METACOGNITIVE TEACHING STRATEGIES FOR STUDENT SUCCESS

Helping Students Learn How To Learn

Liesel Knaack
Director, Centre for Innovation and Excellence in Learning, VIU
Metacognition

Metacognition was a common word by the 1970’s when introduced by John Flavell, but John Dewey had some core components of metacognition in his work on progressive education:

As long as our activity glides smoothly along from one thing to another ... there is no call for reflection. Difficulty or obstruction in the way of reaching a belief brings us, however, to a pause. In the suspense of uncertainty, we metaphorically climb a tree; we try to find some standpoint from which we may survey additional facts and, getting a more commanding view of the situation, decide how the facts stand related to one another (Dewey, 1933, p. 14).
Learners with Strong Metacognitive Skills

- Know the limits of their own memory for a task and elicit help where required
- Do frequent self-assessments of their knowledge to ensure they can figure out how well they are learning something
- Self-monitor frequently and use a variety of strategies to learn
- Undertake careful rehearsal of a skill in order to gain confidence and competence
- Plan effectively at many levels and see the big picture of learning

There is a need to teach for metacognitive knowledge explicitly....we are continually surprised at the number of students who come to [university] having very little metacognitive knowledge; knowledge about different strategies, different cognitive tasks, and particularly accurate knowledge about themselves. (Pintrich, 2002)
Key Questions

How can people learn by reflecting on what they know and do?

How can teachers help students think about their own thinking?

AGENDA

A. Your Own Learning (Activity)
B. Successful Student Learning: Self-Regulated Learning
C. Research, Books and Writings on Learning to Learn (Metacognition)
D. Learning How To Learn (Barbara Oakley + MOOC) (Video)
E. Applying to Classroom (Activity)
F. 10 Metacognitive Teaching Strategies (Handout)
G. 14 Student Strategies (Handout)
H. Wrap Up
QUESTION FOR REFLECTION
What is your ‘metacognition’ story?

On a piece of paper, take a few minutes to jot down a few ideas you have about your OWN learning.

- **When** were you aware of your own learning?
- **How** do you plan, monitor and evaluate your own learning processes?
- **What** learning strategies seem to **work best** for longer term retention and application of learning for you?
**Approaches to Study (Learning)**

<table>
<thead>
<tr>
<th>Approach:</th>
<th>Strongly Agree</th>
<th>Somewhat Agree</th>
<th>Somewhat Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface:</td>
<td>intention to reproduce, unrelated memorizing, passive learning, fear of failure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategic:</td>
<td>study organization, time management, alertness to assessment demands, intention to excel</td>
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</tr>
<tr>
<td>Deep:</td>
<td>intention to understand, relating ideas, use of evidence, active learning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apathetic:</td>
<td>lack of direction, lack of interest</td>
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</tbody>
</table>
TWO PROCESSES FOR LEARNING

Knowledge of Cognition
(Declarative, Procedural, and Conditional)

i. **Awareness** of factors that influence your own learning
ii. **Knowing** a collection of **strategies** to use for learning
iii. **Choosing** the appropriate strategy for the specific learning situation

Regulation of Cognition

i. Setting goals and **planning**
ii. **Monitoring** and controlling learning
iii. **Evaluating** own regulation
LEARNING TO LEARN

1. Awareness of Influencing Factors Affecting Learning
2. Know Strategies to Learn
3. Choose Appropriate Strategy for Situation

4. Set Goals and Plan
5. Monitor and Control Learning
6. Evaluating Own Regulation

KOENWLEDGE of Learning
REGULATION of Learning

L. Knaack (2016)
“WWW& H Rule”

Three fundamental principles are known from the literature for successful metacognitive instruction:

a) **embedding** metacognitive instruction in the **content matter** to ensure connectivity (**WHAT TO DO** and **WHEN**)

b) **informing** learners about the **usefulness** of metacognitive activities to make them exert the initial extra effort (**WHY**)

c) prolonged **training** to guarantee the smooth and maintained **application** of metacognitive activity (**HOW**)

Successful Student Learning Initiative

Question 1: What Does Student Learning Look Like For You?

