Conditions of Learning (R. Gagne)

http://tip.psychology.org/gagne.html

Overview:

This theory stipulates that there are several different types or levels of learning. The significance of these classifications is that each different type requires different types of instruction. Gagne identifies five major categories of learning: verbal information, intellectual skills, cognitive strategies, motor skills and attitudes. Different internal and external conditions are necessary for each type of learning. For example, for cognitive strategies to be learned, there must be a chance to practice developing new solutions to problems; to learn attitudes, the learner must be exposed to a credible role model or persuasive arguments.

Gagne suggests that learning tasks for intellectual skills can be organized in a hierarchy according to complexity: stimulus recognition, response generation, procedure following, use of terminology, discriminations, concept formation, rule application, and problem solving. The primary significance of the hierarchy is to identify prerequisites that should be completed to facilitate learning at each level. Prerequisites are identified by doing a task analysis of a learning/training task. Learning hierarchies provide a basis for the sequencing of instruction.

In addition, the theory outlines nine instructional events and corresponding cognitive processes:

(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).

These events should satisfy or provide the necessary conditions for learning and serve as the basis for designing instruction and selecting appropriate media (Gagne, Briggs & Wager, 1992).

Scope/Application:

While Gagne's theoretical framework covers all aspects of learning, the focus of the theory is on intellectual skills. The theory has been applied to the design of instruction in all domains (Gagner & Driscoll, 1988). In its original formulation (Gagne, 1 962), special attention was given to military training settings. Gagne (1987) addresses the role of instructional technology in learning.

Example:

The following example illustrates a teaching sequence corresponding to the nine instructional events for the objective, Recognize an equilateral triangle:

1. Gain attention - show variety of computer generated triangles
2. Identify objective - pose question: "What is an equilateral triangle?"
3. Recall prior learning - review definitions of triangles
4. Present stimulus - give definition of equilateral triangle
5. Guide learning- show example of how to create equilateral
6. Elicit per formance - ask students to create 5 different examples
7. Provide feedback - check all examples as correct/incorrect
8. Assess performance- provide scores and remediation
9. Enhance retention/transfer - show pictures of objects and ask students to identify equilaterals

Gagne (1985, chapter 12) provides examples of events for each category of learning outcomes.

Principles:

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.

References:

Gagne, R. (1962). Military training and principles of learning. American Psychologist, 17, 263-276.

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

Gagne, R. (1987). Instructional Technology Foundations. Hillsdale, NJ: Lawrence Erlbaum Assoc.

Gagne, R. & Driscoll, M. (1988). Essentials of Learning for Instruction (2nd Ed.). Englewood Cliffs, NJ: Prentice-Hall.

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

Relevant Web Sites:

The following web sites provide further information about Gagne and his work:
http://www.e-learningguru.com/articles/art3_3.htm
http://www.my-ecoach.com/idtimeline/theory/gagne.html
http://www.ibstpi.org/Products/pdf/appendix_A-C.pdf

2. Gagne's Nine Events of Instruction: An Introduction

by Kevin Kruse

http://www.e-learningguru.com/articles/art3_3.htm

Just as Malcolm Knowles is widely regarded as the father of adult learning theory, Robert Gagne is considered to be the foremost researcher and contributor to the systematic approach to instructional design and training. Gagne and his followers are known as behaviorists, and their focus is on the outcomes - or behaviors - that result from training.

Gagne's Nine Events of Instruction

Gagne's book, *The Conditions of Learning*, first published in 1965, identified the mental conditions for learning. These were based on the information processing model of the mental events that occur when adults are presented with various stimuli. Gagne created a nine-step process called the events of instruction, which correlate to and address the conditions of learning. The figure below shows these instructional events in the left column and the associated mental processes in the right column.

Instructional Event	Internal Mental Process
1. Gain attention	Stimuli activates receptors
2. Inform learners of objectives	Creates level of expectation for learning
3. Stimulate recall of prior learning	Retrieval and activation of short-term memory
4. Present the content	Selective perception of content
5. Provide "learning guidance"	Semantic encoding for storage long-term memory
6. Elicit performance (practice)	Responds to questions to enhance encoding and verification
7. Provide feedback	Reinforcement and assessment of correct performance
8. Assess performance	Retrieval and reinforcement of content as final evaluation
9. Enhance retention and transfer to the job	Retrieval and generalization of learned skill to new situation

1. **Gain attention**

   In order for any learning to take place, you must first capture the attention of the student. A multimedia program that begins with an animated title screen sequence accompanied by sound effects or music startles the senses with auditory or visual stimuli. An even better way to capture students' attention is to start each lesson with a thought-provoking question or interesting fact. Curiosity motivates students to learn.

