

The Instructional Design Process

IN 653: Instructional Design

The 5-step design process

1. Front End Analysis
2. Learning Objectives/Outcomes
3. Task Analysis
4. Strategies
5. Evaluation

1

Front End Analysis

Needs

- Determine if it is a training/incentive/organizational problem
- Identify who has the performance problem (management/workers; teacher/learners), the cause of the problem

Environmental

- Organizational climate
- Physical factors
- Socio-cultural climate

Learner

- Identify learner/trainee/employee characteristics
- Identify individual differences that may impact on learning/performance, such as prior knowledge, personality variables, aptitude variables, and cognitive styles

1

Front End Analysis Tools

- Brainstorming
- Customer studies
- Extant data analysis
- Focus groups
- Interviews
- Job descriptions
- Observations
- Performance appraisals
- Questionnaires
- Standardized tests
- Work samples

2

Learning Objectives/Outcomes

“Clear objectives can help the instructor design lessons that will be easier for the student to comprehend and the teacher to evaluate” *Jones*

“A properly written objective tells you what specific knowledge, skill, or attitude is desired and what method of instruction and criteria for learner achievement are required” *Lohr*

Writing clear learning objectives is important because:

- Objectives define what you will have the learner do
- Objectives identify behaviours, conditions, and criteria needed for performing and assessing

2

Learning Objectives/Outcomes Formats

Mager format

1. **Performance** - An objective always states what a learner is expected to be able to do and/or produce to be considered competent
2. **Conditions** - An objective describes the important conditions (if any) under which the performance is to occur
3. **Criterion** - An objective describes the criteria of acceptable performance; that is, it says how well someone would have to perform to be considered competent

Preparing Instructional Objectives: A Critical Tool in the Development of Effective Instruction (1997)

2

Learning Objectives/Outcomes Formats

Mager format - examples

Given a list of thirty five chemical elements (**condition**), the learner must be able to recall and write the valences (**performance**) of at least thirty (**criterion**)

Given a meter scale (**condition**), the learner must be able to identify the value indicated by the position of the pointer (**performance**) as accurately as the construction of the meter will allow (**criterion**)

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2

Learning Objectives/Outcomes Formats

Gagne/Briggs format

1. **Situation**
2. **Learned Capability**
3. **Object**
4. **Action**
5. **Tools and Other Constraints**

*Given a battery, light bulb, socket, and pieces of wire (**situation**), demonstrate (**learned capability**) the making of an electronic circuit (**object**) by connecting wires (**action**) to battery and socket (**tools**) and testing the lighting of the bulb (**action**).*

*In response to a question (**situation**), the learner will state (**learned capability**) orally (**action**) three technological trends that will affect the future capabilities of navies (**object**). The answer is to be completed in three minutes (**constraints/tools**).*

2

Learning Objectives/Outcomes Formats

ABCD format

1. Audience
2. Behaviour
3. Condition
4. Degree

Given all the basic shapes - cone, cylinder, cube, and sphere (condition), each second-semester geometry student (audience) will identify (behaviour) orally each shape (degree).

Using tape recorded readings of the try out sessions for the school play (condition), students in the drama class (audience) will select (behaviour) the proper voice for each character as indicated in the drama text (degree).

2

Learning Objectives/Outcomes Formats

Component	Mager	Gagné & Briggs	ABCD
Performance (What will be done)	Performance (Doing verb)	Learned capability, object & action	Behaviour
Condition (Under what)	Condition	Situation	Condition
Criteria (How well)	Criterion	Tools/Constraints	Degree
Learner (By whom)	(Implied)	(Implied)	Audience

Pre-tests/Post-tests

Performance assessment

Peer/Self-evaluation assessment strategies

Portfolio assessment

Criterion-referenced tests

Observation

Interviews

Simulations

Essays

Recall

Recognition

Constructed answers

Formative assessment

Summative assessment

3

Task Analysis

Analyse the learning outcomes and performance objectives by identifying the domains and levels of learning and determining prerequisite skills and task/content structure

Taxonomies for Identifying Learning Domains/Levels
(psychomotor, intellectual, affective)

Bloom's taxonomy of cognitive domain

Krathwohl's taxonomy of affective domain

Gagne's five learned capabilities

Harrow's taxonomy of psychomotor domain

Taxonomies for identifying learning domains/levels

1. Bloom's taxonomy of cognitive domain
2. Krathwohl's taxonomy of affective domain
3. Gagne's five learned capabilities

Bloom's taxonomy of cognitive domain

Knowledge is defined as remembering of previously learned material.

Comprehension is defined as the ability to grasp the meaning of material. This may be shown by translating material from one form to another (words to numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects).

Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories.

Analysis refers to the ability to break down material into its component parts so that its organizational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts, and recognition of the organizational principles involved.

Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information).

Evaluation is concerned with the ability to judge the value of material (statement, novel, poem, research report) for a given purpose.

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Krathwohl's taxonomy of affective domain

Receiving is being aware of or sensitive to the existence of certain ideas, material, or phenomena and being willing to tolerate them.

Responding is committed in some small measure to the ideas, materials, or phenomena involved by actively responding to them.

Valuing is willing to be perceived by others as valuing certain ideas, materials, or phenomena.

Organization is to relate the value to those already held and bring it into a harmonious and internally consistent philosophy.

Characterization by value or value set is to act consistently in accordance with the values he or she has internalized.

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Gagne's five learned capabilities

Intellectual skills “knowing how” or having procedural knowledge

Verbal information being able to state ideas, “knowing that”, or having declarative knowledge

Cognitive strategies having certain techniques of thinking, ways of analysing problems, and having approaches to solving problems

Motor skills executing movements in a number of organized motor acts such as playing sports or driving a car

Attitudes mental states that influence the choices of personal actions

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4

Strategies

Behaviourism

Building fluency
Chaining
Drill and practice
Instructional cues
Negative reinforcement
Positive reinforcement
Punishment
Reinforcement removal
Shaping

Cognitivism

Advance organizers
Anchoring ideas
Chunking information
Imagery
Logical sequencing of content
Metaphoric devices
Mnemonics
Organizational techniques
Outlining
Pattern recognition
Repetition
Self-questioning
Summarization

Constructivism

Articulation
Authentic tasks
Coaching
Collaboration and social negotiation
Cultural diversity
Encourage curiosity
Enhance relevance
Exploration
Hypothesis generation
Learning by discovery
Modelling and explaining
Problem-solving activities
Reflection
Role-playing
Self-directed learning

Formative Evaluation

- Expert review
- Design review
- One-on-one evaluation
- Small group evaluation
- Learner validation
- Field trial / field test / operational tryout
- Rapid prototype
- Alpha testing
- Beta testing

Summative Evaluation

- Expert judgement
- Filed trial
- Pilots
- Data analysis