Question 2: What Challenges You in Achieving Learning?

- 2014-2015
- 1000 Students, Faculty, Admin and Support Staff
- 2000 + unique responses coded
Self-Regulated Learners – Having Good Metacognition
RESEARCH, BOOKS AND WRITINGS

How Learning Works: 7 Research-Based Principles for Smart Teaching

Susan Ambrose (2010)
Creating Self-Regulated Learners: Strategies to Strengthen Self-Awareness and Learning Skills

Linda B. Nilson (2013)
RESEARCH, BOOKS AND WRITINGS

Teach Students How To Learn: Strategies You Can Incorporated into Any Course to Improve Student Metacognition, Study Skills and Motivation

Saundra Yancy McGuire (2015)
RESEARCH, BOOKS AND WRITINGS

Small Teaching: Everyday Lessons from the Science of Learning

James M. Lang (2016)
RESEARCH, BOOKS AND WRITINGS

The New Science of Learning: How to Learn in Harmony With Your Brain

Terry Doyle and Todd Zakrajsek
(2013)
RESEARCH, BOOKS AND WRITINGS

Make it Stick: The Science of Successful Learning

Peter C. Brown, Henry L. Roediger III and Mark A. McDaniel (2014)
RESEARCH, BOOKS AND WRITINGS

How We Learn: The Surprising Truth About When, Where and Why It Happens

Benedict Carey (2014)
Feature
Approaches to Biology Teaching and Learning

Promoting Student Metacognition
Kimberly D. Tanner
Department of Biology, San Francisco State University, San Francisco, CA 94132
Self-Regulated Learning and Academic Achievement: An Overview

Barry J. Zimmerman

To cite this article: Barry J. Zimmerman (1990) Self-Regulated Learning and Academic Achievement: An Overview, Educational Psychologist, 25:1, 3-17, DOI: 10.1207/s15326985ep2501_2
RESEARCH, BOOKS AND WRITINGS

Theory Into Practice
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title-content=t775653706

The Role of Metacognitive Knowledge in Learning, Teaching, and Assessing
Paul R. Pintrich

Online publication date: 24 June 2010
Promoting general metacognitive awareness

GREGORY SCHRAW
Department of Educational Psychology, 1313 Seaton Hall, The University of Nebraska-Lincoln, Lincoln, Nebraska, 68588, U.S.A.
RESEARCH, BOOKS AND WRITINGS

Transforming the Lowest-Performing Students: An Intervention That Worked

By Louis Deslauriers, Sara E. Harris, Erin Lane, and Carl E. Wieman

RESEARCH, BOOKS AND WRITINGS

Metacognition and learning: conceptual and methodological considerations

Marcel V. J. Veenman · Bernadette H. A. M. Van Hout-Wolters · Peter Afflerbach

Received: 08 December 2005 / Accepted: 08 December 2005 / Published online: 08 March 2006 © Springer Science + Business Media, Inc. 2006

Metacognition and Learning (2006)
RESEARCH, BOOKS AND WRITINGS

Educational Psychologist
Publication details, including instructions for authors and subscription information: http://www.tandfonline.com/loi/hedp20

Do Learners Really Know Best? Urban Legends in Education
Paul A. Kirschner a & Jeroen J.G. van Merriënboer b
a Centre for Learning Sciences and Technologies, Open University of The Netherlands
b Department of Educational Development & Research and Graduate School of Health Professions Education, Maastricht University
Published online: 14 Jun 2013.
Self-regulated learning is like your own little secret. It stirs from within you, and is the voice in your head that asks you questions about your learning.

