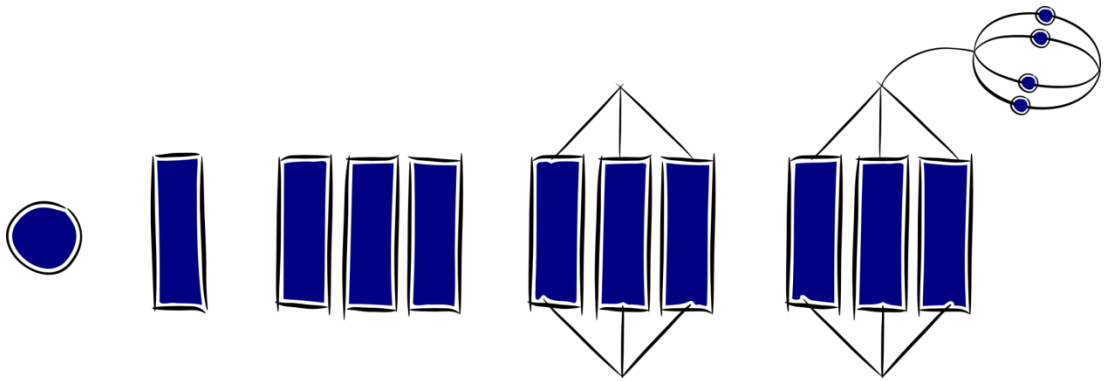
SOLO Taxonomy & Metacognition.

How metacognition can be enhanced with HOT Mapping and
a common understanding of the learning process.

Pam Hook
www.pamhook.com



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“Metacognition” is not just teaching students to ask “Mrs Potter’s Questions”

During a task:
What are you trying to do? (planning)
What are you doing well? (monitoring)
What are you not doing so well? (monitoring)
How could you improve? (regulating)

After completing a task:
What did you do well? (evaluating)
What didn’t you do so well? (evaluating)
How could you improve? (regulating)
Did you complete the task? (evaluating)

What does the research say about self regulated learning?

- Student initiated

Proactive rather than reactive

Zimmerman and Martinez-Pons (2004)

The key questions to ask are:

- Does the learner show initiative?
- Does the learner persevere?
- Does the learner display adaptive behaviours?

Zimmerman and Martinez-Pons (2004)

