Introduction to Instructional Design

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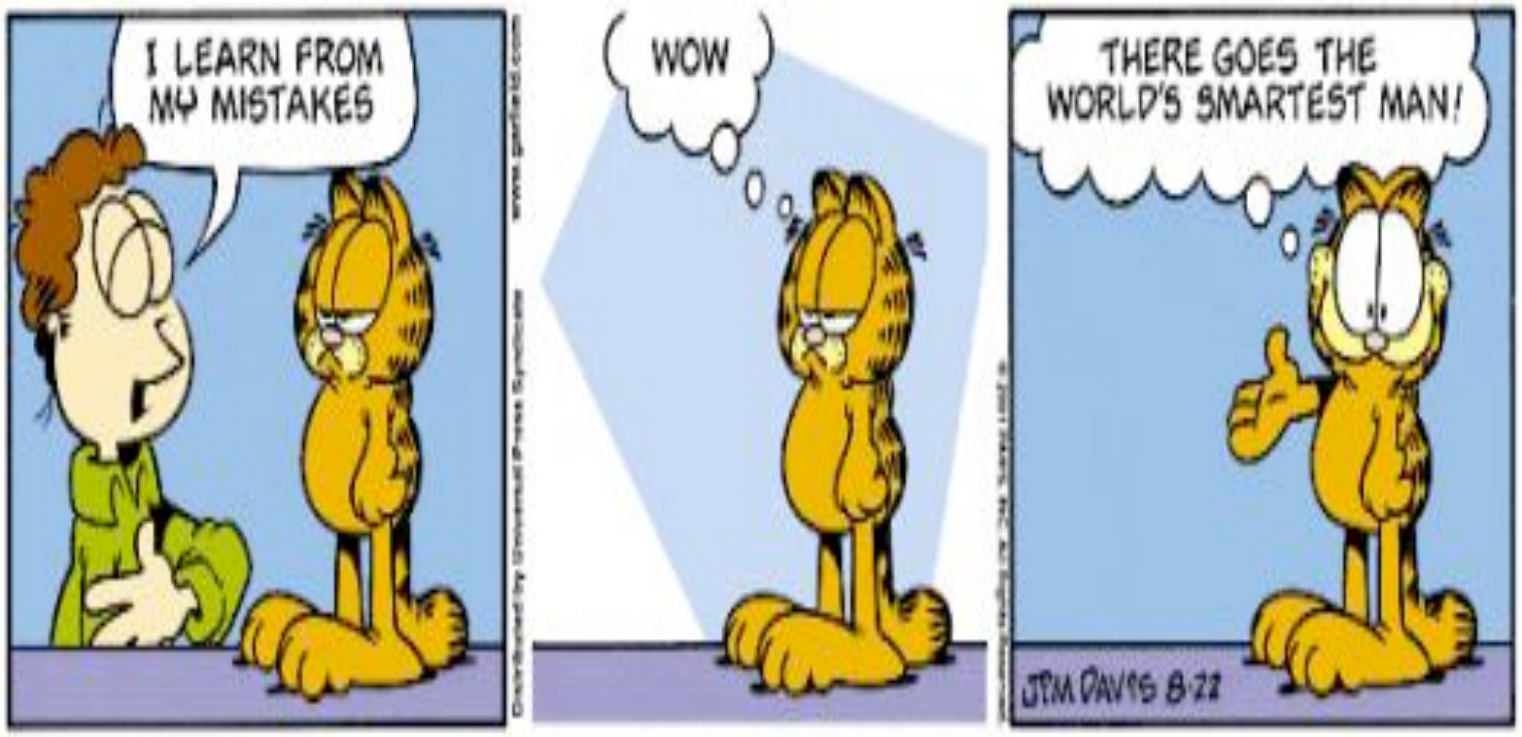
Remember we are all learners…



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

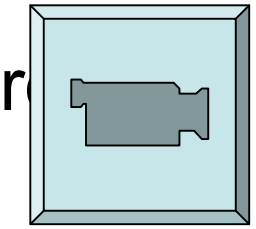
  …to produce instruction that will facilitate learning

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 classr



- 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.