2. **Inform learners of objectives**

   Early in each lesson students should encounter a list of learning objectives. This initiates the internal process of expectancy and helps motivate the learner to complete the lesson. These objectives should form the basis for assessment and possible certification as well. Typically, learning objectives are presented in the form of "Upon completing this lesson you will be able to. . . ." The phrasing of the objectives themselves will be covered under Robert Mager's contributions later in this chapter.

3. **Stimulate recall of prior learning**

   Associating new information with prior knowledge can facilitate the learning process. It is easier for learners to encode and store information in long-term memory when there are links to personal experience and knowledge. A simple way to stimulate recall is to ask questions about previous experiences, an understanding of previous concepts, or a body of content.

4. **Present the content**

   This event of instruction is where the new content is actually presented to the learner. Content should be chunked and organized meaningfully, and typically is explained and then demonstrated. To appeal to different learning modalities, a variety of media should be used if possible, including text, graphics, audio narration, and video.

5. **Provide "learning guidance"**

   To help learners encode information for long-term storage, additional guidance should be provided along with the presentation of new content. Guidance strategies include the use of examples, non-examples, case studies, graphical representations, mnemonics, and analogies.

6. **Elicit performance (practice)**

   In this event of instruction, the learner is required to practice the new skill or behavior. Eliciting performance provides an opportunity for learners to confirm their correct understanding, and the repetition further increases the likelihood of retention.

7. **Provide feedback**

   As learners practice new behavior it is important to provide specific and immediate

feedback of their performance. Unlike questions in a post-test, exercises within tutorials should be used for comprehension and encoding purposes, not for formal scoring. Additional guidance and answers provided at this stage are called formative feedback.

8. **Assess performance**

   Upon completing instructional modules, students should be given the opportunity to take (or be required to take) a post-test or final assessment. This assessment should be completed without the ability to receive additional coaching, feedback, or hints. Mastery of material, or certification, is typically granted after achieving a certain score or percent correct. A commonly accepted level of mastery is 80% to 90% correct.

9. **Enhance retention and transfer to the job**

Determining whether or not the skills learned from a training program are ever applied back on the job often remains a mystery to training managers - and a source of consternation for senior executives. Effective training programs have a "performance" focus, incorporating design and media that facilitate retention and transfer to the job. The repetition of learned concepts is a tried and true means of aiding retention, although often disliked by students. (There was a reason for writing spelling words ten times as grade school student.) Creating electronic or online job-aids, references, templates, and wizards are other ways of aiding performance.

Applying Gagne's nine-step model to any training program is the single best way to ensure an effective learning program. A multimedia program that is filled with glitz or that provides unlimited access to Web-based documents is no substitute for sound instructional design. While those types of programs might entertain or be valuable as references, they will not maximize the effectiveness of information processing - and learning will not occur.

How to Apply Gagne's Events of Instruction in e-Learning

As an example of how to apply Gagne's events of instruction to an actual training program, let's look at a high-level treatment for a fictitious software training program. We'll assume that we need to develop a CD-ROM tutorial to teach sales representatives how to use a new lead-tracking system called STAR, which runs on their laptop computers.

1. Gain attention

The program starts with an engaging opening sequence. A space theme is used to play off the new software product's name, STAR. Inspirational music accompanies the opening sequence, which might consist of a shooting star or animated logo. When students access the first lesson, the vice president of sales appears on the screen in a video clip and introduces the course. She explains how important it is to stay on the cutting edge of technology and how the training program will teach them to use the new STAR system. She also emphasizes the benefits of the STAR system, which include reducing the amount of time representatives need to spend on paperwork.

2. Inform learners of objectives

The VP of sales presents students with the following learning objectives immediately after the introduction.

Upon completing this lesson you will be able to:

- *List the benefits of the new STAR system.*
- *Start and exit the program.*
- *Generate lead-tracking reports by date, geography, and source.*
- *Print paper copies of all reports.*

3. Stimulate recall of prior learning

Students are called upon to use their prior knowledge of other software applications to understand the basic functionality of the STAR system. They are asked to think about how they start, close, and print from other programs such as their word processor, and it is explained that the STAR system works similarly. Representatives are asked to reflect on the process of the old lead-tracking system and compare it to the process of the new electronic one.

4. Present the content

Using screen images captured from the live application software and audio narration, the training program describes the basic features of the STAR system. After the description, a simple demonstration is performed.

