Conditions of Learning

General

Robert Gagné was an American educational psychologist who's ideas of *conditions of learning* and instructional design implications were first introduced in 1965[1]. Gagné assumed that there are **different types of learning outcomes**, each of which is best achieved through its **specific instructional design**, but also that there is a set of steps required in every learning environment (sometimes also known as *the Gagné Assumption*[2]).

- *"Robert M. Gagne is truly one of the most influential educational psychologists of our generation, and he gave academic respectability to the practice of instructional systems design."*[3]

What are conditions of learning?

Gagné, influenced with behaviorist learning theories, suggested there are eight types or conditions of learning, mostly all based on S-R learning. They are (categorized by complexity)[4]:

- **Signal learning** - (clasicall conditioning)
- **Stimulus-response learning** - (operant conditioning)
- **Chaining** - (complex operant conditioning)
- **Verbal association** - (creation of associations using verbal connections)
- **Discrimination learning** - (learning of responding different to different stimuli)
- **Concept learning** - (learning a general response to a class of stimuli)
- **Rule learning** - (a rule is a chain of two or more concepts)
- **Problem solving** - (application of previously learned rules and concepts to new situations)

Outcomes of this types of learning can be divided into five *categories of performance* or *learning outcomes*. Gagne speculated that they distinct in terms of internal organization in the long-term memory and required mental processing. These are verbal information, intellectual skills, cognitive strategies, motor skills and attitudes. The differences in the internal organization and performance of the mentioned categories of performance result in the critical conditions needed for learning. Both categories of performance and their critical conditions of learning are explained in the table that follows.

Category of performance	Description	How to enhance learning?
Verbal information	**Declarative knowledge** like laws, stored as distributed representations.	New material should be related to **previously learned information**, but also distinctive through visual representation.
Intellectual skills	**Procedural knowledge** like dividing integers, stored as linked procedural steps arranged in hierarchies where higher skills include lower ones.	The subordinate involved skills must be learned first or be already present (**prior knowledge**).

Cognitive strategies	Skills that influence the selection and **activation of other production systems**, usually simple like “break a problem into parts”, retrieved by external or internal cueing.	Little use of prior learning, but a lot use of **practicing with different examples**.
Motor skills	Skills like inserting contact lens, manifesting with **smooth** and error-less **performance**.	**Prior learning** and **practice** enhances learning of motor skills.
Attitudes	**Acquired mental states** that in certain situations influence one's actions.	Requires a **human model** to learn from.

But aside from the special conditions that will enhance each of these specific types of learning, there are also nine **events of instruction** which should be the starting point for every type of learning and every instructional design. These events were based on empirical observations of the instructional procedures and the information-processing model of learning and memory. These nine events are[5)]:

1. **Gain attention** (reception) - The first step is to gain students' attention and motivate him to engage with the content.
2. **Inform objectives** (expectancy) - Student needs to be clarified what he can expect.
3. **Stimulate recall of prior knowledge** (retrieval) - Prior knowledge should be activated since it is important for learning new materials.
4. **Present stimulus material** (selective perception) - Present the material to the students, possibly using various learning styles.
5. **Provide learner guidance** (semantic encoding) - Guidance in terms of communication enables the teacher to direct the students in their learning or enable them easier information encoding through visual or other materials.
6. **Elicit performance** (responding) - Students need practice. Practice should immediately follow instructions and be well defined in terms of its nature, objectives and expected student responses.
7. **Provide feedback** (reinforcement) - Feedback is additional guidance offering the student immediate evaluation of his performance enabling him to realize his mistakes and misconceptions.
8. **Assess performance** (retrieval) - At the end of each course student's knowledge should be assessed in order to check if expected learning has occurred.
9. **Enhance retention and transfer** (generalization) - The learning process does not end when the class does. The teacher should advise students how and in which context to apply and transfer the just gained knowledge in the world outside the classroom.

Based on his research, Gagné in 1968 proposed ***the theory of cumulative learning***, based on the premise that new learning most of all depends on combining previously acquired and recalled material and skills, but also on the ability of learning transfer. In his own words,

- *“There is a specifiable minimal prerequisite for each new learning task. Unless the learner can recall this prerequisite capability… he can not learn the new task”*[6)]

This theory was in contrast to developmental theories of the time and, particularly, Jean Piaget's stage theory of cognitive development which assumed that master higher-order skills doesn't depended on successfully learned lower-order skills, but rather on the specific stage in cognitive development, related to age.

What is the practical meaning of conditions of learning?

An example of how each of Gagné's nine events of instruction can be implemented follows[7)8)]:

1. **Gain attention** - Show students a short interesting film related what they are about to learn, pose them an intriguing question or give them a case study.
2. **Inform objectives** - Tell students what they will learn by the end of the course.
3. **Stimulate recall of prior knowledge** - Activate students' prior knowledge by posing related questions.
4. **Present stimulus material** - Present the material to the students and use additional materials like timelines, various examples, concept maps, diagrams, and encourage students to engage in the discussion.
5. **Provide learner guidance** - Give students time for discussion, answer their questions and offer them additional materials on topic. Be available to the students also when not in class.
6. **Elicit performance** - Give students a brief test after each unit to let them check their own knowledge and see if they understand everything before moving on.
7. **Provide feedback** - Discuss quiz results with students. Answer students' questions, also ones posed through e-mail, but instead of giving them a direct answer, give them hints or guidelines that will lead them to the answer.
8. **Assess performance** - Either by a test at the end of the course, seminar, case study, assess students' performance to see if the course objectives defined at the beginning have been accomplished.
9. **Enhance retention and transfer** - Provide students with real-life examples or contexts in which they can use the acquired knowledge.

Criticisms

Gagne's theory was criticized because it is[9)]:

- **insufficient for self-learning** (which resulted in suggestions to supplement it with learner-initiated strategies)
- "*…not particularly applicable to situations in which incidental learning, discovery-based learning or other forms of instruction are desired…*" and assumes "*content can be sufficiently structured and that enough activities can be provided for the learners to acquire the desired knowledge and skills*"[10)]
- **ineffective in adult teaching**.

1)
Gagné, R. M. The conditions of learning and theory of instruction (1st ed.). New York, NY: Holt, Rinehart & Winston, 1965.
2)
Specht, P. Robert Gagne - Learning Theorist. Boise State University, College of Education.
3)
Zimmerman, Barry J., and Dale H. Schunk. Educational psychology: a century of contributions, p328. Routledge, 2003.
4), 5)
Gagné, Robert Mills. The conditions of learning and theory of instruction. Holt, Rinehart and Winston, 1985.
6)

Cited in Zimmerman, Barry J., and Dale H. Schunk. Educational psychology: a century of contributions. Routledge, 2003.

7)

For more examples see: Sadaf S, Ali SK., Zuberi RW. Problem-based Learning: Enhancing Tutors' Facilitation Skills Using Structured Small Group Experiential Learning . Education for Health 9 (online), 96. 2009. or Gagné's Nine Events of Instruction. The G. Raymond Chang School of Continuing Education Digital Education Strategies.

8)

Gagné, Robert Mills. The conditions of learning and theory of instruction. Holt, Rinehart and Winston, 1985.

9)

Zimmerman, Barry J., and Dale H. Schunk. Educational psychology: a century of contributions. Routledge, 2003.

10)

Dills, Charles R., and A. J. Romiszowski. Instructional development paradigms. Educational Technology, 1997.

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