More formally, self-regulated learning is the conscious planning, monitoring, evaluation, and ultimately control of one’s learning in order to maximize it. It’s an ordered process that experts and seasoned learners like us practice automatically. It means being mindful, intentional, reflective, introspective, self-aware, self-controlled, and self-disciplined about learning, and it leads to becoming self-directed.
Learning How To Learn: Barbara Oakley (2014)

https://www.youtube.com/watch?v=O96fE1E-rf8
Learning How To Learn: Barbara Oakley (2014)

Key Messages

- You can experience but you don’t always learn
- You can do but not always process what is going on
- You can teach yourself to learn anything
- You can learn in a focused or a diffused way
- You need to let yourself go into times of unstructured thought to think in a diffused way
- You need to practice focusing (25 minutes at a timed activity)
MOOC: Learning How to Learn: Powerful Mental Tools to Help You Masters Tough Subjects

VIDEOS: https://class.coursera.org/learning-001/lecture
How do you help students LEARN how to LEARN?

- Idea?
- Idea?
- Example?
- Strategy?
- Technique?
Metacognition: Purposefully thinking about one’s own thinking strategies – when students are able to “learn to think” and “think to learn”

Three critical steps to teaching metacognition:
1. Teaching students that their ability to learn is mutable
2. Teaching planning and goal-setting
3. Giving students ample opportunities to practice monitoring their learning and adapting as necessary
Ten Metacognitive Teaching Strategies

Helping Students Learn How to Learn

**Definition**
meta = ‘about’ and cognition = thinking

**Metacognition:** Purposefully thinking about one’s own thinking strategies – when people are able to “learn to think” and “think to learn”

*Metacognition is the regulatory system people use to understand and control own cognitive (brain) performance. It involves people being very aware of how they learn, what strategies meet their needs, evaluating the effectiveness of strategies and then implementing the best plan of action to optimally learn.*
1. Metacognitive Awareness Inventory (MAI)

<table>
<thead>
<tr>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I ask myself periodically if I am meeting my goals.</td>
<td></td>
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<tr>
<td>2. I consider several alternatives to a problem before I answer.</td>
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<tr>
<td>3. I try to use strategies that have worked in the past.</td>
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<tr>
<td>4. I pace myself while learning in order to have enough time.</td>
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<tr>
<td>5. I understand my intellectual strengths and weaknesses.</td>
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<tr>
<td>6. I think about what I really need to learn before I begin a task</td>
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<tr>
<td>7. I know how well I did once I finish a test.</td>
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<tr>
<td>8. I set specific goals before I begin a task.</td>
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<tr>
<td>9. I slow down when I encounter important information.</td>
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<tr>
<td>10. I know what kind of information is most important to learn.</td>
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<tr>
<td>11. I ask myself if I have considered all options when solving a problem.</td>
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<tr>
<td>12. I am good at organizing information.</td>
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<tr>
<td>13. I consciously focus my attention on important information.</td>
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<tr>
<td>14. I have a specific purpose for each strategy I use.</td>
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<tr>
<td>15. I learn best when I know something about the topic.</td>
<td></td>
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<tr>
<td>16. I know what the teacher expects me to learn.</td>
<td></td>
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<tr>
<td>17. I am good at remembering information.</td>
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<tr>
<td>18. I use different learning strategies depending on the situation.</td>
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<tr>
<td>19. I ask myself if there was an easier way to do things after I finish a task.</td>
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<tr>
<td>20. I have control over how well I learn.</td>
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<tr>
<td>21. I periodically review to help me understand important relationships.</td>
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<tr>
<td>22. I ask myself questions about the material before I begin.</td>
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<tr>
<td>23. I think of several ways to solve a problem and choose the best one.</td>
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</tbody>
</table>
METACOGNITIVE TEACHING STRATEGIES

2. Pre-Assessment (Self-Assessment) of Content

- Misconception Questions
- Threshold Concepts in Discipline
- Conceptual Challenges
- Common Trip-Up Areas

Attribution and Share-Alike License: Veronique Debord-Lazaro
https://www.flickr.com/photos/debord/
3. Self-Assessment of Self-Regulated Learning Skills

