

**ADAPTIVE
LEARNING
ENVIRONMENTS:**

**Metacognition and
help-seeking**

Metacognition

Metacognition activity

Task 1: Review definitions

- Many wrote about metacognition in assignment 1.
- So considerable expertise available in the class.

1. Discuss in your group what metacognition is.
2. Does there seem to be agreement about this?
3. Make sure that everyone in your group can:
 - a. Give short definition of “main idea” of metacognition
 - b. Explain why educators and ALE researchers may be interested in metacognition.

This should be at a general level, not the level of specific projects.

Metacognition activity

Task 2: Consider examples on next slide

For each example, your group should:

1. Decide whether or not they think it counts as an example of metacognition.
2. Be ready to give a 1-sentence explanation of why or why not.

If your group cannot agree, the “yes” and “no” factions should each prepare an explanation.

Assume that the learners involved are at college/
university level.

Do these count? Why? Why not?

1. Asking your human tutor/ your pedagogical agent a clarifying question about the course material
2. Repeatedly asking questions until you get the tutor/ pedagogical agent to give you the correct answer or demonstrate the relevant procedure.
3. Recognising that you made a misspelling, or a simple arithmetic error in your work.
4. Recognising that you made an error because of a conceptual misunderstanding
5. Realising that you do not have enough information to work out the physics problem you have been assigned
6. Spending the majority of your revision time on material that you think you do not know very well

Metacognition activity

Task 3: Come up with a new example

1. Come up with ONE short new example of a common student behaviour or situation that requires metacognition.
Context could be ALE, traditional classroom, honours project supervision, doing your readings... anything.
2. Be ready to explain why that behaviour/situation requires metacognition.

If you have time: Open questions

Do you think that asking lots of questions is more likely to be a sign of a “good” student or a weak one? Would it depend on the questions?

Do you think that it is possible to teach metacognition, or is it an inherent thing that some people are good at and some not?

Metacognition in brief

Knowledge of knowledge, regulation of knowledge

(what you know and where the gaps are) (Brown 1987)

Knowledge *and beliefs* about cognition; monitoring and controlling your cognitive processes

(Hacker, on Flavell 1979 and later adherents)

- Metacognition as monitoring of processes, regulation of to achieve cognitive goals. Metacognition requires *strategy*.
- Conscious and deliberate processes,
(though some e.g. concentrating harder on something, self-regulation, may become automatised over time)
- Metacognitive processes as a relative of *executive processes which are also about monitoring, and regulating other cognitive processes*

“What is basic to the concept of metacognition is the notion of **thinking about one’s own thoughts**. Thinking can be of what one knows (i.e., **metacognitive knowledge**), what one is currently doing (i.e., **metacognitive skill**), or what one’s current cognitive or affective state is (i.e., **metacognitive experience**).”

Hacker (1998), p. 18. *See reading list– required!*

“To differentiate metacognitive thinking from other kinds of thinking, it is necessary to consider the source of metacognitive thoughts: **Metacognitive thoughts do not spring from a persons immediate external reality; rather, their source is tied to the persons own internal mental representations of that reality**, which can include what one knows about that internal representation, how it works, and how one feels about it.

Therefore, metacognition sometimes has been defined simply as **thinking about thinking**, cognition of cognition, or using Flavell’s (1979) words, “**knowledge and cognition about cognitive phenomena**” (p. 906).”

Hacker (1998), p. 18. *See reading list– required!*

**Help seeking– is
it a good sign?**

“Many authors have taken the viewpoint that **rather than being an activity signalling and promoting the dependence of the learner, help seeking is an important strategy** and can be instrumental in the development of independent skill and ability”

(Ames, 1983; Nelson-LeGall, 1981; Newman, 1994).

“It is likely that learners’ help-seeking behavior reflects their metacognitive and domain-specific skills and knowledge”

(Newman, 1994, 1998a; Puustinen, 1998; Wood & Wood, 1999).

“It can be assumed also that learners’ help-seeking behavior reflects their attitudes about learning, their achievement goals...and their epistemological beliefs.”

Aleven, Stahl, Schworm, Fischer, & Wallace (2003), p. 278.

Emphasis added.

Help-seeking model

A task analysis of the help-seeking process, and it comprises the following steps:

1. Become aware of need for help.
2. Decide to seek help.
3. Identify potential helper(s).
4. Use strategies to elicit help.
5. Evaluate help-seeking episode.

From Nelson-LeGall (1981), expanded by Newman (1994). Model discussed at length in Alevan, Stahl, Schworm, Fischer, & Wallace (2003) as relates to ALEs.

Aleven et al p. 278:

“Help seeking is a manifestation of self-regulated behavior.

Many authors have taken the viewpoint that rather than being an activity signaling and promoting the dependence of the learner, help seeking is an important strategy and can be instrumental in the development of independent skill and ability (Ames, 1983; Nelson-LeGall, 1981; Newman, 1994).

It is likely that learners’ help-seeking behavior reflects their metacognitive and domain-specific skills and knowledge (Newman, 1994, 1998a; Puustinen, 1998; Wood & Wood, 1999).

It can be assumed also that learners’ help-seeking behavior reflects their attitudes about learning, their achievement goals (Arbreton, 1998; Newman, 1998a; Ryan & Pintrich, 1997), **and their epistemological beliefs.”**

**Are students
good at asking for
help?**

The phrase you want is **Blissful ignorance!!!**

As a group: students are quite poor at seeking help at the right time, and doing something *with* the help.

- May make minimal use of help resources, e.g. tutoring system help buttons, glossaries, asking pedagogical agent...

Help-seeking is metacognitive, so...

- Better students, with (usually) better metacognition may not need much domain help
- Weak students may get burnt twice: not knowing they need help (poor self-assessment), and not being able to effectively seek it

→ See especially work from Cognitive Tutors researchers on (non-)use of help resources in their systems

Who should be responsible for helping?

Almost all systems have “on-demand” help resources (students decide when needed)

Some systems also intervene more actively

- When student gets off-path in model tracing tutor
- When specific factual error detected (AutoTutor)

Often system “pushing” help is limited—why?

- Incomplete diagnostic information
- Relatively likely to be wrong
- Maybe worse than doing nothing

→ BUT...on-demand help creates extra student burden

Teaching vs. Supporting metacognition

More common in ALEs to *encourage* students toward a range of metacognitive behaviours than to *overtly teach* metacognitive strategies.

- Encouraging example: Betty's Brain
- Teaching example: Help Tutor (a cog. tutor)

Roll et al. (2007 – the SSS1 paper) argue that the former is not enough. Will not transfer to other contexts, domains. MUST teach!

BUT is this too much of an additional cognitive demand, or interference with domain learning?