# Samenvatting Educational Psychology

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Het gebruik van deze samenvatting is bedoeld als studeerhulp na het lezen van de verplichte literatuur. Gebruik van deze samenvatting is geheel voor eigen risico.

Soms wordt er verwezen naar bladzijden of tabellen in het originele boek.

Succes met studeren!

# Inhoud

# Chapter 1: Perspectives on Learning

Because so little of our behavior is instinctive and so much of it is learned, we're able to benefit from our experiences. We human beings seem to inherit an ability to think and learn in ways that nonhumans cannot. Our capacity to be versatile and adapt to many different situations and environments far exceeds that of other animal species.

We'll define learning as a long-term change in mental representations or associations as a result of experience. Regardless of how we define learning, we know it has occurred only when we actually see it reflected in a person's behavior:

- Performing a completely new behavior
- Changing the frequency of an existing behavior
- Changing the speed of an existing behavior
- Changing the intensity of an existing behavior
- Changing the complexity of an existing behavior
- Responding differently to a particular stimulus

Basic research: investigating specific learning processes under tightly controlled conditions.
Applied research: investigating people's learning in more 'real-world' tasks and settings.

Quantitative data: measurements and other numbers.
Qualitative data: complex verbal or behavioral performances.

Principles of learning identify certain factors that influence learning and describe the specific effects these factors have (usually broadly applicable). When a principle is observed over and over again—when it stands the test of time—it is sometimes called a law. Theories of learning provide explanations about the underlying mechanisms involved in learning.

History of theories of learning (in chronological order):

- Structuralism
- Functionalism
- Behaviorism
- Social learning theory
- Gestalt psychology
- Cognitivism
- Social cognitive theory
- Contextual theories / sociocultural theory
- Cognitive neuroscience

Advantages of theories over principles:

- They allow us to summarize the results of many, many research studies and integrate numerous principles of learning.
  - Theories provide starting points for conducting new research.
  - Theories help us make sense of and explain research findings.
- They can ultimately help us design instructional and therapeutic strategies and environments that facilitate human learning and development to the greatest possible degree.


Potential drawbacks of theories:

- No single theory explains everything researchers have discovered about learning. - Theories affect the new information that's published, thereby biasing the knowledge we have about learning.

To maximize productive student learning, teachers must understand the factors that influence learning (principles) and the processes that underlie it (theories). They must also draw on research findings regarding the effectiveness of various instructional practices.

# Chapter 3: Behaviorist Principles and Theories

Basic assumptions in behaviorism:
- Principles of learning should apply equally to different behaviors and to a variety of animal species (equipotentiality).
- Learning processes can be studied most objectively when the focus of the study is on stimuli and responses (S-R psychology).
- Internal processes tend to be excluded or minimized in theoretical explanations. Neobehaviorist theorists do however consider these factors.
  - Learning involves a behavior change.
  - Organisms are born as blank slates.
  - Learning is largely the result of environmental events, learning is conditioning. - The most useful theories tend to be parsimonious ones → ones that explain the learning of all behaviors by as few learning principles as possible (concise theories).

Classical conditioning:
- Neutral stimulus (NS) with no response
- NS followed by unconditioned stimulus (UCS) leading to an unconditioned response (UCR) - NS becomes a conditioned stimulus (CS) which leads to a conditioned response (CR) Some psychologists describe classical conditioning as a form of signal learning. It can explain a variety of involuntary responses, fears, phobias, attitudes, etc.

Common phenomena in classical conditioning:
- Associative bias: some associations are more likely to be made than others. - Contiguity and contingency: stimuli should be presented at approximately the same time (contiguity), and the potential CS must occur only when the UCS is likely to follow (contingency).
- Extinction: repeated presentations of the CS without the UCS lead to successively weaker and weaker CRs.
- Spontaneous recovery: recurrence of a CR when a period of extinction is followed by a rest period.
  - Generalization: when learners respond to other stimuli in the same way they respond to a CS. - Stimulus discrimination: when one stimulus (CS+) is presented in conjunction with an UCS, and another stimulus (CS-) is presented in absence of the UCS, making learners differentiate between the two stimuli.
- High-order conditioning (or second-order conditioning): a NS becomes a CS by being paired with a UCS, so that it soon elicits a CR. Next, a second NS is paired with the CS, and it too begins to elicit the CR. The second stimulus has also become a CS.

Counterconditioning:
- A new response that is incompatible with the existing CR is chosen (cannot be performed at the same time).
  - A stimulus that elicits the incompatible response is identified.
- The stimulus that elicits the new response is presented to the individual, and the CS eliciting the undesirable CR is gradually introduced into the situation.

Counterconditioning is for example used in a therapeutic technique: systematic desensitization.

Thorndike's law of effect: responses to a situation that are followed by satisfaction are strengthened; responses that are followed by discomfort are weakened.
Revised law of effect: Thorndike continued to maintain that rewards strengthen the behaviors they follow, but he deemphasized the role of punishment.

Operant conditioning: a response that is followed by a reinforcer is strengthened and therefore more likely to occur again.
Reinforcer: a stimulus or event that increases the frequency of a response it follows.
Transituational generality of a reinforcer: any single reinforcer is likely to increase many different behaviors in many different situations.

Key conditions for operant conditioning:

- The reinforcer must follow the response.
- Ideally, the reinforcer should follow immediately.
- The reinforcer must be contingent on the response.

| | Classical Conditioning | Operant Conditioning |
|---|---|---|
| **Occurs when:** | Two stimuli (UCS and CS) are paired | A response (R) is followed by a reinforcing stimulus ($S_{Rf}$) |
| **Association acquired:** | CS ⟶ CR | R ⟶ $S_{Rf}$ |
| **Nature of response:** | Involuntary: elicited by a stimulus | Voluntary: emitted by the organism |

**Figure 3.4**
Differences between classical and operant conditioning.

Primary reinforcer: satisfies a built-in, perhaps biology-based, need or desire. Secondary reinforcer (or conditioned reinforcer): a previously neutral stimulus that has become reinforcing to a learner through repeated association with another reinforcer.

Positive reinforcement (extrinsic or intrinsic):

- Material (e.g. food or a toy)
- Social (e.g. a smile, attention or praise)
- Activity (opportunity to engage in a favorite activity)
- Token (insignificant item that a learner can accumulate to earn something bigger)

Feedback is especially likely to be effective when it communicates what students have and haven't learned and when it gives them guidance about how they might improve their performance.
Positive
feedback and the intrinsic reinforcement that such feedback brings are probably the most productive forms of reinforcement in the classroom.

Negative reinforcement: something is being taken away from the situation (e.g. removal of guilt or anxiety).

Common phenomena in operant conditioning:

- Superstitious behavior: randomly administered reinforcement tends to reinforce whatever response has occurred immediately beforehand, and a learner will increase that response. -

Shaping: a process of gradually reinforcing closer and closer approximations to the behavior we ultimately want to see.
- Chaining: the process of first reinforcing just one response, then two in a row, then a sequence of three, and so on.
- Extinction: when a response decreases in frequency because it no longer leads to reinforcement.
- Extinction burst: a brief increase in the behavior being extinguished in the initial stages of the extinction process.

Continuous reinforcement: every response is reinforced.
Intermittent reinforcement: some instances of the desired response are reinforced, some are not.
Continuous reinforcement causes learners to learn behavior faster, intermittently reinforced responses are extinguished more slowly.