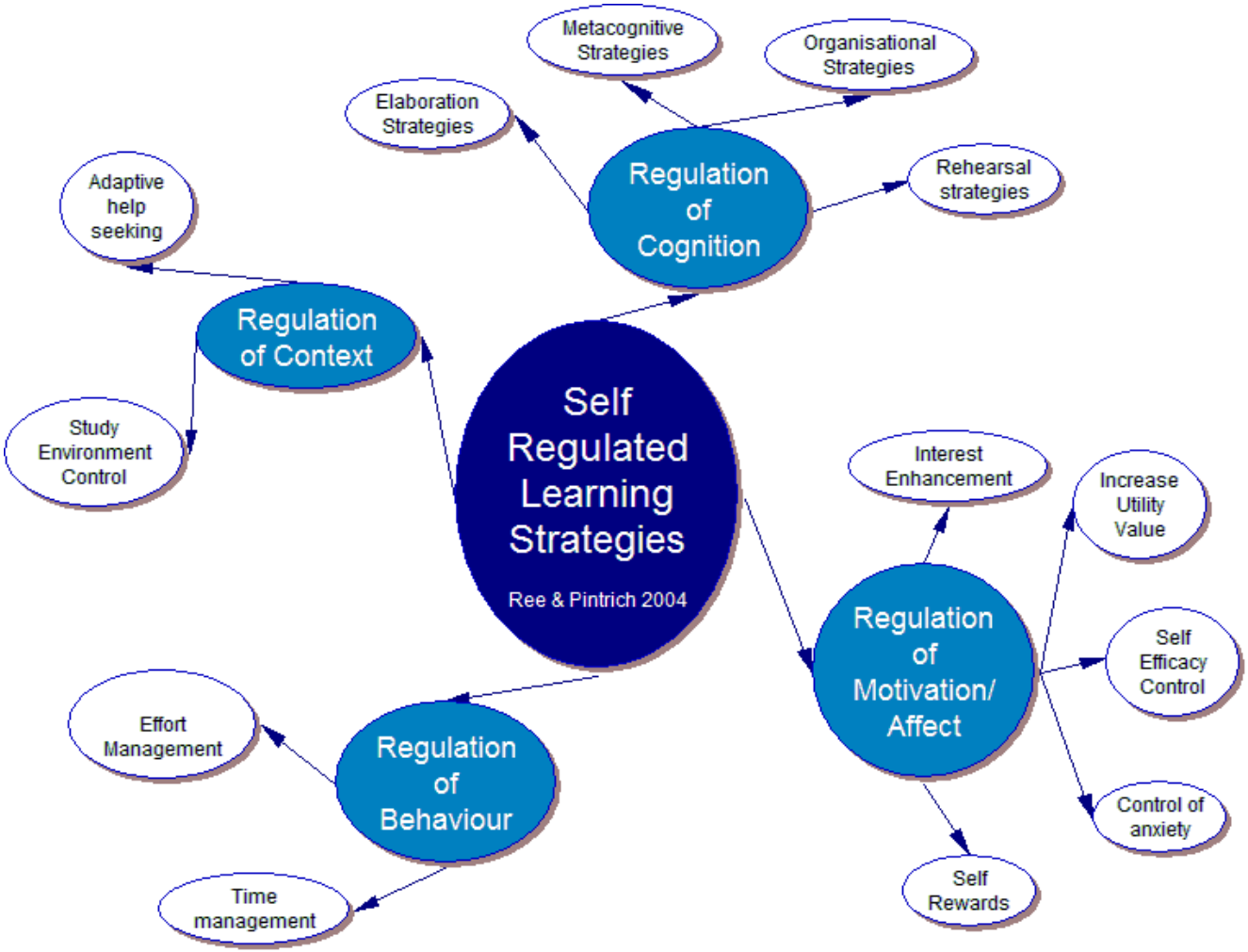
Self Regulation Processes

(Zimmerman, 1989)

Planning and goal setting
Self monitoring and recording
Self evaluating (performance and records)
Self rewarding and self punishing
Environmental structuring

Ree and Pintrich's 10 Powerful Self Regulated Learning Strategies

Ree and Pintrich 2004



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1. Self – evaluation.

Student initiated evaluations of quality or progress of work.

"I work out how deep my understanding is using SOLO Taxonomy."

"I go back and assess my work using the success criteria in a HOT SOLO coded Map rubric to see if I can improve my learning outcome."

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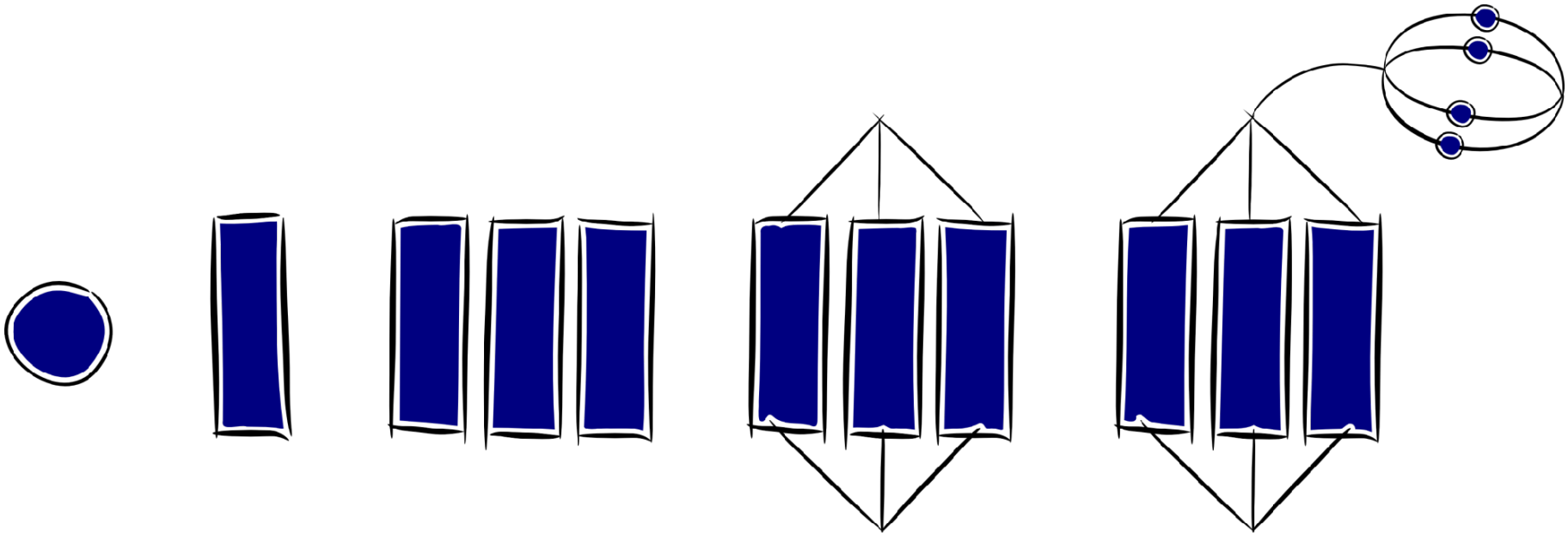
Ree and Pintrich 2004

