Remember we are all learners...
Learning Outcomes

After instruction the learner will be able to:

• Demonstrate knowledge of definitions and vocabulary of instructional design by scoring 80% or more on a paper test.

• Identify and describe the components of the ADDIE model.

• Apply instructional design principles to current and future instruction including courses with an online component.
Getting started

- **Instruction** is the arrangement of information and environment to facilitate learning.
- **Learning** is the development of new knowledge, skills or attitudes as an individual interacts with information and the environment.
Beware over-simplification!

- The definition that follows is one of several equally viable definitions for ID.
- It is a personal favorite because it works.
- Avoid simplistic ‘recipe’ approaches.
- Well designed instruction leading to thorough learning is analogous to a well-prepared feast leading to a satisfied palate.
Definition of Instructional Design

• Instructional design BLENDS what we know about…
  – the LEARNERS
  – the SUBJECT MATTER
  – HOW PEOPLE LEARN
  – the capabilities of an INSTRUCTIONAL MEDIUM

...to produce instruction that will facilitate learning
Expanding on these “Terms”

• SUBJECT MATTER
  – The content to be taught including knowledge, skill, or attitude.

• INSTRUCTION
  – Ways to organize the subject matter to facilitate learning (from lecture to virtual reality)

• DELIVERY
  – Making the best use of the medium (text, motion video, computer-based teaching, etc.)
Best Practices

• Ferris Bueller’s Day Off video clip
  • 12 MB media file - use only in classroom

• Does anyone have a positive example from their teaching that they would like to share that shows a blend of Subject matter, Instruction and Delivery?
Technology is…

• …anything that extends human capabilities – lever, wheel, chalk board, books, video, computers….

• Instruction technology refers to both the hardware and the process that is used to enhance/extend teaching and learning.
ID is a “systems” approach.

- Teaching is about communicating information effectively, nurturing learners, helping learners to develop…
- Instructional Design is about the organization of content, sequencing of learning, assessing achievement, and the preparation of sound instructional materials so that ‘teaching’ can move forward.
A system has four basic parts

• Input
• Processing
• Output
• Feedback
System Components

INPUT → PROCESSING → OUTPUT

FEEDBACK
A Classroom is a Complex System

• …with multiple inputs:
  – Physical environment
  – Number of students
  – Ability levels and ages of students
  – Curriculum requirements
  – Available teaching resources
  – Expectations of students, parents, administration
  – Skill and knowledge of the teacher
So what is the ID process?

• The ID process is a planning and organizational tool.

• The process helps to ensure that all the important information is considered in the context of the instructional problem or challenge.
Components in the ADDIE model

• Analysis
• Design
• Development
• Implementation
• Evaluation
ID Process - Analysis

- Front end (feasibility) analysis
  - Mostly corporate concern $$$
- Learning needs analysis
  - discrepancy or gap analysis (e.g. Kappler)
- Learner or audience analysis
- Content or task analysis
ID Process - Design

- Specification of **intended** learning outcomes
  - knowledge, skills, behaviors, attitudes…
- Specification of evaluation methods and criteria indicative of learner achievement
- Scope and sequencing of instructional events
- Media selection
ID Process - Development

- Project management
- Timelines
- Resource management
- Prototype development
- Beta testing
- Usability testing
ID Process - Implementation

• Training for both learners and teachers
• Embedded help
• Support materials for successful utilization
• Management of resources and time
ID Process - Evaluation

• Formative (short term)
  • beta testing
  • usability testing
• Summative (long term)
  • large scale validation
  • multiple contexts
Give time constraints

*We will not examine the nuances of:*

- Implementation
- Evaluation

- However, if you chose to work on a project with Learning Technologies we will use the entire ID process.
Instructional Design Models

• **Multiple ID Models - U Denver**

• See also the handout on Instructional Design for Online Teaching (available online)
Needs Analysis:
Identify the problem that will be ‘fixed’ by instruction.