Reinforcement schedules:
- Ratio schedules:
  - Fixed-ratio (FR) schedule: a reinforcer is presented after a certain constant number of responses have occured.
  - Variable-ratio (VR) schedule: a reinforcer is presented after a particular but continually changing number of responses have been made.
- Interval schedules:
  - Fixed-interval (FI) schedule: reinforcement after a certain time interval, in which the time interval remains constant.
  - Variable-interval (VI) schedule: reinforcement after a certain time interval, in which the time interval changes somewhat unpredictably.

Variable schedules lead to steadier response rates and greater resistance to extinction than fixed schedules.
- Differential schedules: a specific number of responses occurring within a specific time interval leads to reinforcement.
  - Differential rate of high responding (DRH) schedule (lots of responses)
  - Differential rate of low responding (DRL) schedule (very few or no responses)

Antecedent stimuli/responses: these set the stage for certain behaviors to follow or not follow.
Discriminative stimulus: when a particular response leads to reinforcement only when a certain stimulus is present. Providing these stimuli is often called cueing or prompting. An organism is under stimulus control when it is more likely to make certain responses in the presence of certain stimuli.
Setting events: complex environmental conditions under which certain behaviors are most likely to occur.
Generalization: when a learner has learned to respond in a certain way in the presence of one stimulus, it may respond in the same way in the presence of other stimuli.
Generalization gradient: the tendency to generalize more readily as stimuli become more similar to the original discriminative stimulus.

Stimulus discrimination: learning that a response will be reinforced in the presence of one stimulus, but not in the presence of another stimulus.

Behavioral momentum: learners are more likely to make desired responses if they are already making similar responses.

Avoidance learning: the process of learning to stay away from an aversive stimulus.
Pre-aversive stimulus: a cue signaling the advent of the aversive stimulus.

Active avoidance learning: the learner deliberately makes a response to avoid an aversive event.
Passive avoidance learning: the learner learns that not behaving in a certain way allows them to avoid an aversive event.
Avoidance behaviors are hard to extinguish, so they need to be prevented from being learned in the first place, or be systematically desensitized.

Instrumental conditioning: the behavior-increasing effect of reinforcement + the behavior-suppressing effect of punishment.
Punishment decreases the frequency of the response it follows.
Punishment I: the presentation of a stimulus, typically an aversive one.
Punishment II: the removal of a stimulus, usually a pleasant one.

Potentially effective forms of punishment:

- Verbal reprimands
- Restitution (returning the environment to the same state of affairs it was in before) - Restitutional overcorrection (making things better than they were beforehand) - Positive-practice overcorrection (repeating an action, but this time correctly, perhaps exaggerated)
- Time-out
- In-house suspension (being removed from normal classroom activities for one or more school days with close adult supervision in a separate room within the school building) - Response cost (the withdrawal of a previously earned reinforcer)

Ineffective forms of punishment:

- Physical punishment
- Psychological punishment
- Extra classwork
- Out-of-school suspension
- Missing recess

In recent decades, behaviorists have begun to incorporate elements of cognition and motivation into their views of human behavior. As a result, the distinction between behaviorism and cognitivism has become increasingly blurry.

# Chapter 4: Applications of Behaviorist Principles

Applying behaviorist principles to classroom management:

- Need for a generally positive, upbeat classroom atmosphere.
- School should be a place where students encounter more success than failure.

Myths and misconceptions about reinforcement and punishment:

- Reinforcement is bribery.
- Reinforcement leads to dependence on concrete, external rewards.
- Reinforcing one student for being good teaches other students to be bad.
- Punishment reduces self-esteem.
- Eliminating a problem behavior doesn't eliminate the underlying cause of the behavior.

Genuine concerns:

- Encouraging productive behaviors through reinforcement alone ignores cognitive factors that might be interfering with learning.
- Reinforcement of some behaviors may interfere with maximal learning and performance over the long run.
- Extrinsic reinforcement of a personally enjoyable behavior can undermine the behavior's intrinsically reinforcing effects.
  - A punished behavior isn't forgotten and may return.
  - Punishment can have negative side effects.
- Improving behavior in one context may lead to more frequent behavior problems in another context (behavioral contrast).

Effective strategies for using reinforcement in classrooms:

- Specify desired behavior (or terminal behavior) up front.
- Identify consequences that are truly reinforcing for each learner.
- Make sure that learners will gain more than they lose by changing their behavior. - Explicitly describe response-consequence contingencies (e.g. through a contingency contract). - Administer reinforcement consistently.
- Gradually shape complex behaviors.
- When giving reinforcement publicly, make sure all students have an opportunity to earn it. - Use objective criteria to monitor progress.
- Foster the ability to delay gratification.
- Once the terminal behavior is occurring regularly, gradually wean learners off extrinsic reinforcers.

Strategies for decreasing undesirable behaviors:

- Extinguishing responses
- Presenting noncontingent reinforcement
- Reinforcing other behaviors (ideally incompatible behaviors)
- Using punishment
  - Choose a punishment that is truly punishing without being overly severe. - Inform learners ahead of time about what behaviors will be punished.
  - Describe unacceptable behaviors in clear, concrete terms.

- Whenever possible, administer punishment immediately after the inappropriate behavior.
- Administer punishment within the context of a generally warm, supportive environment.
  - Explain why the behavior is unacceptable.
  - Be consistent in imposing punishment for inappropriate behavior.
  - Modify the environment so that misbehaviors are less likely to occur.
  - Teach and reinforce more appropriate behaviors.

When problem behaviors are extremely entrenched and counterproductive, applied behavior analysis (ABA) strategies can be used:
- Behaviors that are the focus of an intervention (target behaviors) are identified in observable, measurable terms.
  - Target behaviors are measured both before and during the intervention.
- Environmental conditions that are possibly encouraging problem behaviors are identified (functional analysis).
  - A specific intervention or treatment plan is developed and implemented.
  - The treatment is monitored for effectiveness as it progresses, and modified if necessary. - Measures are taken to promote generalization of newly acquired behaviors (e.g. teaching many different versions of the desired behavior).
  - Treatment is phased out after the desired behavior is acquired.

Using ABA with large groups:
- Group contingency: an entire group must perform a desired behavior in order for reinforcement to occur.
- Token economy: individuals who behave appropriately are reinforced with token reinforcers that can later be traded for backup reinforcers. Elements:
    - A set of rules describing the responses that will be reinforced.
    - A variety of backup reinforcers.
    - A 'store' at which the backup reinforcers can be 'purchased'.
  - Schoolwide positive behavior support:
    - Explicitly defining and teaching appropriate behaviors.
    - Designing a curriculum and implementing instructional practices tailored to students' current needs and ability levels.
    - Giving students opportunities to make choices.
    - Regularly reinforcing students for behaving appropriately.
    - Providing multiple layers of support depending on individual students' needs. - Continually monitoring the program's effectiveness.

More and more, teachers, clinicians, and other practitioners are adding cognitive elements to these ABA techniques → modeling the desired behavior, coaching, etc.

Implications of behaviorism for classroom instruction and assessment:
  - Learning involves a change in behavior.
  - Voluntary behaviors are most likely to increase when they are followed by reinforcement. - Complex behaviors often need to be gradually shaped over time.
- Interventions tend to be most effective when the desired behavior is explicitly identified in advance.
- Interventions tend to be maximally effective when learners' progress is monitored from start to finish.

Instructional goals: desired general outcomes of instruction over the long run.
Instructional objectives: more specific planned outcomes of a particular lesson or unit.
Advantages:
- These determine in advance what teachers want students to learn, making it easier to choose appropriate methods.
- Teachers can more easily communicate and coordinate what they are collectively trying to accomplish in their classrooms.
- Students know what they must focus on.