SOLO Taxonomy - Biggs and Collis 1982

The **S**tructure of **O**bserved of **L**earning **O**utcomes



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Biggs, J.B., and Collis, K.F. (1982) Evaluating the Quality of Learning-the SOLO Taxonomy (1st ed) New York: Academic Press.

HOT Visual Mapping and Self Assessment Rubrics (coded against SOLO Taxonomy)

	Definition identifies several relevant ideas and links these to the whole. Taken into another context
 Relational	Definition identifies several relevant ideas and links these to the whole
 Multistructural	Definition identifies several relevant ideas
Unistructural	Definition identifies one relevant idea
.	Needs teacher assistance

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Hooked on Thinking SOLO coded Self Assessment Rubric for Drama Y0 to Y2

"Doing Stuff" Drama Y0 -2 *n.b.Can replace text with images*	Prestructural 	Unistructural 	Multistructural 	Relational 	Extended Abstract 
		Tacit	Aware	Strategic "because/ give reasons/ explain)	Reflective
Use of Voice	I cannot be heard by others	I can be heard by the audience (volume/ projection) I can show "a feeling" from the story using my voice (e.g. angry, sad)	I can be heard by the audience and I can alter my voice to be loud or quiet when they listen to me I can show more than one feeling from the story using my voice	I can choose how to use my voice to show a feeling to the audience. (volume and expression)	I can choose how to use my voice to show a feeling to the audience and change this at the right time and in the right way. (change in response to the changes in the storyline - improvise)
Facial Expression	I (my face) cannot be seen by others.	I can show the audience my face I can show "a feeling" from the story using my face (e.g. angry, sad) when asked	I can make my face show more than one feeling to the audience I can show different feelings from the story on my face when asked.	I can choose how to change my face to show a feeling from the story to the audience.	I can choose how to use my face to show a feeling to the audience and change this at the right time and in the right way. (change this in response to changes in the storyline - improvise)
Movement	I can move my body to tell the story with teacher direction	I can move my body to show "a feeling" from the story when asked.	I can move my body to show different feelings from the story when asked.	I can choose how to move my body to show different feelings from the story.	I can choose how to move my body to show different feelings from the story and change this at the right time and in the right way -. improvise

2. Organising and transforming

Student-initiated overt or covert rearrangement of instructional materials to improve learning.

I look at the WALT and choose the best HOT Maps to use for the learning task.

"I look at the expected learning outcomes against SOLO Taxonomy and construct a rubric with SOLO coded success criteria before I start my writing."

