial or are licensed under Creative Commons (CCO) licenses and used for education purposes.

Animated characters were created by Presentermedia [https://www.presentermedia.com/] Copyright 2009

PRESENTERMEDIA. All rights reserved. [Terms of End user license (F.III) for educational purposes, including e-learning materials.]