Behavioral objectives:
- The outcome is stated in terms of an observable and measurable behavior. - It contains the stimulus condition(s) under which the behavior should be exhibited. - It contains a criterion for judging acceptable performance.

Criticism: these often focus on lower-level skills rather than higher-level skills. Solution: identifying a small number of general, nonbehavioral objectives, along with examples of behaviors that reflect each one. This can be done with a taxonomy of objectives. Teachers can also draw from content-area standards: general statements regarding the knowledge and skills that students should acquire at various grade levels.

Programmed instruction (PI): the student learns through a series of frames, encountering new information, responding to questions, and checking answers. Can be executed as a linear program or a branching program (next frame depends on error rate). Key principles:
- Active responding
- Shaping
- Immediate reinforcement
- Self-pacing

A branching program can be carried out through computer-assisted instruction (CAI).

Mastery learning: an approach to instruction in which students must learn the material in one lesson to a high level of proficiency before proceeding to the subsequent lesson. Components: - Small, discrete units.
- A logical sequence.
- Demonstration of mastery at the completion of each unit.
- A concrete, observable criterion for mastery of each unit.
- Additional, remedial activities for students needing extra help or practice.

Personalized system of instruction (or PSI or the Keller Plan): form of mastery learning. Features: - Emphasis on individual study.
- Unit exams.
- Supplementary instructional techniques.
- Use of proctors (more advanced students who administer/score exams and tutor students).

Mastery learning is probably most appropriately used when a teacher's main goal is for students to learn specific skills or a specific body of information prerequisite to later topics.

Backward design in school assessment: planning of one or more end-of-instruction assessments precedes rather than follows instructional planning.
Formative assessment: ongoing assessment of students' progress.
Summative assessment: assessment conducted at the end of instruction.

Behaviorist principles are most useful for students who have previously had more failures than successes in their academic careers, students with little motivation, and students with chronically high levels of anxiety.

# Chapter 6: Introduction to Cognitivism

Basic assumptions in cognitive perspectives:

- Some learning processes may be unique to human beings.
- Learning involves the formation of mental representations or associations that aren't necessarily reflected in overt behavior changes.
- People are actively involved in their own learning.
- Knowledge is organized.
- The focus of scientific inquiry must be on objective, systematic observations of people's behaviors, but behaviors often allow reasonable inferences about unobservable mental processes.

Tolman's purposive behaviorism:

- Learning is an internal change (latent learning = unobservable learning).
- Behavior is purposive (aimed at attaining one's goals).
- Expectations affect behavior.
- Learning results in an organized body of information (cognitive maps).

Gestalt psychology:

- Perception is often different from reality.
- The whole is more than the sum of its parts.
- People are predisposed to organize experiences, and to do so in predictable ways. - Law of proximity: people perceive things that are close together in space as a unit. - Law of similarity: people perceive things that physically resemble one another as a unit.
  - Law of closure: people tend to fill in missing pieces to form a complete picture. - Law of Prägnanz: people organize their experience as simply, concisely, symmetrically, and completely as possible.
- Learning follows the law of Prägnanz (and involves the formation of memory traces). - Problem solving involves restructuring and insight.

Verbal learning research:

- Serial learning (learning a set of items in a particular sequence)
- Paired-associate learning (learning pairs of items)

General learning principles that emerged from verbal learning research:

- Serial learning is characterized by a particular pattern (serial learning curve: first (primacy effect) and last (recency effect) items are learned more easily).
- Overlearned material can be more easily recalled later on.
- Distributed practice is usually more effective than massed practice.
- Learning in one situation often affects learning and recall in another situation.
  - Retroactive inhibition: when people learn two sets of paired associates in succession, the learning of the second diminishes their ability to recall the first.
  - Proactive inhibition: in the situation above, people also often struggle to remember the second set.
  - Retroactive facilitation or proactive facilitation: when learning one set of information can actually improve the recall of information learned at another time.
- Characteristics of the material affect the speed with which people can learn it. - Items are learned quicker when they're meaningful.
  - Items are easier to learn when they're pronounceable.
  - Concrete items are easier to learn than abstract items.
- People often impose meaning on new information.

- People organize what they learn.
- People often use encoding strategies to help them learn (‘changing’ information). - People are more likely to learn general ideas than to learn words verbatim.

Information processing theory: a variety of specific theories about how people mentally deal with new information (e.g. computerlike, or not).

Constructivism: portrays learning more as constructing knowledge rather than as directly acquiring it from the outside world.
Individual constructivism: the process of construction occurs separately within each learner.
Social constructivism: theories that focus on how people work together to create new knowledge.

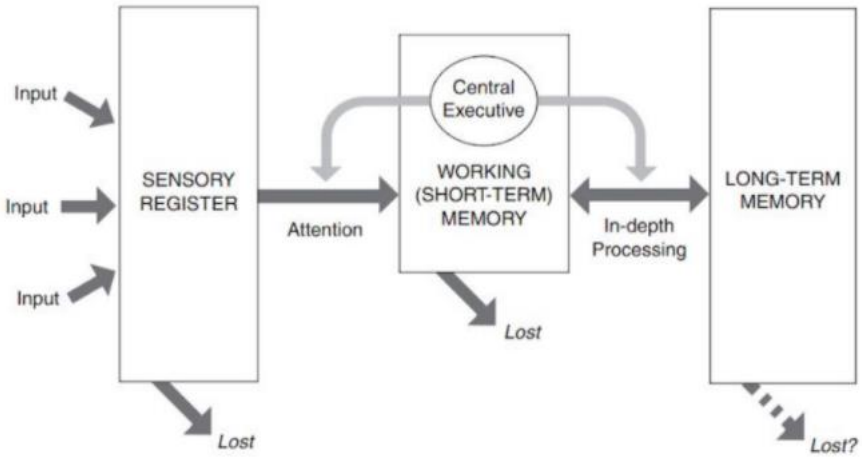
Contextual theories: the idea that people’s thinking and learning are inextricably intertwined with their physical bodies or with their immediate physical, social, and cultural environments.

General educational implications of cognitivist approaches:

- Students control their own learning through the cognitive processes in which they engage. - Students actively construct - rather than passively absorb - their knowledge. - Instructional practices can have a significant impact on how students mentally process classroom material and thus also on how effectively students learn it.

# Chapter 7: Basic Components of Memory

Memory: a process of saving information for a period of time OR a particular part of the human memory system where acquired information is 'located'.
Storage: the process of 'putting' new information in memory.
Encoding: modifying information when storing it (e.g. changing the form, adding to it, simplifying).
Retrieval: the process by which people 'find' information they've previously stored.




Dual-store model of memory: claims that working memory and long-term memory are distinctly different entities.

Control processes: cognitive processes that directly affect memory's functioning.

Sensory register: holds incoming information long enough for it to undergo very preliminary cognitive processing. Characteristics:

- Capacity: very large
- Forms of storage: same form in which it has been sensed
- Duration: very short, less than a second - little over two seconds

If we want to move information from the sensory register into working memory, it appears that, at least in most cases, we must pay attention to it. Factors influencing attention: - Motion

- Size
- Intensity
- Novelty (unusual stimuli draw attention)
- Incongruity (stimuli that don't make sense draw attention)
- Social cues
- Emotion
- Personal significance

Attention almost certainly involves both automatic responses and conscious control. It also involves learning to some degree. Attention: focused cognitive processing of particular aspects of the environment.