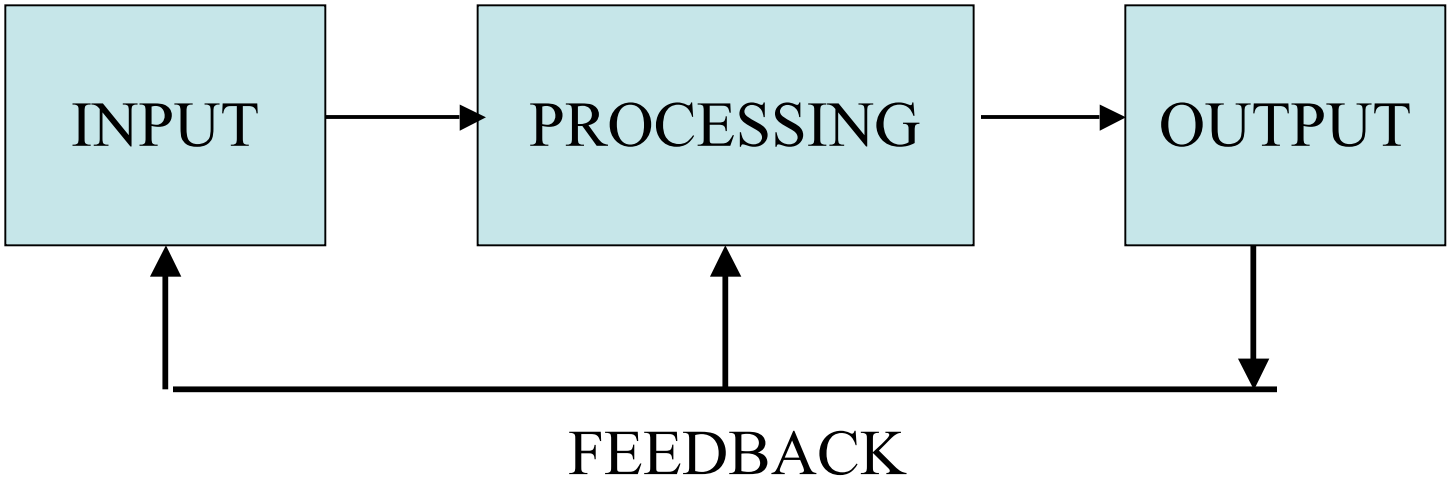
ID is a “systems” approach.

- 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



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:

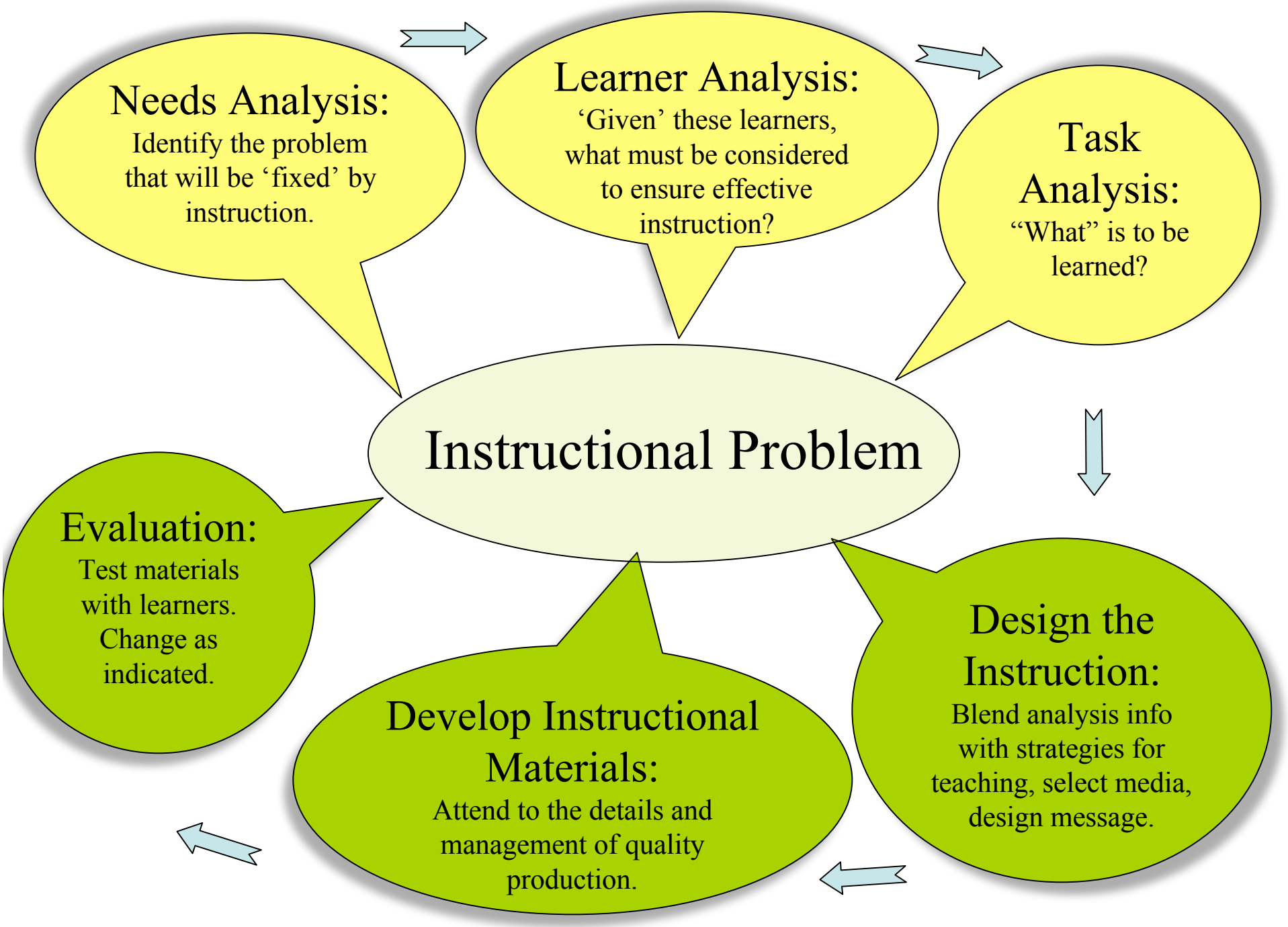
- Implementation
- Evaluation

- 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.
Develop Instructional Materials:
Attend to the details and management of quality production.
Design the Instruction:
Blend analysis info with strategies for teaching, select media, design message.

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

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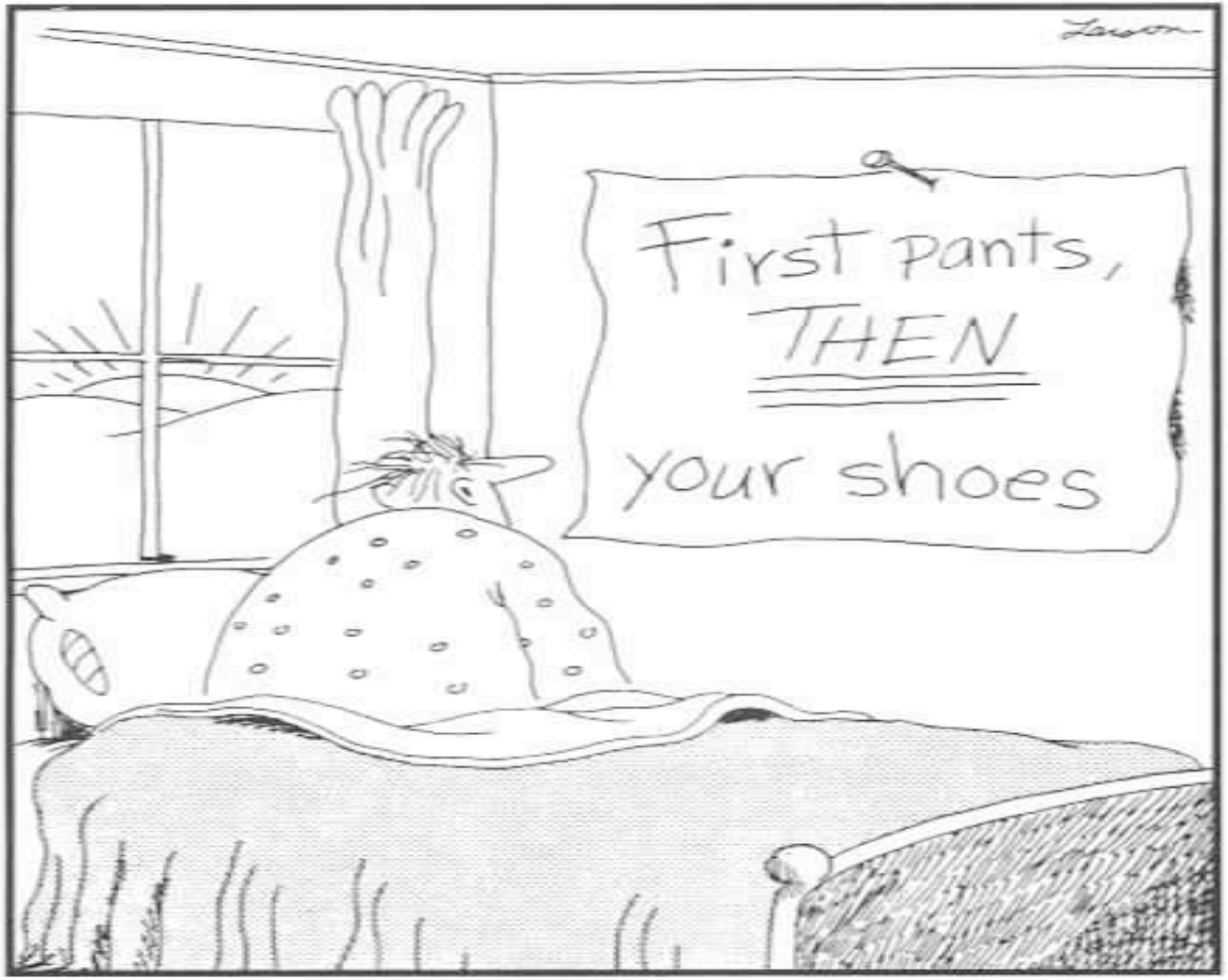
Design - Task Analysis