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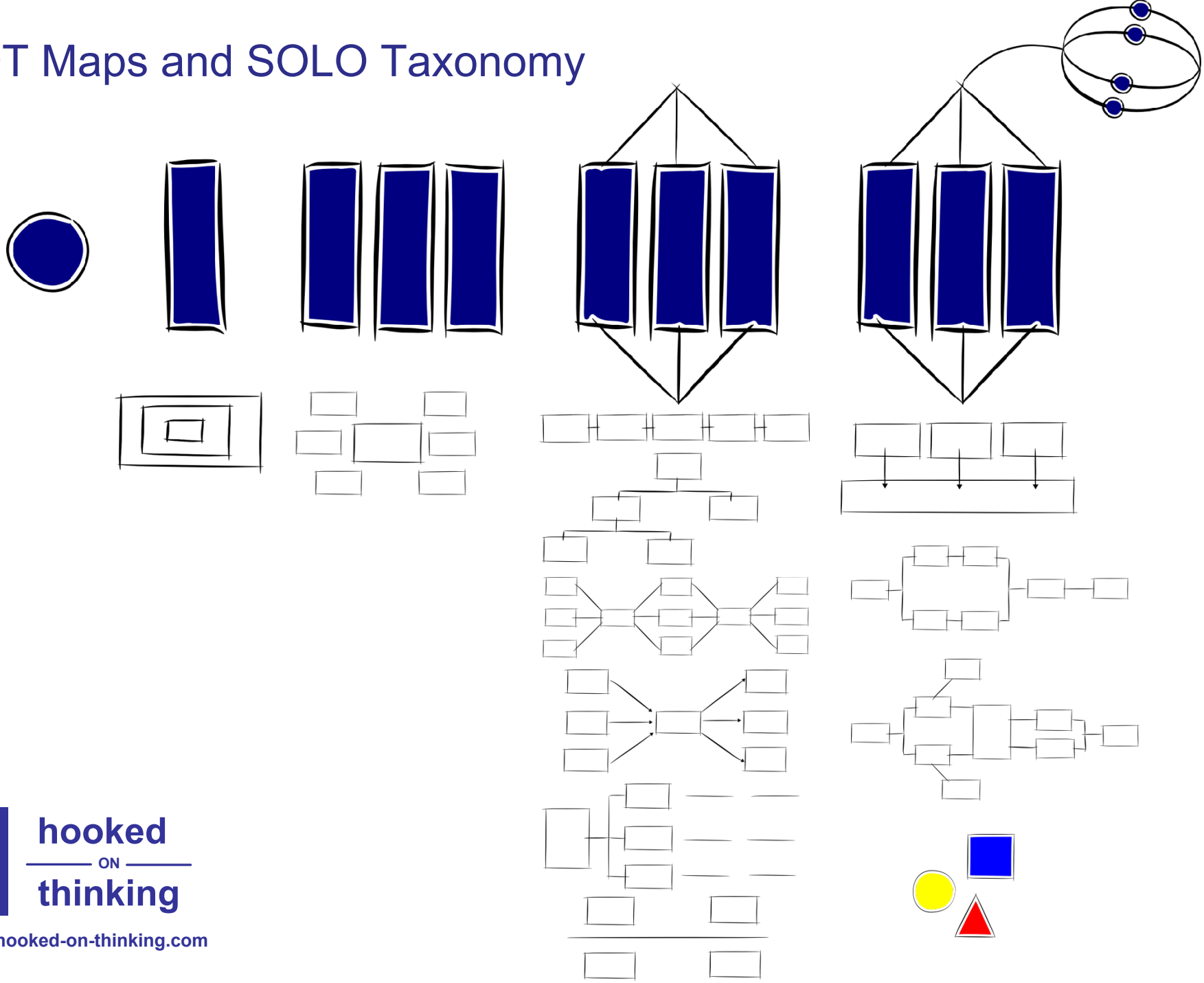
Ree and Pintrich 2004

HOT Maps and SOLO Taxonomy



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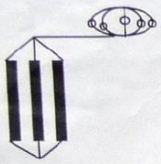
SELF ASSESSMENT RUBRICS

NAME: _____ DATE: 28.05.09

 Extended Abstract	I can identify all parts of the fly, explain its functions and tell you what would happen if they weren't there, whilst linking, describing and predicting what may happen in the future.
 Relational	I can identify all the parts to a fly explain its functions and explain what would happen if the part was missing.
 Multistructural	I can identify several parts to a fly and tell you its function what would happen if the part was missing.
 Unistructural	I can identify 1 part of a fly and its functions.
 Prestructural	I can not identify parts of the fly or its function