Figure-ground: when people are focusing on the details of one object (the figure), they cannot also inspect other things in their line of sight—things that become the background (or ground) for the object.
Limited processing capacity: the number of stimuli being attended to depends on how much cognitive processing is required for each one.

Working memory: the component of memory in which active thinking occurs. Characteristics: -
Capacity: very limited, but hard to specify how large it is exactly
- Forms of storage: a lot of information in encoded in an auditory form, but visual, spatial, tactile and psychomotor encoding also occurs
    - Phonological loop (auditory)
    - Visuospatial sketchpad (visual)
    - Episodic buffer (where information can interact and be integrated)
- Duration: short-term, less than 30 seconds

Central executive: controls and monitors the flow and use of information throughout the memory system.

Control processes in working memory:
- Organization
- Retrieval
- Maintenance rehearsal (repeating information over and over again so it stays in working memory)

People store information in long-term memory more successfully when they relate it to things they already know (both declarative and procedural knowledge). Characteristics of long-term memory:
- Capacity: unlimited
- Forms of storage: information is encoded in a variety of ways
    - Explicit knowledge: easy to recall and explain
    - Implicit knowledge: affects behavior but can't consciously be retrieved
- Duration: indefinitely long, but probably not permanent

Challenges to the dual-store model:
- Are working memory and long-term memory really different?
- Is conscious thought necessary for long-term memory storage?

Alternative views of human memory:
- Levels-of-processing model: incoming information is processed by a central processor at any one of a number of different levels of complexity.
- Activation model: all information stored in memory is in either an active or an inactive state. Activation almost invariably spreads from one piece of information to associated pieces.

Generalizations about memory and their educational implications:
- Attention is essential for explicit memory.
    - Include variety in topics and presentation styles.
    - Provide frequent breaks from tasks requiring considerable attention and concentration.
    - Ask questions.
    - Minimize distractions when independent work is assigned.
    - Also minimize distractions during whole-class lessons.

- If certain students have trouble staying on task, seat them near the teacher. - Monitor students' behaviors.

- Learners can process only a limited amount of information at a time.
- Learners must be selective about the information they study and learn.
- Even with attention-getting and appropriately paced and structured lessons, learners differ in their ability to control what they attend to and consciously think about.
- With specialized experiences, learners might be able to expand the limited capacities of their attention and working memory, but if so, probably only a little bit.
- The limited capacity of working memory isn't necessarily a bad thing.

# Chapter 8: Long-Term Memory Storage and Retrieval Processes

Perception: our interpretation of the environment.
Sensation: the information we actually receive from the environment.
You cannot perceive everything you sense, but in perception we interpret our senses (through constructive processes).
Ambiguous stimulus: a stimulus that can be interpreted in at least two ways.

Long-term memory is selective, constructive, occasionally distortive, and to some degree dependent on a learner's existing knowledge. Human beings also tend to find meaning in what they see and hear.

Cognitive processes involved in long-term memory storage:

- Rehearsal: verbally repeating something over and over in a short time period; maintains information in working memory, can also be effective for storing in long-term memory.
- Meaningful learning: relating new information to knowledge already stored in long-term memory; more effective than meaningless rehearsal.
    - Self-reference effect: relating new information to oneself can have a dramatic effect on learning.
- Internal organization: a body of new information is stored more effectively when its pieces are interconnected.
- Elaboration: using prior knowledge to embellish on new information and storing the embellished version.
    - Generation effect: when learners elaborate on and integrate new information to the point that they construct an entirely new idea, concept, etc.
- Visual imagery: a mental 'picture' that captures how something looks or might look (people's memory for visual material is often better than for strictly verbal material).

Many procedures involve a combination of physical behaviors and mental activities. Complex procedures may be learned as declarative knowledge, and (through practice) turn into a learned behavior. Therefore meaningful learning and elaboration may be helpful.

Factors affecting long-term memory storage:

- Working memory (the less working memory capacity is available, the less information can be transferred to long-term memory)
- Prior knowledge
- Prior misconceptions (can cause mislearning)
- Expectations
- Verbalization (talking or writing about an experience promotes long-term memory storage)
- Enactment (engaging in an overt psychomotor behavior that reflects what's being learned promotes long-term memory storage)
- Repetition and review

Controlled processing: requires much of a person's attention and most/all working memory capacity.
Automatic processing (or automaticity): occurs with little or no conscious attention, requires little working memory capacity.

Retrieval is easier when related pieces of information are stored in close association with one another, because we then have a good idea about where to find a particular item. Retrieval from long-term

memory may be a process of looking in various small 'locations' in memory, searching in only one location at a time. Retrieval of information tends to be easier when learners engage in thought processes similar to those they previously used when storing the information—a phenomenon known as encoding specificity.

Retrieval cues: hints that may trigger the activation of certain parts of long-term memory.

Like long-term memory storage, long-term memory retrieval can involve constructive processes. Often people retrieve only part of what they've previously stored, and they may fill in the holes based on what's logical or consistent with their existing knowledge and beliefs.

Misinformation effect: people's memory for an event may become distorted when they subsequently receive inaccurate information about the event.

In some cases, retrieval is almost entirely constructive in that people can produce information they've never specifically stored. False memories are common when certain stimuli or events might reasonably or logically have been experienced.

Recalling an event we've previously experienced often affects our later memory for the event, especially if we verbally describe the event and perhaps embellish on it in some way .

Explanations for forgetting:

- Decay
- Interference and inhibition
- Repression
- Failure to retrieve
- Construction error
- Insufficient self-monitoring during retrieval
- Failure to store or consolidate

General principles that should guide instructional practices:

- Instruction is more effective when it activates and builds on students' prior knowledge. - Students are more likely to engage in meaningful learning when they're explicitly encouraged to do so.
- Instruction is more effective when it helps students organize new material. - Instruction is more effective when it encourages students to elaborate on what they're learning.
- Visual aids enhance long-term memory storage.
- The most effective ways to teach procedural knowledge depend to some degree on the nature of the procedures to be learned.
- Information that must be retrieved within a particular context should ideally be stored within that context.
- Taxonomies of goals and objectives can be useful reminders of the various ways in which students might be asked to think about and apply what they've learned.
- Rapid learning doesn't necessarily mean better learning.
- Effective instruction provides opportunities for review and practice of previously learned knowledge and skills.
- Classroom assessment practices significantly affect both storage and retrieval.

# Chapter 9: The Nature of Knowledge

Declarative knowledge: concerns the nature of how things are, were, or will be.
    - Episodic memory: one's memory of personal life experiences.
- Semantic memory: one's general knowledge that's relatively independent of specific experiences.
Procedural knowledge: knowing how to do things.
    - Conditional knowledge: information about how to respond under different circumstances.
Conceptual knowledge: combination of our declarative and procedural knowledge; general understandings of certain situations or phenomena.

Explicit knowledge: knowledge that we can easily recall and explain.
Implicit knowledge: knowledge that we can't consciously recall or explain but that nevertheless affects our behavior.

Forms of encoding in long-term memory:
- Encoding in terms of physical characteristics
- Encoding in terms of actions
- Encoding in terms of symbols (e.g. words, numbers, maps, graphs)
- Encoding in terms of meanings

Different forms of encoding are not mutually exclusive.

Contemporary theories of long-term memory are associationistic: they propose that the various pieces of information stored in long-term memory are either directly or indirectly associated with one another.