**Approaches to Studying Inventory (ASI)**

**Deep and Surface Learning**

<table>
<thead>
<tr>
<th>What Approach to Learning Do You Use?</th>
<th>Strongly Agree</th>
<th>Somewhat Agree</th>
<th>Somewhat Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Approach</strong></td>
<td></td>
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</tr>
<tr>
<td>I find I have to concentrate on just memorising a good deal of what I have to learn.</td>
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<tr>
<td>I am not really sure what's important in lectures, so I try to get down all I can.</td>
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<tr>
<td>I tend to read very little beyond what is actually required to pass.</td>
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<tr>
<td>I concentrate on learning just those bits of information that I have to know to pass.</td>
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<tr>
<td>I like to be told precisely what to do in essays or other assignments.</td>
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<tr>
<td>I often seem to panic if I get behind in my work.</td>
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<tr>
<td>Often I find myself wondering whether the work I am doing here is really worthwhile.</td>
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<tr>
<td><strong>Approach</strong></td>
<td></td>
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</tr>
<tr>
<td>I think I am quite systematic and organized when it comes to studying for exams.</td>
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<tr>
<td>I am pretty good at getting down to work whenever I need to.</td>
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<tr>
<td>I organize my study time carefully to make the best use of it.</td>
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<tr>
<td>Before starting work on an assignment or exam question, I think first how best to tackle it.</td>
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<tr>
<td>I look carefully at my instructor's comments on course work to see how to get higher marks the next time.</td>
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</tr>
<tr>
<td>I put a lot of effort into studying because I am determined to do well.</td>
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<tr>
<td>When I have finished a piece of work, I check it through to see if it really meets requirements.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When I am reading, I stop from time to time to reflect on what I am trying to learn from it.</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>When I am working on a new topic, I try to see in my own mind how all the ideas fit together.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Often I find myself questioning things I hear in lectures or read in books.</td>
<td></td>
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</tr>
<tr>
<td>Some of the ideas I come across on the course I find really gripping.</td>
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</tr>
<tr>
<td>I usually set out to understand for myself the meaning of what we have to learn.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I like to play around with ideas of my own even if they don't get me far.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is important for me to be able to follow the argument or to see the reason behind things.</td>
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</tr>
</tbody>
</table>
4. Think Alouds

“[I]t is terribly important that in explicit and concerted ways we make students aware of themselves as learners. We must regularly ask, not only ‘What are you learning?’ but ‘How are you learning?’ We must confront them with the effectiveness (more often ineffectiveness) of their approaches. We must offer alternatives and then challenge students to test the efficacy of those approaches.” (Weimer, 2012)
5. Concept Mapping and Visual Study Tools

Example: Based on Novak’s Concept Map of Meaningful Learning
## 6. Classroom Assessment Tools

<table>
<thead>
<tr>
<th>Assessment Method</th>
<th>Description</th>
<th>How To Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ticket-Out-The-Door</strong></td>
<td>During last few minutes of class, students write response to a question or two about class concepts. Hand in as exit class.</td>
<td>Review/read all before next class and use to clarify, correct or elaborate more for students.</td>
</tr>
<tr>
<td><strong>One Minute Paper</strong></td>
<td>During the last few minute of class, students write response to “Most important thing I learned today” and “What I understood the least today”.</td>
<td>Review/read all before next class and use to clarify, correct or elaborate more for students.</td>
</tr>
<tr>
<td><strong>Muddiest Point</strong></td>
<td>Similar to One-Minute Paper – but only ask students to describe what they didn’t understand during class and what they think might help them.</td>
<td>Same as One-Minute Paper but if many students have same problem, reteach concept another way.</td>
</tr>
<tr>
<td><strong>Student-Generated Test Questions</strong></td>
<td>Divide the class into groups and assign each group a topic on which they are to each write a question and answer for next test.</td>
<td>Use as many of the questions as possible on next test.</td>
</tr>
</tbody>
</table>
7. Metacognitive Note Taking Skills

Students aren’t taught how to take good study notes – or how to structure new learning that will help them learn how to learn

<table>
<thead>
<tr>
<th>Date:</th>
<th>Course Name:</th>
</tr>
</thead>
</table>

**Class Learning Outcomes**

- 
- 

**Connections**

**Already Know**

In this section briefly list what you already know about the topic for this class.