Learner Analysis:
‘Given’ these learners, what must be considered to ensure effective instruction?

Task Analysis:
“What” is to be learned?

Instructional Problem

Evaluation:
Test materials with learners. Change as indicated.

Design the Instruction:
Blend analysis info with strategies for teaching, select media, design message.

Develop Instructional Materials:
Attend to the details and management of quality production.
So what’s the point?

- Experienced teachers can be spontaneous in the classroom.
  - after internalizing the teaching/learning process and re-teaching the same content
- Experienced teachers with new subject matter need to examine the instructional process.
- The ID process enhances the creation of effective instruction.
Instructional design is a discipline

• Like any other discipline it has conventions and rules and epistemologies that inform practice.

• It is not the Holy Grail but it has its place in the art and science of education.
Find a point on the continuum where you are comfortable

- technology rich classrooms
- extended classrooms (web-based)
- on-line learning environments
- virtual classrooms
Before you take a Break..

- The next few slides will be a self-test to see what you recall.

- Are you ready to begin?
Questions?

After a 5 minute break we will examine the ADDIE model in more detail.
Closer look at ADDIE components

- Analysis (link)
- Design (link)
- Development (link)

No time to explore I and E in this class.
- Implementation (link)
- Evaluation (link)
Analysis

• Consists of at least three components
  • Need for instruction (is instruction the solution?)
  • Learner analysis
  • Content or Task analysis

• This is where your eyes start to roll-up in your head.
Needs Analysis

• Less of a problem in Higher Education
  – Students **need** the general education course to help them decide on their major
  – Students **need** a broad liberal arts education so all the required Gen Ed courses contribute to a rounded individual

• Graduate students **need** the content knowledge in their chosen discipline
Learner Analysis

• "WHO" will be receiving the instruction.
• Identify important learner characteristics that might enhance or impede the instruction.
• Analyze learners along four domains:
  • cognitive
  • personality
  • social
  • physical
Cognitive Characteristics:

- general aptitudes (raw talent)
- specific aptitudes (mathematic, verbal etc.)
- functional literacy (e.g., reading level)
- visual literacy (ability to create and understand images/graphics)
- learning styles (Kolb or others)
- metacognitive abilities (thinking about their thinking-awareness and self-regulation)
- prerequisite content knowledge
Personality Characteristics:

- **Motivation to learn** (what drives the learner)
- **Interests** (School and non-school)
- **Attitudes toward content**
- **Attitudes toward learning**
- **Attitudes toward technology**
- **Self-esteem** (Belief that they can succeed)
- **Anxiety** (has negative impact on learning)
- **Beliefs/Values**
- **Locus of control**
Social Characteristics:

- Tendencies to cooperate or compete
- Relationships with peers
- Socioeconomic status
- Attitudes toward authority
- Racial or ethnic background
- Culture
- Career ambitions
- Educational level of family/learner
Physical Characteristics:

- Visual abilities
- Auditory abilities
- Tactile abilities
- General health
- Fatigue (energy level, ability to focus/concentrate)
- Age
- Gender
So What?

• Many instructors will say:
  • I have a lot of curriculum to cover and not much time.
  • I don’t have time to take into consideration the characteristics of our learners.

• All of which is true UNLESS an investment of time and effort to understand your learners will impact on teaching and learning.
How to address learner characteristics using a LMS

• Birds of a Feather discussion forums
• Buddy systems that match novice students with more advanced students
• Assignments that transfer ‘book’ learning to real world situations/applications
• Assignments that support higher order thinking

• BUILD ONCE - REUSE OFTEN
Application Activity

• Five (5) minutes to discuss with the persons at your table:
  1. Who are my students (pick a specific course)?
  2. List one learner characteristic from each category that had (or might have) an impact on how you teach.
  3. One suggestion on how a change in design could reduce the impact.
Closer look at ADDIE components

• Analysis (link)
• Design (link)
• Development (link)

• Implementation
• Evaluation
Design - Task Analysis

First pants, THEN your shoes
Task Analysis

• Describes in detail "WHAT" the instruction will focus on – the content.
• This analysis is reflected in the instructional objectives.
• The task analysis is conducted before the objectives are written.
Side note

• A complete and accurate analysis of the “tasks” facing the learner is the best investment of your time and effort.