Models of long-term memory organization:
- Hierarchy
- Network
    - Propositional network (e.g. agent, object, relation)
- Parallel distributed processing (PDP) or connectionism: a single node might be associated with many different pieces of information, so when one idea is activated, other ideas that share some of its nodes may also be activated.

Concept: a mental grouping of objects or events that are similar in some way (concrete or abstract). Learners haven't completely acquired a concept until they can correctly identify all positive and negative instances of it.
Positive instance: a particular example of a concept.
Negative instance: a nonexample of the concept.
Defining features: must be present in all positive instances.
Correlational features: frequently found in positive instances but not essential.

Some theorists propose that people's knowledge of concepts may include a prototype or typical example of the concept. If not, there may be multiple exemplars.

A relatively passive buildup of associations may form the basis of some concepts, especially for infants and young children. Older children and adults are often cognitively active in learning a concept's defining features. In some situations learners may form various hypotheses about a concept's meaning and then use positive and negative instances to confirm or reject each hypothesis.

Factors affecting concept learning:

- Concepts are easier to learn when defining features are more salient than correlational and irrelevant features.
  - Definitions facilitate concept learning.
  - Numerous and varied positive instances help to illustrate a concept.
  - Negative instances are useful in demonstrating what a concept is not.
  - Positive and negative instances are more effective when presented simultaneously. - Classroom assessment tasks can enhance as well as monitor concept learning.

Schema: a closely connected set of ideas related to a specific object or event.
Script: a schema of an event.
Information that is in line with existing schemas and scripts is remembered more easily.

Personal theories: coherent belief systems that encompass cause-and-effect relationships.
The concepts people form are influenced by the theories they have. Theories help organize experiences and information.
These can be misconceptions due to how things appear to be, common expressions in language, mistaking correlation for causation, popular media, or other sources.

Fostering theory development:

- Physical or technology-based models can help learners tie ideas together. - Group interacting can enhance learners' theoretical understandings.
  - Some theories and mental models can be useful even if they aren't entirely accurate.

Worldview: a set of beliefs and assumptions about reality in general. Probably culturally transmitted. Often implicit knowledge.

Conceptual change: the process of replacing one personal theory or belief system with another one.
Why are learners' counterproductive beliefs often so resistant to change?

- Learners' existing beliefs affect their interpretations of new information. - Most learners have a confirmation bias: they look for information that confirms their beliefs. - Learners' existing beliefs are often consistent with their everyday experiences. - Some erroneous beliefs are integrated into a cohesive whole, with many interrelationships existing among various ideas.
  - Learners may fail to notice an inconsistency between new information and their prior beliefs. - Learners may have a personal or emotional investment in their existing beliefs. - Sometimes learners' existing beliefs are supported by their social environment.

Promoting conceptual change:

- Before beginning instruction, teachers should determine what beliefs and misconceptions students currently have about a topic.
  - Students should learn correct information in a meaningful rather than rote fashion. - Students can sometimes build on kernels of truth in their existing understandings. - Students are more likely to revise their current ways of thinking when they believe revision is in order.
  - Students must explicitly compare their existing beliefs with alternative explanations. - Students must want to learn correct explanations.
- Throughout a lesson, students' understandings should be monitored for particularly tenacious misconceptions.

Expertise: having acquired a great deal of information about a particular topic or subject matter.
Experts' knowledge tends to be highly organized.
Adaptive expertise: considerable knowledge and skills in combination with open-mindedness and innovation.


Generalizations about the nature of knowledge:

- There can be considerable redundancy in how information is stored.
- Most of our knowledge is a summary of our experiences rather than information about specific events.
- Concepts reduce the world's complexity.
- Concepts allow abstraction of the environment.
- Concepts enhance the power of thought.
- Concepts facilitate inferences and generalization to new situations.
- Concepts make it easier for us to make connections among the things we know. - In most situations, integrated knowledge is more useful than fragmented knowledge. - An in-depth study of a few topics is often more beneficial than a superficial study of many topics.

# Chapter 10: Cognitive-Developmental Perspectives

Cognitive-developmental theories: focus on how children's thinking processes change in significant qualitative ways with age and experience. Children typically play an active role in their development.

Piaget's theory:

- Children are active and motivated learners.
- Children organize what they learn from their perspectives.
- Interaction with the physical environment is critical for learning and cognitive development. - Interaction with other people is equally critical for learning and development. - Children adapt to their environment through the processes of assimilation and accommodation.
    - Assimilation: responding to and possibly interpreting an object/event in a way that's consistent with an existing scheme.
    - Accommodation: modifying an existing scheme to account for the new object/event, or forming an entirely new scheme.
- A process of equilibration promotes progression toward increasingly complex forms of thought.
    - Equilibration: moving from equilibrium to disequilibrium and back again. - Equilibrium: state in which new events can be interpreted using existing schemes.
        - Disequilibrium: a sort of mental discomfort that spurs children to try to make sense of what they observe.
    - Children think in qualitatively different ways at different age levels.

Piaget's stages of cognitive development:

- Sensorimotor stage (birth until age 2)
    - Goal-directed behavior
    - Understanding object permanence (objects continue to exist when out of sight) - Beginning symbolic thought
- Preoperational stage (age 2 until age 6 or 7)
    - Language
    - Egocentrism
    - Illogical quality of thinking
- Concrete operations stage (age 6 or 7 until age 11 or 12)
    - Thinking becomes logical
    - Difficulty dealing with abstract concepts and hypothetical ideas
- Formal operations stage (age 11 or 12 through adulthood)
    - Understanding of abstract concepts
    - Proportional thinking
    - Separation and control of variables
    - Development of metacognition
    - Idealism

Infants, toddlers, preschoolers, and elementary school children seem to be more competent than Piaget described. However, he overestimated what adolescents can do.
Moreover, experience, prior knowledge, and culture influence children's quality of thinking. This could mean that they go through the stages at different ages, or that the stages overlap in some cases.

Neo-Piagetian theories' general ideas:

- Cognitive development is constrained by the maturation of information processing mechanisms in the brain.
- Children acquire new knowledge through both unintentional and intentional learning processes.
  - Children acquire cognitive structures that affect their thinking in particular content domains. - Development in specific content domains can sometimes be characterized as a series of stages.
  - Formal schooling has a greater influence on cognitive development than Piaget believed.

Case's theory (neo-Piagetian):

- Notion of central conceptual structures: integrated networks of concepts and cognitive processes that form the basis for much of children's thinking/reasoning/learning. Transformations in these structures mark entry into the next stage of development. - Number
    - Spatial relationships
    - Social thought

Implications of Piagetian and neo-Piagetian theories:

- Children and adolescents can learn a great deal through hands-on experience. - Puzzling phenomena can create disequilibrium and spur children to acquire new understandings.
- Interactions with peers can also promote more advanced understandings. - Children are more likely to reason in sophisticated ways when they work with familiar tasks and topics.
- Piaget's clinical method can offer many insights into children's reasoning processes. - Piaget's stages can provide some guidance about when certain abilities are likely to emerge, but they shouldn't be taken too literally.
- Children can succeed in a particular domain only if they have mastered basic concepts and skills central to that domain.

# Chapter 11: Sociocultural Theory and Other Contextual Perspectives

Contextual theories of learning: people's learning and development are inextricably dependent on and bound to various physical, social, and cultural contexts.
Sociocultural theory (Vygotsky): society and culture provide innumerable concepts and strategies that children gradually begin to use in thinking about/dealing with everyday tasks and problems.