Next Steps: (WTN)

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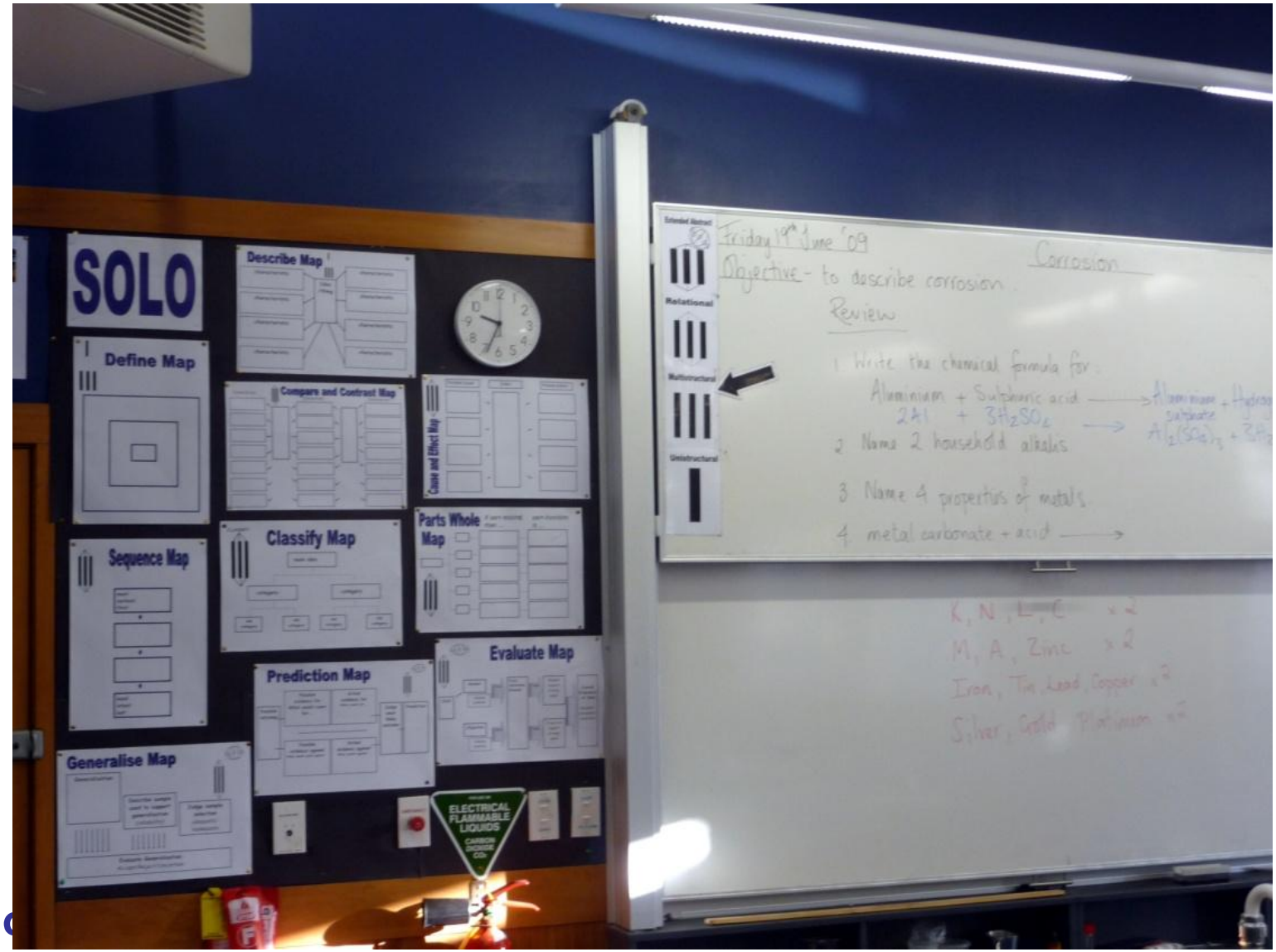
Newmarket Primary School



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Lincoln High School

3. Goal-setting and planning

- Student initiated setting of educational goals and planning for sequencing, timing, and completing activities related to those goals.