5. Provide "learning guidance"

With each STAR feature, students are shown a variety of ways to access it - using short-cut keys on the keyboard, drop-down menus, and button bars. Complex sequences are chunked into short, step-by-step lists for easier storage in long-term memory.

6. Elicit performance (practice)

After each function is demonstrated, students are asked to practice with realistic, controlled simulations. For example, students might be asked to "Generate a report that shows all active leads in the state of New Jersey." Students are required to use the mouse to click on the correct on-screen buttons and options to generate the report.

7. Provide feedback

During the simulations, students are given guidance as needed. If they are performing operations correctly, the simulated STAR system behaves just as the live application would. If the student makes a mistake, the tutorial immediately responds with an audible cue, and a pop-up window explains and reinforces the correct operation.

8. Assess performance

After all lessons are completed, students are required to take a post-test. Mastery is achieved with an 80% or better score, and once obtained, the training program displays a completion certificate, which can be printed. The assessment questions are directly tied to the learning objectives displayed in the lessons.

9. Enhance retention and transfer to the job

While the STAR system is relatively easy to use, additional steps are taken to ensure successful implementation and widespread use among the sales force. These features include online help and "wizards", which are step-by-step instructions on completing complex tasks. Additionally, the training program is equipped with a content map, an index of topics, and a search function. These enable students to use the training as a just-in-time support tool in the future. Finally, a one-page, laminated quick reference card is packaged with the training CD-ROM for further reinforcement of the learning session.

3 Information from: Driscoll, M.*(1991) Psychology of Learning for Instruction.* Allyn and Bacon.

http://www.my-ecoach.com/idtimeline/theory/gagne.html

Gagne's idea is tied to Skinner's idea of sequenced learning events as displayed in his Nine Events of Instruction. The table below shows Gagne's events of instruction and an example lesson that follows it.

Example Lesson: Be Inspired Using Kidspiration
Objective: Students will learn how to use the Kidspiration multimedia software program to create a diagram.
Note: This lesson is geared for K-5 teachers with basic computer skills.

Event of Instruction	Lesson Example	Rationale
1. Gaining Attention	Teacher tells learners how she has used Kidspiration in the classroom. Shows an example diagram made using Kidspiration on projection screen/TV monitor. Asks learners questions about diagramming.	Giving background information creates validity. The use of multimedia grabs the audience's attention. Asking questions in the beginning creates an interactive atmosphere.
2. Informing the Learner of the Objective	Teacher says, "Today I am going to show you how to use a multimedia presentation software called Kidspiration."	Make learners aware of what to expect so that they are aware and prepared to receive information.
3. Stimulating Recall of Prior Learning	For this particular group of learners, they have learned previously about Mind Mapping and Schemata. Teacher associates this knowledge with lesson at hand.	When learning something new, accessing prior knowledge is a major factor in the process of acquiring new information.
4. Presenting the Stimulus	Teacher gives students step-by-step tutorial on using Kidspiration. (My eCoach Kidspiration Guide) and has installed Kidspiration software on their computers.	The goal is information acquisition, therefore, the stimulus employed is written content and the actual software program.
5. Providing Learner Guidance	Teacher demonstrates how to create a diagram on the video projection screen/TV monitor. Teacher shows students how to use Kidspiration tools to type in text, add links, add symbols, use sounds, etc. Learners are allowed to try the tools	Teacher uses "discovery learning" because learners are adults and it gives them the freedom to explore. Teacher facilitates the learning process by giving hints

	demonstrated in partners on their computers.	and cues when needed. Since the audience are teachers with some basic level of technology skills and the software program is easy to follow and understand, guidance is minimal.
6. Eliciting Performance	Teacher asks students to demonstrate Kidspiration tools.	Requiring the learner to produce based on what has been taught enables the learner to confirm their learning.
7. Giving Feedback	Teacher gives immediate feedback to learners after eliciting responses.	Regular feedback enhances learning.
8. Assessing Performance	Assign a practice activity - Create a diagram that focuses on Farm Animals. Teacher checks work.	Independent practice forces students to use what they learned and apply it. Assessing such gives instructors a means of testing student learning outcomes.
9. Enhancing Retention and Transfer	Teacher asks learners to create activities using Kidspiration for 2nd grade students. Teacher also charges learner with teaching another learner how to use Kidspiration.	Applying learning in real-life situations is a step towards Mastery Learning.

Sources

Conditions of Learning: Gagne
http://tip.psychology.org/gagne.html

Robert Gagne's Instructional Design Approach
http://www.gsu.edu/~mstswh/courses/it7000/papers/robert.htm

Driscoll, M.*(1991) Psychology of Learning for Instruction*: Allyn and Bacon.