Key ideas in Vygotsky's theory:

- Some cognitive processes are seen in a variety of species; others are unique to human beings (lower mental functions vs higher mental functions).
- Through both informal conversations and formal schooling, adults convey to children the ways in which their culture interprets and responds to the world.
- Every culture passes along physical and cognitive tools that make daily living more effective and efficient.
    - Thought and language become increasingly interdependent in the first few years of life. - Complex mental processes emerge out of social activities; as children develop, they gradually internalize the processes they use in social contexts and begin to use them independently. - Children appropriate their culture's tools in their own idiosyncratic manner. - Children can accomplish more difficult tasks when they have the assistance of people more advanced and competent than themselves.
- Challenging tasks promote maximum cognitive growth (through zone of proximal development (ZPD)).
    - Play allows children to cognitively 'stretch' themselves.

Common themes in Piaget's and Vygotsky's theories:

- Qualitative changes in the nature of thought
- Challenge
- Readiness
- Importance of social interaction

Key theoretical differences:

- To what extent is language essential for learning and cognitive development? - What kinds of experiences promote learning and development?
- What kinds of social interactions are most valuable?
- How influential is culture?

Current perspectives/elaborations on Vygotsky's theory:

- Social construction of meaning: adults help children attach meaning to objects/events around them, e.g. through a mediated learning experience (social constructivism).
    - Scaffolding: supportive techniques to help students within the zone of proximal development. - Participation in adult activities: through guided participation/legitimate peripheral participation or a community of practice → helps development.
    - Apprenticeships: intensive form of guided participation.
- Acquisition of teaching skills: when children and adults teach others, the 'teachers' often benefit as much as the 'students'.
    - Dynamic assessment:
        - Identifying tasks that children cannot initially do independently.
        - Providing in-depth instruction and practice in behaviors and cognitive processes related to the task.
        - Determining the extent to which each child has benefited from the instruction.

Combining sociocultural theory and information processing theory:

- Intersubjectivity: mutual understanding between learners, needed to communicate. - Joint attention
  - Social referencing
- Social construction of memory: adults engage children in conversation about past events. - Collaborative use of cognitive strategies: adults can engage children in activities that require collaborative use of particular strategies, children gradually internalize the strategies.

Contemporary contextual perspectives:

- Embodiment: processes in the human brain are intimately and inextricably intertwined with our immediate physical context and bodily reactions to it.
- Situated and distributed learning and cognition:
  - Situated learning/cognition: a good deal of learning and thinking occurs primarily in certain contexts.
  - Distributed cognition: people can think and learn more effectively when they offload some of the cognitive load onto something or someone else.
    - Distributed knowledge/intelligence: in large groups, different people gain expertise in different topics, thereby spreading out the group's collective knowledge base. - Ecological systems theory:
      - Microsystems: immediate and regular surroundings.
      - Mesosystems: interactions among various microsystems.
      - Exosystems: people and institutions that affect the child's microsystems. - Macrosystems: cultural beliefs and behaviors.

General implications of sociocultural and other contextualist theories:

- Learners can think more effectively when they acquire the basic cognitive tools of various activities and academic disciplines.
- Children learn and remember more when they talk about their experiences. - Children should have opportunities to engage in activities that closely resemble those they will encounter in the adult world.
- Children often acquire better strategies when they collaborate with adults on complex tasks. - Challenging tasks, especially when sufficiently scaffolded, tend to foster maximum cognitive development.
- Technology-based software and applications can effectively scaffold many challenging tasks, and occasionally they offer good alternatives to real-world activities and problems. - Children's abilities should be assessed under a variety of work conditions. - Group learning activities can help children internalize cognitive strategies.

Peer-interactive instructional strategies can be highly effective and motivating. However, students probably learn most effectively with some teacher guidance and structure even when instructional methods are largely peer-interactive and learner-directed. Forms:

- Class discussions:
  - Class discussions should focus on topics that lend themselves to multiple perspectives, explanations, or approaches.
  - Students should have sufficient prior knowledge about a topic to discuss it intelligently.
  - The classroom atmosphere should be conducive to open debate and the constructive evaluation of ideas.
    - Small-group discussions encourage a greater number of students to participate. - Class discussions are often more effective when they're structured in some way. - Some type of closure should be provided at the end of the discussion.

- Reciprocal teaching: teacher and several students meet in a group to read a section of a text, stopping periodically to discuss what they're reading.
- Cooperative learning: students work in small groups to achieve a common goal. - Students work in small, teacher-assigned groups.
- Groups have one or more common goals toward which to work.
- Students have clear guidelines about how to behave.
- Group members must depend on one another for their success.
- A structure is provided to encourage productive behaviors.
- The teacher serves primarily as a resource and monitor.
- Students are individually accountable for their achievement.
- Students are rewarded for group success.
- At the completion of an activity, each group evaluates its effectiveness.
- Peer tutoring: students who have mastered a topic teach those who haven't. - Teachers should be sure that tutors have mastered the material being taught and use sound instructional techniques.
- Structured interactions can enhance the effectiveness of peer tutoring.
- Teachers must be careful that their use of higher-ability students to tutor lower-ability students isn't excessive or exploitive.
- Teachers can use peer tutoring to help students with special educational needs. - Tutoring doesn't necessarily need to be limited to same-age pairs.
- Communities of learners:
- Students should focus on complex problems that need solving.
- Students should learn basic skills in persuasion and argumentation.
- Students must be committed to working effectively - and must learn how to work effectively - with all of their classmates.
- Technology-based collaborative learning

# Chapter 12: Metacognition, Self-Regulated Learning, and Study Strategies

Metacognition: people's awareness and understandings of their own thinking and learning processes, as well as their regulation of those processes to enhance their learning and memory. Metacognition involves many strategies. However, a good deal of metacognition may be implicit: without conscious awareness.

Self-regulated learning:

- Goal setting
- Planning
- Self-motivation
- Attention control
- Use of effective, goal-relevant learning strategies
- Self-monitoring
- Appropriate help-seeking
- Self-evaluation
- Self-reflection

Roots of self-regulated learning:

- Opportunities to engage in independent, self-directed learning activities - Socially regulated learning → co-regulated learning

Effective learning and study strategies:

- Meaningful learning, organization, and elaboration
- Note taking
- Identifying important information
- Summarizing
- Comprehension monitoring
- Mnemonics
  - Verbal mediation (two words or ideas are associated by a word or phrase that connects them)
  - Visual imagery
  - Superimposed meaningful structure (e.g. 'nooit op zondag werken')

Development of metacognitive knowledge and skills:

- Children become increasingly aware of the nature of thinking.
- Children become increasingly realistic about their memory capabilities and limitations. - Children become increasingly aware of and use effective learning and memory strategies. - Children engage in more comprehension monitoring as they get older.
- Some learning processes may be used unconsciously and automatically at first but become more conscious and deliberate with development.

Epistemic beliefs: ideas about what 'knowledge' and 'learning' are. People's epistemic beliefs seem to be at least partly situation- and context-specific. Furthermore, learners' epistemic beliefs may be specific to particular content domains. Dimensions:

- The certainty of knowledge
- The simplicity and structure of knowledge
- The source of knowledge
- The criteria for determining truth
- The speed of learning
- The nature of learning ability

Developmental and cultural differences in epistemic beliefs:
- Realist view (3 year olds): knowledge is the same as what people say or do. - Absolutist view (4 year olds): knowledge is certain and definite.
- Multiplist view (adolescents and up): knowledge is seen as uncertain, all opinions are legitimate.
- Evaluativist view (later in life, if at all): people's ideas and opinions have more or less merit and legitimacy depending on whether evidence or logic supports them.

