

Cognition and Learning

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Topic 3

Metacognition



Metacognition?

- Its about becoming more aware of our thinking processes and reflecting on what we do cognitively.
- When we become more aware of our thinking process, how we reason, how we make decision, we can identify ways that can make us become better learners.
- We ‘metacognitize’ whenever we carry out an “internal dialogue” with ourselves to reflect upon what we do/we don’t do.



Defining Metacognition

- Metacognition refers to one's knowledge concerning one's own cognitive processes or anything related to them (Flavell, 1976).
- Higher order thinking which involves active control over the cognitive processes engaged in learning.



J.H. Flavell

Image source:
<http://certainty.wordpress.com/page/2/>

Metacognition

- Research has shown that effective thinkers and learners have certain characteristics in common.
 - They **monitor their own thinking**.
 - They are **aware of what they know and what they don't know**.
 - They are **aware of what they need to know in order to solve a problem or fully understand a difficult concept**.



What is Metacognition?

- ▶ Refers to knowledge that people have about their own thought processes.
- ▶ Conscious examination of the critical thinking process.

Meta + Cognition.

“Meta” = beyond

“Cognition” = Thinking & processing info

Metacognition = Cognition about cognition

Metacognition = Thinking about thinking



Where it all seems to begin...

- Concept of 'metacognition' first achieved widespread prominence in the 1970s based on research by Flavell on children role-taking:
 - the cognitive skills that children require in order to understand and accept the roles of others.
 - study the ways in which children think about their thinking processes.
- Developed his theory of "metacognition" or "metaconsciousness,"
 - a child's understanding about the workings of the human mind and her own thought processes.



Flavell's Contributions



The Developmental Psychology of Jean Piaget

by JOHN H. FLAVELL
Associate Professor of Psychology
University of Rochester

With a Foreword by Jean Piaget

Image source:

<http://certainty.wordpress.com/page/2/>

- Marked the start of the modern science of cognitive development.
- A founder of social cognitive developmental psychology.



Four Classes of Metacognitive Phenomena

- Metacognitive Knowledge (*metacognitive awareness*)
- Metacognitive Experiences or Regulations
- Tasks or Goals
- Strategies or Activities



Metacognitive Knowledge (*awareness*)

- All the knowledge & beliefs acquired & stored in LTM about the factors that effect cognitive abilities –stored world knowledge
 - Eg; acquired beliefs that you are not good at drawing.
- Metacognitive knowledge can lead the individual to engage in or abandon a particular cognitive enterprise based on its relationship to his interests, abilities and goals.

Knowledge retrieved from memory

Metacognitive Knowledge: The Categories

- **Person variables**
 - the individual's knowledge and beliefs about himself as a thinker or learner, and what he believes about other people's thinking processes.
 - One's beliefs about him/herself as a learner may facilitate or impede performance in learning situations.
- **Task variables**
 - encompassed all the information about a proposed task that is available to a person.
 - This knowledge guides in management of task & provide information about degree of success likely to produce.
- **Strategy variables**
 - identifying goals and sub-goals and selection of cognitive processes to use in their achievement.

Metacognitive Experiences

- What is experienced **during** a cognitive endeavor – online awareness
 - “stream of consciousness” process in which other information, memories, or earlier experiences may be recalled as resources in the process of solving a current-moment cognitive problem.
 - Knowledge being present in STM/working memory
 - Evoked during the process.
- Include presence of feelings – affective response to tasks
 - Success or failure, frustration or satisfaction, etc.
 - Effect the moment-to-moment unfolding of a task for an individual.
 - May in fact determine interest or willingness to pursue similar tasks in the future.

Metacognitive Tasks or Goals

- The desired **outcomes or objectives** of a cognitive venture
 - include comprehension, committing facts to memory, or producing something, such as a written document or an answer to a math problem, or of simply improving one's knowledge about something.
- Achievement of a goal draws heavily on both metacognitive knowledge and metacognitive experience for its successful completion

Metacognitive Strategies or Activities

- Strategies designed to monitor cognitive progress.
 - ordered processes used to control one's own cognitive activities and to ensure that a cognitive goal (for example, solving a math problem, writing an effective sentence, understanding reading material) have been met.
- Initially provided by teacher and students practice and discuss the strategies as they learn to use them.
 - Ultimately, students able to prompt themselves and monitor their own comprehension without the teachers' support.

