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The Pedagogy of Medical Education

Instructional Design Principles

- The best instruction is that which is:
 - **Effective** - facilitates learners' acquisition of the prescribed knowledge, skills and attitudes
 - **Efficient** – requires the least possible amount of time necessary for learners to achieve the objective
 - **Appealing** – motivates and interests learners, encourages them to persevere in the learning task
 - **Enduring** – encoded in long-term memory, accessible and applicable in the future

Gagne, R., Briggs, L. & Wager, W. (1992). Principles of Instructional Design (4th Ed.). Fort Worth, TX: HBJ College Publishers.

Instructional Design Principles

- There should be a congruence among objectives, learning activities, and assessment.
- The objectives should be the driving force behind decisions about activities and assessment.
- Students must participate actively, interacting mentally as well as physically with material to be learned.

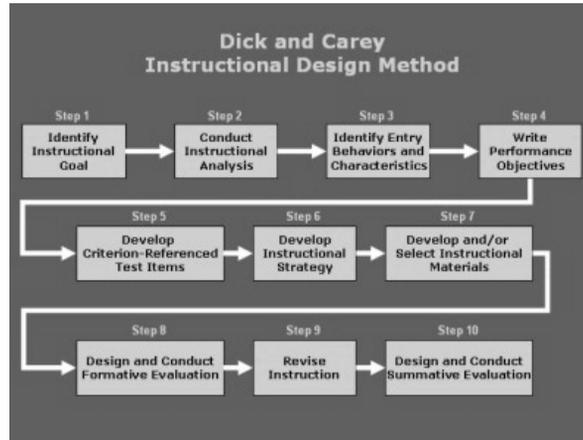
Gagne, R., Briggs, L. & Wager, W. (1992). Principles of Instructional Design (4th Ed.). Fort Worth, TX: HBJ College Publishers.

Instructional Design Principles

- Learners should be evaluated in terms of how nearly they achieve the instructional objectives rather than how they “stack up” against their fellow students.

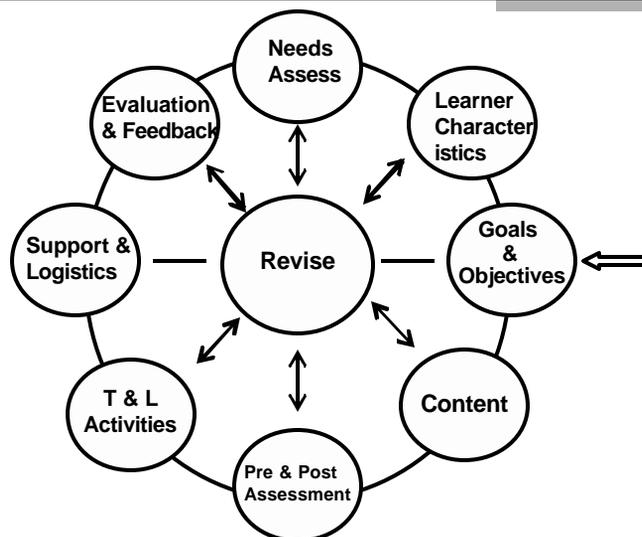
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Linear Instructional Design Model



Dick, W. & Carey, L. (1990). The systematic design of Instruction. (3rd Ed.). London, England. Scott, Foresman and Co. Publishers

Nonlinear Instructional Design Model



Morrison, G, Ross, S. & Kemp, J. (2004). Designing effective instruction. (4th Ed.). New Jersey.

Adult Learning Principles

1. Capitalize on the experience of participants.
2. Adapt to the aging limitations of the participants.
3. Adults should be challenged to move to increasingly advanced stages of personal development.
4. Adults should have as much choice as possible in the availability and organization of learning programs.

Cross, K.P. (1981). *Adults as Learners*. San Francisco: Jossey-Bass.

Application of Adult Learning Theory

1. Explain why specific things are being taught
2. Instruction should be task-oriented instead of memorization -- learning activities in context of common tasks to be performed.
3. Instruction should take into account the wide range of different backgrounds of learners; learning materials and activities should allow for different levels/types of previous experience
4. Since adults are self-directed, instruction should allow learners to discover things for themselves, providing guidance and help when mistakes are made.

Cross, K.P. (1981). *Adults as Learners*. San Francisco: Jossey-Bass.

Principles of Andragogy

1. Adults need to be involved in the planning and evaluation of their instruction.
2. Experience (including mistakes) provides the basis for learning activities.
3. Adults are most interested in learning subjects that have immediate relevance to their job or personal life.
4. Adult learning is problem-centered rather than content-oriented.

Knowles, M. (1984). *Andragogy in Action*. San Francisco: Jossey-Bass.