Environment and culture may also influence the development of epistemic beliefs.

People's epistemic beliefs influence their studying and learning.

Intentional learning: when a learner is actively and consciously engaged in cognitive and metacognitive activities directed specifically at thinking about and learning something.

Why students don't always use effective strategies:
- Students are uninformed or misinformed about effective strategies.
- Students have epistemic beliefs that lead them to underestimate or misunderstand a learning task.
- Students mistakenly believe that they're already using effective strategies. - Students have little relevant prior knowledge on which they can draw.
- Assigned learning tasks don't lend themselves to sophisticated strategies. - Students have goals that are inconsistent with effective learning.
- Students think that sophisticated learning strategies require too much effort to be worthwhile. - Students have low self-efficacy about their ability to learn in an academic setting.

Promoting effective learning and study strategies:
- Students learn strategies more effectively when the strategies are taught within the context of specific subject domains and ongoing learning tasks.
- Students can use sophisticated learning strategies only when they have a knowledge base to which they can relate new material.
- Students should learn many different strategies, as well as the kinds of situations in which each one is appropriate.
- Effective strategies should be practiced with a variety of tasks and on an ongoing basis. - Strategy instruction should include covert as well as overt strategies.
- Teachers can model effective strategies by thinking aloud about new material. - Students can also benefit from reflecting on and describing their current study strategies. - Teachers should scaffold students' initial attempts at using new strategies, gradually phasing out the scaffolding as students become more proficient.
- Some software programs and applications can also scaffold strategy use.
- Students can often learn effective strategies by working collaboratively with their classmates. - Students must understand why new strategies are helpful.
- Students should have epistemic beliefs that are consistent with effective strategies. - Students must believe that, with sufficient effort and appropriate strategies, they can learn and understand challenging material.

# Chapter 13: Transfer, Problem Solving, and Critical Thinking

Transfer: when something you learn in one situation affects how you learn or perform in another situation.
Much school learning seems to yield inert knowledge that students never use outside the classroom.

Types of transfer:
- Positive transfer: when learning in one situation facilitates learning/performance in another situation.
- Negative transfer: when something learned in one situation hinders a person's ability to learn/perform in a second situation.
- Vertical transfer: a learner acquires new knowledge/skills by building on more basic information and procedures.
- Lateral transfer: when knowledge of the first topic is helpful but not essential to learning the second one.
- Near transfer: involves situations or problems that are similar in both superficial characteristics and underlying relationships.
- Far transfer: involves two situations that are similar in one or more underlying relationships but different in their surface features.
  - Specific transfer: when the original learning task and the transfer task overlap in some way. - General transfer: when the original task and the transfer task are different in both content and structure.

Theories of transfer:
- Historical perspective: formal discipline
  - Learning in one situation improves learning and performance in another situation regardless of how different the two situations might be.
- Early behaviorism: Thorndike's identical elements
  - Transfer occurs only to the extent that the original and transfer tasks have identical elements (they involve some of the same stimulus-response associations).
- Later behaviorism: similarity of stimuli and responses
  - When stimuli and responses are similar in the two situations, maximal positive transfer will occur.
  - When stimuli are different and responses are similar, some positive transfer will occur.
  - When stimuli are similar and responses are different, negative transfer will occur. - Information processing: importance of retrieval
  - Transfer can occur only when learners retrieve things they've previously learned at a time when those things might be useful.
- Contextual: situated learning
  - Situated learning (which is associated primarily with the environments in which learning has taken place) is unlikely to result in transfer to very different contexts. - Contemporary view of general transfer
  - General transfer isn't as common as specific transfer, but learning occurring at one time can facilitate learning at another time if, in the process, the individual learns how to learn.

Other than knowledge; emotional reactions, motives, and attitudes may transfer as well.
Factors affecting transfer:
- Meaningful learning promotes better transfer than rote learning.
- The more thoroughly something is learned, the more likely it is to be transferred to a new situation.

- The more similar two situations are, the more likely it is that something learned in one situation will be applied to the other situation.
    - Principles are more easily transferred than discrete facts.
- Numerous and varied examples and opportunities for practice increase the extent to which information and skills will be applied to new situations.
- The probability of transfer decreases as the time interval between the original task and the transfer task increases.
    - Transfer increases when the cultural environment encourages and expects transfer.

Problem solving: using knowledge and skills we've previously learned to address an unanswered question or troubling situation. Problem components:

- Goal
- Givens
- Operations

Well-defined problem: the desired end result is clearly stated, all needed information is readily available, and a particular sequence of operations will lead to a correct solution. An ill-defined problem is the opposite.

Theories of problem solving:

- Early behaviorism: trial-and-error learning and response hierarchies
    - A problem can potentially be solved in a variety of ways, some having greater success rates than others → response hierarchy.
- Early cognitivism: insight and stages of problem solving
    - Problem solving is a process of mentally restructuring a problem until insight is achieved.
    - Different researchers identified different mental stages through which problem solving might proceed.

- Information processing theory: cognitive factors affecting problem solving: - Working memory capacity
    - Encoding of the problem
        - Mental sets: standard ways to think about problems
    - Retrieval from long-term memory
        - Incubation: letting the problem 'percolate' for a while, while engaging in other activities (can help with solving)
    - Knowledge base
    - Metacognition

Problem-solving strategies:

- Algorithms: specific, step-by-step procedures for solving problems.
- Heuristics: general problem-solving strategies that may or may not yield a correct solution. - Talking to oneself about the problem
    - Brainstorming
    - Means-ends analysis
    - Working backward
    - Using visual imagery
    - Drawing an analogy
    - Using external representations of problem components

When people learn algorithms in a rote manner, without understanding their underlying logic, they may sometimes apply the algorithms unthinkingly and inappropriately.

Facilitating transfer and problem solving in instructional settings:

- Students should learn information meaningfully and thoroughly.
- Students should also learn problem-solving strategies in a meaningful manner. - Discovery activities and expository instruction both play important roles in learning problem-solving skills.
- Students should have a mental set for transfer.
- Some prerequisite skills should be practiced until they are learned to automaticity. - Practice doesn't necessarily make perfect, but it does increase the odds of successful transfer and problem solving.
- Students should have experience identifying problems for themselves.
- To minimize negative transfer, differences between two ideas should be emphasized. - Instruction in general problem-solving skills can be helpful.
- Students should learn strategies for defining ill-defined problems.
- Students' early attempts to solve difficult problems should be scaffolded. - Small-group problem-solving activities can also promote effective problem-solving strategies. - Authentic activities can increase the probability that students will transfer knowledge, skills, and problem-solving strategies to real-world contexts.
- Digital technologies offer several good platforms for real-world-like problem-solving tasks. - Classroom assessment practices should include measures of transfer and problem solving.

Critical thinking: evaluating the accuracy, credibility, and worth of information and lines of reasoning. - Verbal reasoning

- Argument analysis
- Probabilistic reasoning
- Hypothesis testing

Age, personality, and culture all influence critical thinking.

Fostering critical thinking in the classroom:

- Encourage some intellectual skepticism.
- Model critical thinking.
- Give students many opportunities to practice critical thinking.
- Have students debate controversial issues from several perspectives, and occasionally ask them to take a perspective quite different from their own.
- Help students understand that critical thinking involves considerable mental effort but that it's essential when one is deliberating about important issues.