"I use HOT SOLO self-assessment rubrics to set my 'where to next goals."
"I use a GANTT chart and the HOT SOLO Taxonomy inquiry rubric to plan the "where to next" stages in my inquiry research, I check my progress regularly."

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Ree and Pintrich 2004

Vauxhall School - Hooked on Thinking SELF ASSESSMENT RUBRIC FOR INQUIRY

STUDENT INQUIRY	Inquiry Question Formulating focus questions	Planning the Inquiry Finding resources Complete a timeline for the inquiry stages	Collect Identifying and recording relevant information	Connect Connecting the information	Create and Communicate Creating new knowledge Communicating to an audience	Reflection (formative and summative) What am I doing? Is it going well? What should I do next?
Prestructural Learning outcomes show unconnected information, no organisation. Task not attacked in appropriate way	I need help to ask a question.	I need help to find resources I need help to make a timeline	I need help to identify relevant information. I need help to record information.	I need help to do more than "cut and paste" what I found out.	I need help to look at the connected information in a new way. I need help to share what I found out.	I need help to know what I'm doing. I need help to know whether it is going well. I need help to know what I should do next.
Unistructural ***Tacit use*** Learning outcomes show connections are made, but significance to overall meaning is missing	I can ask a simple question.	I can locate one resource. I can make an inquiry timeline.	I can identify relevant information from one source. I can record information in one way.	I can connect my information if I am told what to do.	I can look at the connected information in a new way. I can share what I found out.	I know what I am doing. I can tell what I'm doing.
Multistructural ***Aware use*** Learning outcomes show simple connections but importance not noted.	I can ask a question to collect information.	I can locate several different resources. I can make an inquiry timeline with all relevant stages in the right order.	I can identify relevant information from several sources. I can record information in more than one way.	I am aware of several ways to connect my information but I need help to know when to use them.	I can look at the connected information in several new ways. I can share what I found out in several different ways.	I know what I am doing. I can tell you what I'm doing and describe it.
Relational ***Strategic use*** Learning outcomes show full connections made, and synthesis of parts to the overall meaning.	I can ask a question to connect information.	I can locate several different relevant resources from different media. I can make an inquiry timeline with all relevant stages in the right order and explain why the decisions were made.	I can identify relevant information from several sources and link this to my inquiry questions. I can record information in more than one way and explain why I have chosen these ways.	I am aware of several ways to connect my information and can choose the most appropriate one for the circumstances. (I know when and how to use HOT SOLO maps)	I can look at the connected information in several new ways AND explain why I have chosen these ways. I can communicate this in an appropriate way for my audience AND explain why I have chosen this way.	I can tell you what I am doing and describe it. I can tell you whether it is going well or not (self assessment rubrics).
Extended Abstract ***Reflective use*** Learning outcomes go beyond subject and makes links to other concepts - generalises	I can ask a question to create and communicate information.	I can locate several different relevant resources from different media AND evaluate the validity and reliability of them. I can make an inquiry timeline with all relevant stages in the right order and explain why the decisions were made AND I can adapt and modify my timeline where necessary.	I can identify clear, relevant, reliable and valid information from a wide range of sources. I can record information in more than one way and explain why I have chosen these ways AND I can justify my decisions.	I am aware of several ways to connect my information and I use these fluently.	I can look at the connected information in several new ways and explain why I have chosen these ways AND justify my decision. I can communicate this in an appropriate way for my audience AND explain why I have chosen this way AND justify my decision.	I can tell you what I am doing and describe it. AND I can tell you whether it is going well or not (self assessment rubrics). AND I can predict what I should do next OR what I would do next time.

4. Seeking Information

- Student – initiated efforts to secure further task information from non social sources when undertaking an assignment.

"Before I start I check the intranet for SOLO multistructural learning strategies, so I can collect as much relevant information as possible concerning the topic."