Principles of Metacognition in Learning

- According to Ann Brown, metacognition includes two dimensions:
 - Knowledge of cognition
 - what we know about cognition.
 - Regulation of cognition
 - how we regulate cognition (how we control cognition to do something).

Knowledge about Cognition

- Includes 3 components:
 - **Declarative knowledge** – what we know about ourselves as learners.
 - **Procedural knowledge** – knowledge about strategies (mnemonics, summarizing main ideas, skimming unimportant information, taking notes).
 - **Conditional knowledge** – when and why you use the strategy. (e.g.: how do you study for a psychological subject and how do you study for a technical subject).

Regulation of Cognition

- **Planning**
 - E.g.: setting goals, activating relevant prior knowledge, & budgeting time.
- **Regulation**
 - E.g.: monitoring and self-testing skills to control learning for instance, pausing while reading.
- **Evaluation**
 - Appraising products, consolidating intellectual gains.

Types of Metacognition

- Metamemory
- Metacomprehension

Types of Metacognition

- Metamemory
 - Realizing that you need to use a strategy to remember someone's name.
- Metacomprehension
 - Trying to decide whether you understood the definition of metacognition.

Metamemory

- It refers to people's knowledge, awareness, and control of their memory.
- **Metamemory** is relevant when you learn new material and when you try to remember previously learned material.

Metamemory

- **Metamemory** helps you to identify which memory strategies work best for you and which ones are inefficient.
- Memory strategies will not greatly improve your memory unless you use your metamemory to decide what you already know and what you need to review in more detail.

Metamemory

- **Metamemory checklist**
 - Is relearning easier than learning material for the first time?
 - Is material at the beginning and end of a list easier to learn than material in the middle?
 - Is it important to organize material in a meaningful manner?



Metamemory

- **Metamemory checklist**

- If you have an English Language exam where you have to answer 50 questions in 60 minutes, how many of you would:
 - Test yourselves prior to the exam?
 - Time yourselves on a mock exam question?
 - Keep a notebook to write down all the words that you do not understand.



Metamemory

- **Metamemory**
 - Develop your metamemory
 - Know exactly which study strategies work best in which circumstances

Metacognition in Children

- Young children unable to monitor their comprehension accurately. (Baker, 1989).
 - E.g.: a 6-year-old who has been memorizing some information told the investigator that he could quiz her and she was ready. However, it turned out that her recall was minimal.
- Older children are better able to describe their cognitive processes. (Markman, 1979).

Researches

- Young children are not fully aware of which cognitive processes various task involved. Older children and adults employ more monitoring activities.
- Retarded learners – less likely to to develop a variety of strategies than normally intelligent individuals (Ellis, 1979).
- Metacognitive abilities develop with age and experience.

Metacognition in Elderly People

- Older adults – decline in memory with increasing age. Research shows that they are pessimistic about their memory capabilities.
- It could be the attitude that also affects the findings.
- Mixed findings on the issues that older adults do not monitor their memories as well as younger adults.



Monitoring your Own Learning

- What is the purpose of learning this information?
- Do I know anything about this topic?
- Do I know of strategies that will help me learn?
- Am I understanding as I proceed?
- How should I correct errors?
- Have I accomplished the goals I set for myself?
 - TRY THIS OUT WHEN LEARNING A TOPIC.
Ask these questions and then see the results.

How do you use Metacognition?

K What I know	W What I want to learn	L What I have learned

How do you use Metacognition

- Organise your thoughts
- Create timelines to plan out projects
- Compare information (lecture notes vs assigned textbooks vs notes from previous cohorts vs journals)
- Blog your thoughts (what you already know & what you are learning)
- Work together on projects and compare information

How do you use Metacognition

- When reading, you can:
 - Predict
 - Confirm
 - Monitor
 - Reflect
 - Evaluate
- It becomes easier when you use your working memory to facilitate comprehension processing.