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.

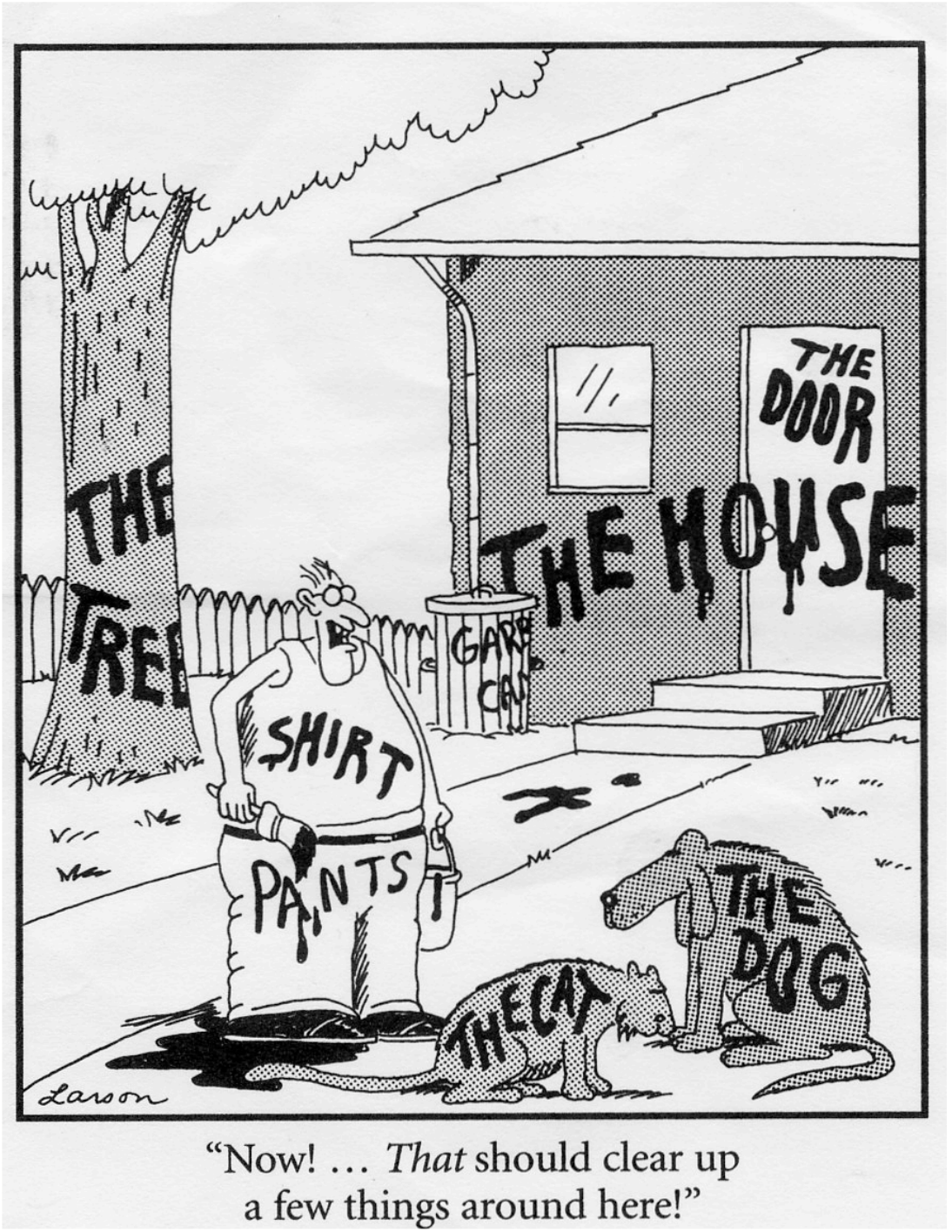
Make the ‘hidden’ structure of the content visible - identify each element

- 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

Build a Shared Vocabulary



"Now! … *That* should clear up a few things around here!"