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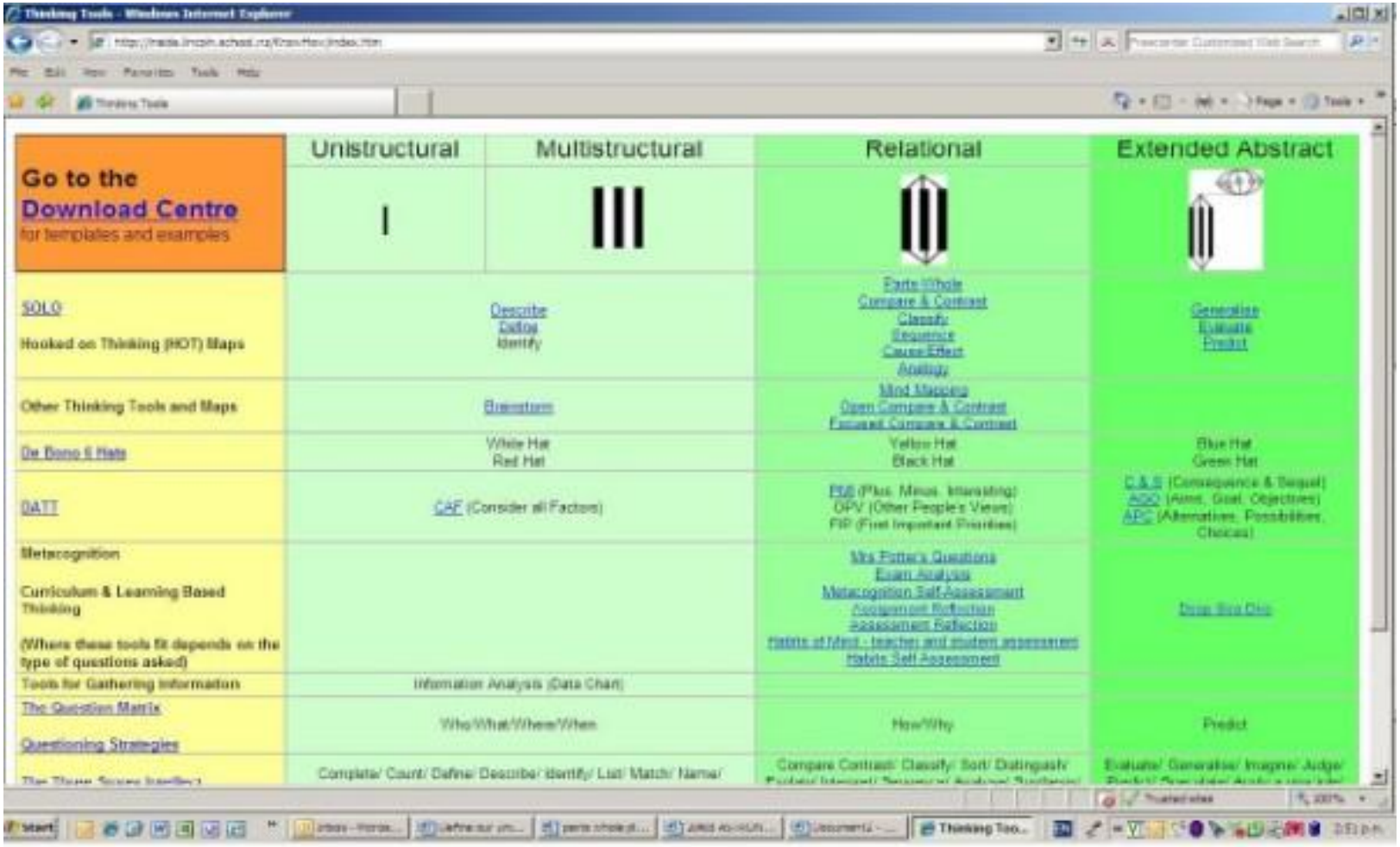
Ree and Pintrich 2004



