INVESTIGATING THE ROLE OF
METACOGNITIVE AWARENESS IN
UNIVERSITY STUDIES

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The purpose→ to provide reliable theoretical overview on metacognitive awareness

(1) definition, components and sub-components of metacognitive awareness
(2) its origin and essence from the point of view of its historical development
(3) link it to motivation and age
(4) characteristics of self-regulated learners and the meta-cognitive strategies they use
(5) major challenges in the implementation of metacognitive awareness.
The rapid development of sciences changed the quality of education to learning-centered education

- **Objectives of learning-centered education** in university studies:
  - Creative and reflective thinking of the student
  - Learning by doing and experiencing
  - Active participation in the teaching process

- **Crucial components** of learning-centered education
  - Metacognitive awareness
  - Motivation
  - Regulating own study processes
- features of **successful learners** \(\rightarrow\) to other learners

- explore learner **internal factors** ≠ **external factors** (instruction)

- **individual differences** that play a central role in learner **autonomy** and self-regulation

learner motivation

learning aptitude

learning strategies

metacognitive awareness is larger framework to view learner strategies within
- Metacognition is a multifaceted topic of research.
  - Metacognitive beliefs
  - metacognitive awareness
  - metacognitive experiences
  - metacognitive knowledge
  - metacognitive skills
  - executive skills
  - higher-order skills
  - metacomponents
  - metamemory

- Metacognitive training is a challenging task → not just adding a few new activities in learning environments
-first discussed by psychologist (Flavell, 1976) → self-knowledge (Fleming and Dolan, 2012).
-the psychological and neural matters are not well understood.
-The development of self-regulatory strategies is important (Hasselhorn and Labuhn, 2011).
-“being meta-cognitive” → take charge of their own learning consciously → improving performance (Hacker et al., 2009).
Metacognition (regulation of that performance by monitoring and evaluating) is differentiated from cognition (performing a task) (Fleming et al., 2014).

All the stipulated points highlight the need for further clarification of metacognitive awareness — a complex concept — how it can be fostered — lack of clarity of links among psychological and neural affairs of metacognitive awareness, self-efficiency and self-regulated learning.
Metacognition and related neural structures

-The prefrontal cortex (PFC) → metacognition (Fleming & Dolan, 2012)
-PFC coordinates with the posterior region but anatomically unconnected. The PFC + posterior parietal cortex (PPC) associated with working memory, theory of mind, metacognition, ... etc.
-The PFC continues to develop throughout childhood and adolescence based on recent studies (Dumontheil et al., 2008).
-PFC changes a great deal during adolescence, as the brain's myelin → fatty substance → coats the white matter → improves signal transmission to the gray matter
-We have development of the PFC for intelligent meta-cognitive ability → gray matter volume in the PFC (Teffer & Semendeferi, 2012).
The metacognitive strategies recruited by self-regulated learners

Fleming& Dolan (2012)

PFC → predicting, reflecting and judgment making.

making prediction → ventromedial pre-frontal cortex (vmPFC) → role in imagining the future

reflecting on past task → the anterior and lateral parts of PFC

-Fleming et al. (2014)
Metacognitive strategies and self-regulated learning (SRL) acquisition

McCaig et al. (2011) → rostro-lateral PFC (rLPFC) → metacognitive strategies.

-it is introspection → determines the accuracy of our judgments regarding task performance.

-Neuroscientific studies → to make judgements before (prospective-feelings of knowing) and after (retrospective-judgment of learning) task performance.

-personal belief that one's efforts will produce successful outcomes equates to self-efficacy (McCaig et al., 2011)
-Self-regulated learners adopt a “growth mind-set” → more competent and effective learners than fixed ones → promote learning (Clark, 2014).
-“Formative feedback” (Black & Wiliam, 2009). - Deep involvement of students in metacognitive strategies - to oversee one's own learning → responsible and effective learner (Black & Wiliam, 2009).
-SRL is an active, constructive process → learners set goals for their learning, monitor, regulate, and control their cognition (Zimmerman & Maylan, 2009).
- Self-regulated students are meta-cognitively, socially, motivationally, and behaviorally active.
Metacognition, self-efficacy and self-regulation

Zimmerman & Moylan (2009)

-SRL strategies is central to academic achievement

-sequence of planning, performance and reflection

-The planning phase entails motivation, self-belief and confidence → self-efficacy.

-performance phase is monitoring, self-control and self-observation.

-Reflection is of particular importance

-Reflection is of particular importance - reflection on the individual learning
metacognition and self-efficacy (mediated by motivation)- learner believe that their minds are capable of successfully)

-self-regulatory learners → more advanced metacognitive skills and higher sense of self-efficacy

-training=metacognitive strategies + motivational + cognitive training → more active recruitment of the PFC (McCaig et al., 2011).
-a “moment” into a opportunity for learning is dependent on the meta-cognitive awareness + accurate self-belief → success (self-efficacy).

- teachers → questioning and feedback → self-efficacy of the students (leading + active agent in learning) → internal feedback → self-regulated (Clark, 2014).
Conclusion
- encourage a reflective and strategic learning
- a change in positive or negative direction on motivation → metacognitive awareness
- Prefrontal and anterior cortex play a crucial role in the meta-cognitive affairs
- equip students with the self-regulatory capabilities → educate themselves
- new and accurate learning strategies → fostering of the
1) explicit cognitive + metacognitive instructions
2) metacognitive strategies
3) helping learners to plan and monitor toward goals
4) encouraging cooperative group work to evaluate
5) self-assessment
6) discussion including when, how and why the strategies work

- *lecturer* → *model* metacognitive strategies by thinking aloud

- *other* lecturers to share practice, update their own knowledge through online sources
Educational Implementation

-Metacognitive activities that ask students to reflect on what they know not only help learners + valuable information for their instruction.

Teachers → individual differences in the level of metacognitive awareness → effective instruction

Metacognitive ability should be developed → improve their academic achievements accordingly.