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 cardio-vascular 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.

- Excerpts from R. F. Mager, (1984) Preparing Performance Objectives, Belmont CA: Lake Publishing

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.

Words Open to Many Interpretations	Words Open to Few Interpretations
To know	To write
To understand	To recite
To really understand	To identify
To appreciate	To sort
To fully appreciate	To solve
To grasp the significance of	To construct
To enjoy	To build
To believe	To compare
To have faith in	To contrast
To internalize	To smile

Three characteristics..

- that help make an objective communicate an intent:
- **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. Bisections 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”
  - 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

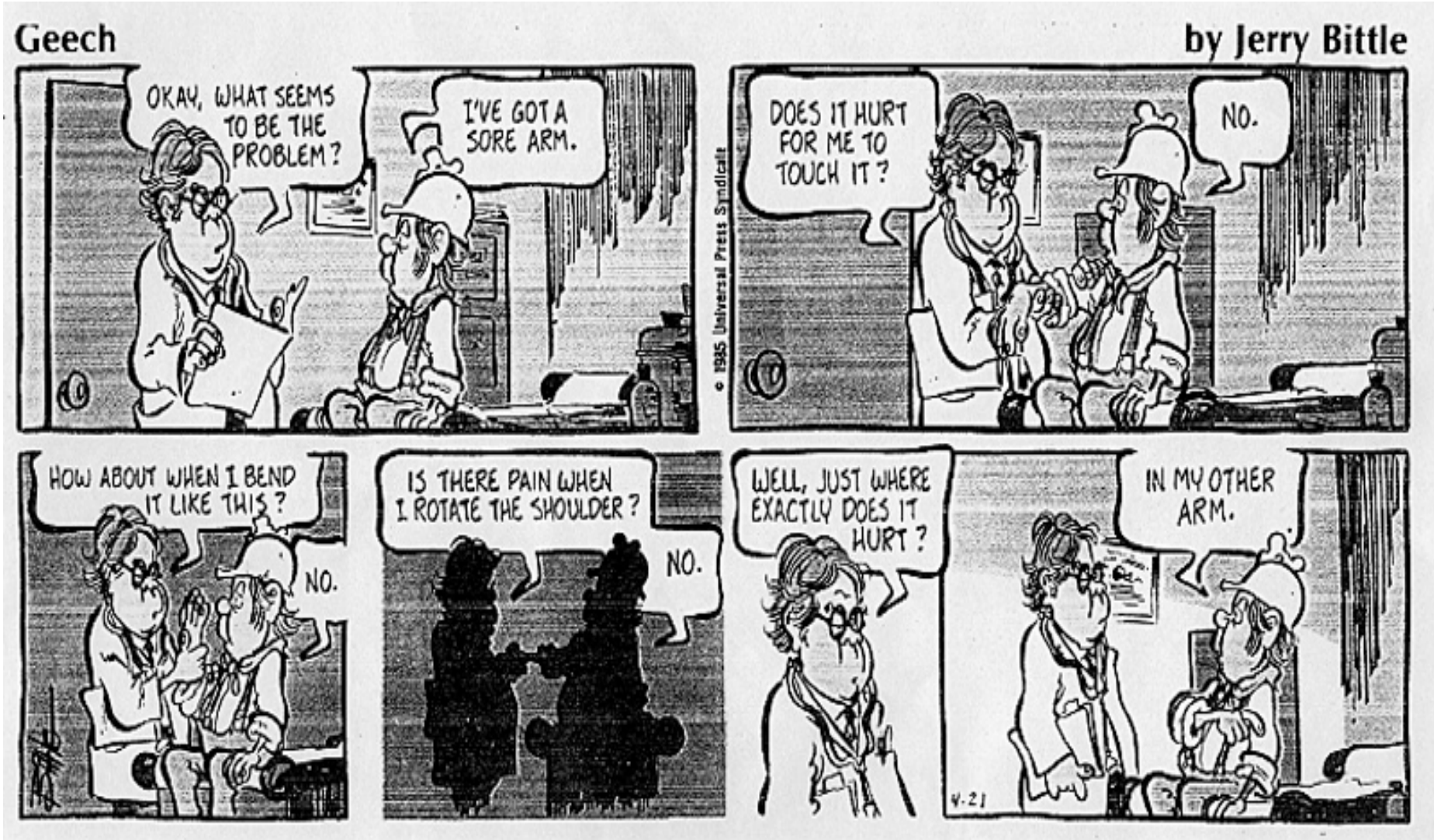
Be explicit

- 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