Discovery Learning

General

Discovery learning is a learning model introduced in 1960s by one of the founders on constructivist theory, Jerome Bruner, but closely related to works of Jean Piaget (see: Stage Theory of Cognitive Development), Lev Vygotsky (see: Social Development Theory), John Dewey and Seymour Papert and later further developed by other researchers. Bruner's theory is considered to be fully constructivist in nature. Discovery learning according to him is a inquiry-based instructional approach in which the learner builds **new knowledge from prior knowledge and active experience**.

What is discovery learning?

In contrast to classical teaching methods in which the learner is usually passive and expected to assimilate the knowledge presented by the teacher[1)], discovery learning offers a **learner-centered approach** in which the learner discovers new knowledge through **active**, **hand-on experiences**[2)] and construct new concepts based on his existing knowledge. This kind of learning is **oriented on the process** of learning, rather then on its content and information. According to Bruner,

- "*practice in discovering for oneself teaches one to acquire information in a way that makes that information more readily viable in problem solving.*"[3)]

Another important aspect of discovery learning is failure, which is viewed as an important element of learning to the extent that learner hasn't really learned anything if he hasn't failed during the learning process.

Later in his career Bruner adopted a more social and political view of learning and language acquisition influenced by Lev Vigotsky's social development theory.

Main attributes of discovery learning, as described by Bicknell-Holmes and Hoffman[4)] are:

- **exploring and problem solving**, which stimulate learners to actively approach to creation, acquisition and generalization of new knowledge instead of passively being exposed to lectures and practice,
- **taking responsibility for learning** in terms oft he ability of learners to choose their own learning pace, and
- **building new knowledge** from the existing.

The characteristics in which discovery learning differs from clasical learning are[5)]:

- active rather than passive learning,
- learning is process-oriented rather than content-oriented,
- failure is important,
- feedback is necessary, and
- understanding is deeper.

What is the practical meaning of discovery learning?

Bruner's constructivistic principles of discovery learning claim that instruction must[6]:

- **provide** students with **experiences and contexts** that make them willing and able to learn (readiness),
- be structured in a **spiral manner** so that the student keeps developing learned concepts in more and more details, and
- be designed to **facilitate extrapolation** that enables student going beyond the information given.

The role of the teacher in such instructional process can be either to provide students with information when necessary (*guided discovery*) or not provide them with information at all (*unguided discovery*).

These principles offering an idea of what instructional process should look like were implemented in several mostly very similar architectures of discovery-based learning:

- Case-Based Learning
- Incidental Learning
- Simulation-Based Learning
- Goal Based Scenarios
- Problem-Based Learning

Criticisms

Discovery learning has been subjected to many criticisms lately (see: criticisms of constructivism), with more and more studies showing:

- **inefficiency** of pure discovery learning, especially for novice learners, and
- strong positive effects of guided instruction and worked examples, mostly excluded from learning by discovery[7][8][9][10].

- "*In summary, learners encounter problems with all processes characteristic of discovery learning such as stating hypotheses, designing experiments, interpreting data and regulating the learning process (monitoring and planning).*"[11]

Still, this debate is ongoing as various researchers still find that guided discovery can result in better learning than explicit instruction[12].

Keywords and most important names

- Jerome Bruner
- **discovery learning**, **discovery-based learning**, **guided discovery**, **exploring**

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1) See for example: Assimilation theory.

2) Bruner, J. S. The art of discovery. Harvard Educational Review, 31, 21–32. 1961.

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