**Thoughts**

In this section briefly share how you feel about this topic (positive, nervous, excited, curious).

**Relationships + Connections**

In this section indicate how this topic connects or relates to previous topics, things you already know etc.

**Questions**

In this section list any questions you have on this topic before the class begins.

**Learning Insights**

Record questions about content/class, connections you are making, feelings/thoughts, areas where you understand...

**Class Notes**

Record class notes here. Tip: do not write everything! Consider jotting down key concepts and headings and then fill in with other details.
8. Reflective Writing

- The most important part of the reading, video or class is....
- The most useful or valuable thing(s) I learned today was....
- The most surprising or unexpected idea I encountered was...
- The ideas that stand out the most in my mind are....
- This helped or hindered my understanding of the reading, video or class ....
- Two ideas that I have found confusing are....
- "I learned a lot doing this assignment". I agree (or disagree) because....
- The advice I’d give myself based on what I know now and if I were starting this assignment over again would be....
- If I were to paraphrase what we have learned today for a high school student it would look like this....
- What I have learned today, I am able to connect to other courses in this way...
9. Wrappers (Course, Homework and Exam)

**Why Wrappers Work**

- Time efficient
- Students are doing the task anyway
- Only add a few minutes to a task
- Metacognition practice is built in to the that task
- Students are self-monitoring in context
- Feedback on accuracy can be built in
- Feedback is immediate
- Support can gradually be faded out
  - in just 3 lessons most students are successful on their own
- Minor interventions can significantly change behavior

![Diagram showing metacognitive teaching strategies]

- 1. Awareness of Influencing Factors Affecting Learning
- 2. Know Strategies to Learn
- 3. Choose Appropriate Strategy for Situation

**Knowledge of Learning**

- 4. Set Goals and Plan
- 5. Monitor and Control Learning
- 6. Evaluating Own Regulation

**Regulation of Learning**
10. Retrospective Post-Assessment (Post-Mortem)

Before this course I thought I was ……

Now I think ……

My thinking about this course has changed in this way…..
14 STUDENT LEARNING STRATEGIES

Strategies to Help You Be a Successful Student: Learning and Studying Tips

1. Learn Deeply
   You want to engage in deep learning—not in a shallow or surface manner. When you learn deeply it sticks in your brain much longer and helps you apply learning and remember it!
   Photo Credit: https://www.flickr.com/photos/22463400@N00/1197947341 by Mark Borean

2. Don’t Multitask
   Focus on maximizing focus and minimizing distractions (research clearly shows your brain can’t do any one thing very well with doing many things). Remove distractions (cell phone, Internet, etc.) to maximize your learning potential.

3. Make Meaningful Connections
   Make meaningful connections between all concepts (make stories, connections and relationships between new learning to help your brain remember).

4. Make Learning Personal
   Relate new learning to your own personal experiences (it will stick better in your brain by making a personal connection).

5. Determine Distinctiveness
   Figure out what makes a concept very unique or different? (e.g., similarities and differences in new concepts so your brain can remember better).
   Make a chart, a comparison list etc. Photo Credit: https://www.flickr.com/photos/39879960@N00/3015592606/

6. Practice Appropriate Retrieval and Application—don’t memorize isolated facts—
   If you memorize a bunch of facts that are not connected your brain won’t remember them longer term; instead figure out ways to remember what you need to know and then apply it. Practice and study related to how your teacher will want content to be recalled.

GREAT VIDEOS FOR STUDENTS
How to Get the Most Out of Studying
Parts 1 – 5
Stephen Chew, Samford University
On YouTube
METACOGNITIVE TEACHING STRATEGIES FOR STUDENT SUCCESS

Helping Students Learn How To Learn

Liesel.Knaack@viu.ca

This slideshow will go up on Festival Schedule under this session for sharing.