Experiential Learning Principles

1. Significant learning takes place when the subject matter is relevant to the personal interests of the student
2. Learning which is threatening to the self (e.g., new attitudes or perspectives) are more easily assimilated when external threats are at a minimum
3. Learning proceeds faster when the threat to the self is low
4. **Self-initiated learning is the most lasting and pervasive.**

Rogers, C.R. (1969). *Freedom to Learn*. Columbus, OH: Merrill.

Cognitive Learning Principles

- Learning activities must provide multiple representations of content
- Instructional materials should avoid oversimplifying the content domain and support **context-dependent** knowledge
- Instruction should be **case-based** and emphasize **knowledge construction**, not transmission of information
- Knowledge sources should be highly **interconnected** rather than compartmentalized.

Spiro, R.J. & Jehng, J. (1990). Cognitive flexibility and hypertext: Theory and technology for the non-linear and multidimensional traversal of complex subject matter. D. Nix & R. Spiro (eds.), Cognition, Education, and Multimedia. Hillsdale, NJ: Erlbaum.

Constructivist Principles

- Instruction must be concerned with the experiences and contexts that make the student willing and able to learn (readiness).
- Instruction must be structured so that it can be easily grasped by the student (spiral organization).
- Instruction should be designed to facilitate extrapolation and or fill in the gaps (going beyond the information given).

Bruner, J. (1996). The Culture of Education, Cambridge, MA: Harvard University Press.

Cognitive Dissonance Principles

- Dissonance theory applies to all situations involving attitude formation and change. It is especially relevant to decision-making and problem-solving.
- Dissonance results when an individual must choose between attitudes and behaviors that are contradictory.
- Dissonance can be eliminated by reducing the importance of the conflicting beliefs, acquiring new beliefs that change the balance, or removing the conflicting attitude or behavior.

Brehm, J. & Cohen, A. (1962). *Explorations in Cognitive Dissonance*. New York: Wiley.

9 Events of Instruction

- (1) gaining attention (reception)
- (2) informing learners of the objective (expectancy)
- (3) stimulating recall of prior learning (retrieval)
- (4) presenting the stimulus (selective perception)
- (5) providing learning guidance (semantic encoding)
- (6) eliciting performance (responding)
- (7) providing feedback (reinforcement)
- (8) assessing performance (retrieval)
- (9) enhancing retention and transfer (generalization)

Gagne, R., Briggs, L. & Wager, W. (1992). *Principles of Instructional Design* (4th Ed.). Fort Worth, TX: HBJ College Publishers.

Conditions of Learning

1. Different instruction is required for different learning outcomes.
2. Events of learning operate on the learner in ways that constitute the conditions of learning.
3. The specific operations that constitute instructional events are different for each different type of learning outcome.
4. Learning hierarchies define what intellectual skills are to be learned and a sequence of instruction.

Gagne, R. (1985). *The Conditions of Learning* (4th ed.). New York: Holt, Rinehart & Winston .

Learning Objectives

- Fundamental Rule of Thumb
 - **Must be measurable and observable**
- Articulate goal of the training/teaching
- Communicate intent to learner
- Provides means for evaluation
- Assists in selection of materials

Smith, P. & Ragan, T. (1993). *Instructional Design*. Columbus, Ohio. Prentice Hall.

Essential Characteristics of Learning Objectives

- Description of **performance** task and results
 - evidence of achievement: verb and product
- **Conditions** under which performance will take place
- Criterion, **Standards** – minimum acceptable level

Smith, P. & Ragan, T. (1993). Instructional Design. Columbus, Ohio. Prentice Hall.

Rules of Good Visual Aides

- Easy to read in all circumstances
 - Contrast
 - Font size
- Less is more
 - Rule of 6 (pick a number)
 - Simplicity of graphs and charts
- Illustrate concepts and main points

Development of Instructional Materials Posted Online

- Small enough to be easily downloaded over modem connection
- Specify software and version in which materials were created

Analysis of Learning Environment

- What are characteristics of the teachers/trainers who will be using these materials?
- Are there existing curricula into which this piece of instruction must fit? If so, what is the philosophy, strategy or theory used in these materials?
- What hardware is commonly available in the potential learning environments?

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Analysis of the Learner

- Who is your target audience?
 - Cognitive characteristics
 - Specific content knowledge
 - Prior experiences
 - Physiological characteristics
 - Age
 - Sensory perception
 - General health
- Psychosocial characteristics
 - Interests
 - Motivations
 - Attitude toward learning
 - Moral development
 - Job position and rank
 - Role Models

Gagne, R., Briggs, L. & Wager, W. (1992). Principles of Instructional Design (4th Ed.). Fort Worth, TX: HBJ College Publishers.