# Chapter 14: Motivation and Affect

Motivation: an internal state that arouses us to action, pushes us in particular directions, and keeps us engaged in certain activities. Learners are almost always motivated in one way or another. Situated motivation: motivation is also partly a function of the learning environment.
General effects of motivation:

- It directs behavior toward particular goals.
- It increases effort and energy in pursuit of those goals.
- It increases initiation of and persistence in certain activities, even in the face of occasional interruptions and frustrations.
- It affects cognitive processes, such as what learners pay attention to and how much they think about and elaborate on it.
- It determines which consequences are and aren't reinforcing and punishing.

Extrinsic motivation: when the source of motivation lies outside the individual and the task being performed.
Intrinsic motivation: when the source of motivation lies within the individual and task.
Intrinsic motivation has numerous advantages over extrinsic motivation.

Basic human needs that can foster intrinsic motivation:

- Drive reduction
    - Drive is an internal state of need
    - Strength of behavior = habit x drive x incentive
- Arousal
- Competence and self-worth
- Autonomy
- Relatedness and belonging

Maslow's hierarchy of needs:

- Physiological needs
- Safety needs
- Love and belonging needs
- Esteem needs
- Need for self-actualization

Individual differences in motivation (as discussed in trait theories):

- Need for approval
- Need for achievement
    - Motive for success
    - Motive to avoid failure
- Sense of identity
- Dispositions (general, relatively stable inclinations to approach learning and problem-solving situation in a particular way)

Affect: the feelings, emotions, and general moods that a learner brings to bear on a task. Interrelated with motivation, learning, and cognition in a variety of ways, e.g. through self-consciousness, boredom, etc.

Hot cognition: when, as we're thinking about, learning, or remembering something, our very thoughts and memories have emotional overtones.

Mood-dependent memory: we can sometimes retrieve information from long-term memory more successfully when our mood at the time of retrieval is the same as our mood when we initially stored the information.
Anxiety: a feeling of uneasiness and apprehension about a situation, typically one with an uncertain outcome. Made up of worry (cognitive) and emotionality (affective).
State anxiety: a temporary condition elicited by a particular stimulus.
Trait anxiety: a relatively stable state of affairs, such that an individual is chronically anxious in certain situations.

A small degree of arousal (e.g., a little bit of anxiety) facilitates learning and performance. A high degree of arousal (e.g., high anxiety) may facilitate learning and performance when the task is easy (facilitating anxiety), but is likely to interfere when the task is more difficult (debilitating anxiety). Anxiety interferes with an individual's attention to a task and therefore with cognitive processing.

Common sources of anxiety:
- Mathematics anxiety
- Test anxiety

Creating a motivating and affect-friendly classroom environment:
- Students learn more effectively and engage in more productive classroom behaviors when they're intrinsically rather than extrinsically motivated to learn and achieve.
- Students are more likely to be intrinsically motivated when they feel confident they can succeed at classroom tasks.
- Students' intrinsic motivation also increases when they have some degree of autonomy in classroom activities.
  - Extrinsic motivation can also promote learning.
- Feedback and other forms of extrinsic reinforcement should maintain or enhance students' sense of competence and autonomy.
- Students are more likely to focus on their schoolwork when their nonacademic needs have been met.
  - Dispositions that involve actively and thoughtfully engaging with school subject matter should promote more effective cognitive processing and learning over the long run. - Learning is - and should be - an affective as well as cognitive enterprise. - Classroom assessments are more effective motivators when students perceive them as means of enhancing future achievement rather than as judgements of current ability and worth.

# Chapter 15: Cognitive Factors in Motivation

Interest: when people find a topic or activity intriguing and enticing. A form of intrinsic motivation.
Personal interest: resides within people, who tend to have different preferences regarding the topics they pursue and the activities in which they engage.
Situational interest: evoked by something in the environment.

Interest promotes more effective information processing. Some topics seem to be inherently interesting for human beings (people, culture, nature, popular media). New, different, and unexpected things often generate interest, as do things with a high activity level or intense emotions. Many personal interests come from people's prior experiences with topics/activities.

Motivation for performing a task: expectancy for success + value (benefits).
Expectancies are influenced by prior successes/failures, perceived difficulty, quality of instruction, availability of resources/support, and stereotypes. Value is influenced by importance, utility, interest, and cost. Social and cultural factors also have some influence. Lastly, expectancies and values influence each other.

Core goals: general goals of considerable priority for us at any given point in time, that seem to drive much of what we do.

- Achievement goals
    - Mastery goal: desire to achieve competence (optimal).
- Performance goal: desire to present oneself as competent in the eyes of others. -
    Performance-approach goal: desire to receive favorable judgements.
        - Performance-avoidance goal: desire to not receive unfavorable judgements. -
    Work-avoidance goals
- Doing-just-enough goals
- Social goals
- Career goals

People are most successful and experience better emotional well-being when their multiple goals all lead them in the same direction.

Attributions: people's various explanations for success and failure. Dimensions: -
Locus: internal vs external

- Temporal stability: stable vs unstable
- Controllability: controllable vs uncontrollable

Entity view: the belief that intelligence is a 'thing' that's relatively permanent and unchangeable.
Incremental view: the belief that intelligence can and does improve with effort and practice.

Attributions influence learners' emotional responses to events, reactions to reinforcement and punishment, self-efficacy and expectancies, effort and persistence, learning strategies, and future choices and goals.

Attributions are influenced by age, situational cues, patterns of past successes and failures, verbal and nonverbal messages from others, culture, gender, self-protective bias (attributing success to internal causes and failure to external causes), and image management (changing the attributions you communicate depending on who you're talking to).

Explanatory style: the general, typical way in which a person interprets and explains day-today
Mastery orientation: typically attributing accomplishments to your own abilities and efforts.
Learned helplessness: attributing successes to outside/uncontrollable factors and believing that failures reflect a relatively permanent lack of ability.
Mastery orientation makes for more effective learning than learned helplessness.

Motivation, a sense of competence, and a sense of autonomy increase self-regulation. Motivation and affect increase help-seeking behavior, and self-regulating learners control their motivation and affect (emotion regulation).
Internalized motivation: situations in which, over time, people gradually adopt behaviors that other individuals value, ultimately without regard for the external consequences. Sequence: - External regulation

- Introjection (trying to gain other people's approval)
- Identification (seeing behavior as being personally important/valuable)
- Integration

Not the same thing as intrinsic motivation!

Encouraging motivating cognitions:

- Students learn more when they find classroom material interesting as well as informative. - Students tend to be more optimistic about their chances of success when they have environmental support for their efforts.
- Students are more motivated to learn classroom subject matter when they believe it has value for them personally.
- In general, mastery goals lead to better learning than performance goals. - Students learn more effectively when they set goals for themselves.
- Classroom activities are more effective when they enable students to meet several goals at once.
- Optimistic teacher attributions and expectations regarding students' achievement boost students' actual achievement.
    - Look for strengths in every student.
    - Learn more about students' backgrounds and home environments.
    - Assume that ability can and often does improve with time, practice, and high-quality instructional practices.
    - Assess students' progress objectively and frequently.
    - Remember that teachers can definitely make a difference.
- Systematic attempts to change students' attributions can lead to more productive ones. - Most of the time, and for most students, noncompetitive activities are more motivating that competitive ones.
- Age- and ability-appropriate challenges heighten motivation and minimize boredom.

Many effective motivational strategies can be summed up by the mnemonic TARGETS: task, autonomy, recognition, grouping, evaluation, time, and social support.