• The “instruction” will frequently fall out of the task analysis so your development effort is reduced.
Make the ‘hidden’ structure of the content visible - identify each element

- Facts
- Concepts
- Principles or Rules
- Procedures
- Interpersonal Skills
- Attitudes
Facts

• Arbitrary labels or terms
• Necessary to establish a shared **vocabulary** with learners
  • Example – English
    • Noun, verb, adverb, adjective
  • Example – Math
    • Denominator, numerator, exponential
“Now! … That should clear up a few things around here!”

Build a Shared Vocabulary
Concepts

- Concepts are categories used to group similar ideas
- Used to simplify and organize
- Science example
  - Fish – shared characteristics
  - Mammal – shared characteristics
  - Kingdom > Phylum > Class > Order > Family > Genus > Species
Principles or Rules

- Describes a relationship between concepts
- Predictive
  - Gas when heated will expand
  - Physical activity will increase cardiovascular rate
- Theories
  - Evolution, creationism, alien visitation
Procedures

• Ordered sequence of steps
  • Physical steps – hold, turn, release
  • Mental steps – time, observe, measure

• Ask an expert how they know when a step is needed or completed. What are the clues/indicators that they look for?
Interpersonal Skills

• Verbal and non-verbal skills for effective interactions with others
  • e.g. teacher ‘death stare’ at misbehavior
  • Warm smiles, eye contact, firm grip etc.
  • Body language
Attitudes

- Defined as ‘predispositions’ to behavior
- Related to values – often unconscious
- Will probably require careful planning and a lot of time and effort to effect significant change to attitudes.
Procedural Analysis

- Ask these **key questions**:
- What does the learner DO?
- What does the learner NEED to KNOW to do this step?
- What cues inform the learner what to do next, if step is completed or alternative required?
Gathering Task Information

• Interview an expert (SME)
  • If you are the expert work with someone to articulate what you know so well
  • Search the literature
  • (training manuals, on-line help, job aides)
• See what’s already been done that is worthwhile.
Instructional Strategies

- drill/rehearsal
- didactic lecture (traditional)
- discussion/seminar/tutorial
- simulations/games
- project-based learning
- case-based learning
- collaborative learning
- problem-based learning
Bloom’s Taxonomy

• The cognitive domain involves knowledge and the development of intellectual skills.
• Use the appropriate verbs to align expected learning outcomes with tasks while moving up the hierarchy from knowledge to evaluation.
Learning Theory

• Behaviorist
  – stimulus response, reinforcement, programmed learning, de-contextualized knowledge

• Cognitivist
  – information processing model, mind as computer, short term memory, semantic nets

• Constructivist
  – knowledge is in the experience, contextualized, social negotiation of meaning, authentic tasks
Performance Objectives

Definition:

- An objective is a description of a performance you want learners to be able to exhibit before you consider them competent.

- An objective describes an intended result of instruction, rather than the process of instruction itself.

Why care about Objectives?

Objectives provide a sound basis for:

• Selecting or designing instructional materials, content and procedures
• Evaluating or assessing the success of the instruction
• Organizing the students' own efforts and activities for the accomplishment of important instructional intents.
• In short, if you know where you are going, you have a better chance of getting there.
• The selection of clear, accurate action verbs is important.
<table>
<thead>
<tr>
<th>Words Open to Many Interpretations</th>
<th>Words Open to Few Interpretations</th>
</tr>
</thead>
<tbody>
<tr>
<td>To know</td>
<td>To write</td>
</tr>
<tr>
<td>To understand</td>
<td>To recite</td>
</tr>
<tr>
<td>To really understand</td>
<td>To identify</td>
</tr>
<tr>
<td>To appreciate</td>
<td>To sort</td>
</tr>
<tr>
<td>To fully appreciate</td>
<td>To solve</td>
</tr>
<tr>
<td>To grasp the significance of</td>
<td>To construct</td>
</tr>
<tr>
<td>To enjoy</td>
<td>To build</td>
</tr>
<tr>
<td>To believe</td>
<td>To compare</td>
</tr>
<tr>
<td>To have faith in</td>
<td>To contrast</td>
</tr>
<tr>
<td>To internalize</td>
<td>To smile</td>
</tr>
</tbody>
</table>
Three characteristics..

- **Performance** - always say what a learner is expected to be able to do; sometimes describes the product or result of the doing.

- **Conditions** - always describe the important conditions (if any) under which the performance is to occur.

- **Criterion** - the quality or level of performance that will be considered acceptable.
Performance

• "What is the learner DOING when demonstrating achievement of the objective?"

• Objectives allow for both covert and overt behaviors.
Conditions

• The conditions may impact on the performance so must be stated clearly.
• For example:
  – Given a problem of the following type…
  – Given a list of…
  – Given any reference of the learner's choice…
  – Given a matrix of intercorrelations…
  – Without the aid of a calculator…
  – While standing knee deep…
• Specify what the learner will and will not be allowed to use when the performance is being assessed.
Criterion

• How well? What is the yardstick that determines acceptable performance?
• Sometimes the criterion are critical to the performance: sometimes not.
• Adding a criterion to the objective is a way of communicating an important aspect of what it is you want your students to be able to do.
• Three Criterion to include:
  • Speed, Accuracy, Quality
Example of a well written performance objective:

- Given a compass, ruler, and paper, be able to construct and bisect any given angle larger than five degrees. Bisectsions must be accurate to one degree.

- Clear objectives produce clear assessments which makes the teaching and learning easier on both sides of the equation.
Closer look at ADDIE components

• **Analysis** ([link](#))
• **Design** ([link](#))
• **Development** ([link](#))

• Implementation
• Evaluation
Design....then Develop

• Each instructional objective should address a skill or content as specified in the task analysis

• Watch the level of objectives (aim for application level once recall etc. are met)

• Are the appropriate instructional strategies matched to each objective?
Picture the learner…

• As you begin to develop materials, be considerate of the cognitive, psychomotor, and emotional developmental level of the learners.
• Adjust the reading level and step size as required.
Heuristics for Developers

• A heuristic is a general rule or “rule of thumb”

• Make the instruction “concrete”
  o Blend text and images (Tufte)
Step Size and Pacing

• Break big ideas into smaller bites.
• Avoid large leaps from one assumption to another.
• Pacing refers to the amount of time spend developing understanding. Too fast and too slow extremes to avoid.
Signaling the Text’s Schema

• Use an appropriate text structure to signal the learner about the content:
  • Lists of items or ideas (no significant order)
  • Compare or contrast ideas or objects
    • e.g. – difference b/w planet and moon
  • Temporal sequences (over time)
    • Steps in performing a task: start state -> end state
Signaling the Text’s Schema

• Cause and Effect or Explanations
  • Describe relationships, principles and/or rules
• Definition and example
  • To teach concepts – characteristics and examples
Be explicit

• Use pointer words like – **Two** methods for…

• Use typographical signals like –
  • Headings and sub-headings
  • Layout, including white space to isolate key information
  • Type and format variations – italics, bold, size
Pictures and Illustrations

• Visual representation of text message reinforces learning

• Use pictures for decoration to catch attention or signal commonality between items

• Organization – e.g. boxes in a flow chart, steps in a sequence with illustrations or screen captured images
Stick to basics...
Summary

- Instructional Designers utilize skills and knowledge in the areas of:
  - learning theory
  - the instructional process
  - enabling technologies
- to facilitate the creation of effective instruction and learning environments