Go to the Download Centre for templates and examples	Unistructural	Multistructural	Relational	Extended Abstract
	I	III		
SOLO Hooked on Thinking (HOT) Maps	Describe Define Identify		Parts Whole Compare & Contrast Classify Sequence Cause-Effect Analogy	Generalise Evaluate Predict
Other Thinking Tools and Maps	Brainstorm		Mind Mapping Open Compare & Contrast Focused Compare & Contrast	
De Bono 6 Hats	White Hat Red Hat		Yellow Hat Black Hat	Blue Hat Green Hat
DATT	CAF (Consider all Factors)		PMI (Plus, Minus, Interesting) OPV (Other People's Views) FIP (First Important Priorities)	C & S (Consequence & Sequel) AGO (Aims, Goal, Objectives) APC (Alternatives, Possibilities, Choices)
Metacognition Curriculum & Learning Based Thinking (Where these tools fit depends on the type of questions asked)			Mrs Potter's Questions Exam Analysis Metacognition Self Assessment Assignment Reflection Assessment Reflection Habits of Mind - teacher and student assessment Habits Self Assessment	Three Story Intro
Tools for Gathering Information	Information Analysis (Data Chart)			
The Question Matrix Questioning Strategies	Who/What/Where/When		How/Why	Predict
	Complete/ Count/ Define/ Describe/ Identify/ List/ Match/ Name/		Compare Contrast/ Classify/ Sort/ Distinguish/	Evaluate/ Generalise/ Imagine/ Judge/

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Learning interventions coded against SOLO Taxonomy
Lincoln High School

5. Keeping Records and Monitoring

- Student initiated efforts to record events/results.

"I keep a learning log of my SOLO LO's outcomes for each LI."
"I blog post notes of the class discussion."
"I use my phone to send pxt of my design work each day. "
"I tweet the URL's of articles I find online."
"I txt my questions about each lesson"
"I video the results of my experiments with my phone "
"I voice record/ podcast my impressions of the film"

Ree and Pintrich 2004

6. Environmental structuring.

- Student initiated efforts to select or arrange the physical setting to make learning easier.

"I turn off FaceBook so that I am not distracted by my friends messages when I am revising."

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Ree and Pintrich 2004

7. Self-consequences

- Student imagination of rewards/punishment for success or failure.

"If I do well on this assignment, I am going to spend all Saturday at the beach hanging out with friends."

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Ree and Pintrich 2004

8. Rehearsing and memorising

- Student initiated effort to memorise material by practice.

"In preparing for a test, I use mnemonics and make mind maps in Inspiration to help me remember the important ideas."

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Ree and Pintrich 2004

9. **Seeking social assistance.**

- Student initiated efforts to solicit help from peers/ teachers/ adults.

"When I get stuck on a homework problem, I ask my FaceBook friends for help."

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Ree and Pintrich 2004

10. **Reviewing records**

- Student initiated efforts to re-read/ prepare.

- *"When preparing for my speech, I use a webcam to video myself and review my presentation."*

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Ree and Pintrich 2004

11. Others

- Learning behaviour that is initiated by other persons.

“I just do what the teacher tells us to do on our class wiki.”

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Ree and Pintrich 2004

Research into Student Use of Different Metacognitive Strategies

- Flexibility
- Frequency
- Consistency

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Zimmerman and Martinez-Pons 1986

Are academically successful students more likely to use self regulatory strategies to enhance their learning than less successful students?

Zimmerman and Martinez-Pons 1986

GENDER DIFFERENCES

- Girls displayed more goal setting and planning and more keeping records and monitoring strategies than boys.

- Boys reported significantly more non-self regulatory “other” responses than girls.

Zimmerman and Martinez-Pons 1986

GIFTED STUDENTS

Gifted students surpassed regular students at each grade level on measures of

1. Self regulatory learning strategies
2. Self efficacy

Zimmerman and Martinez-Pons 1986

Zimmerman and Martinez-Pons 1986

Planning Phase

Task Analysis
Goal setting
Strategic planning

Self–motivation Beliefs
Self-efficacy
Outcome expectations
Intrinsic interest/value
Goal orientation

Monitoring Phase

Self–control
Self-instruction
Imagery
Attention focusing
Task strategies

Self–observation
Metacognitive monitoring
Self recording

Evaluation Phase

Self–judgment
Self-evaluation
Causal attribution

Self–reaction
Self satisfaction/affect
Adaptive/ Defensive

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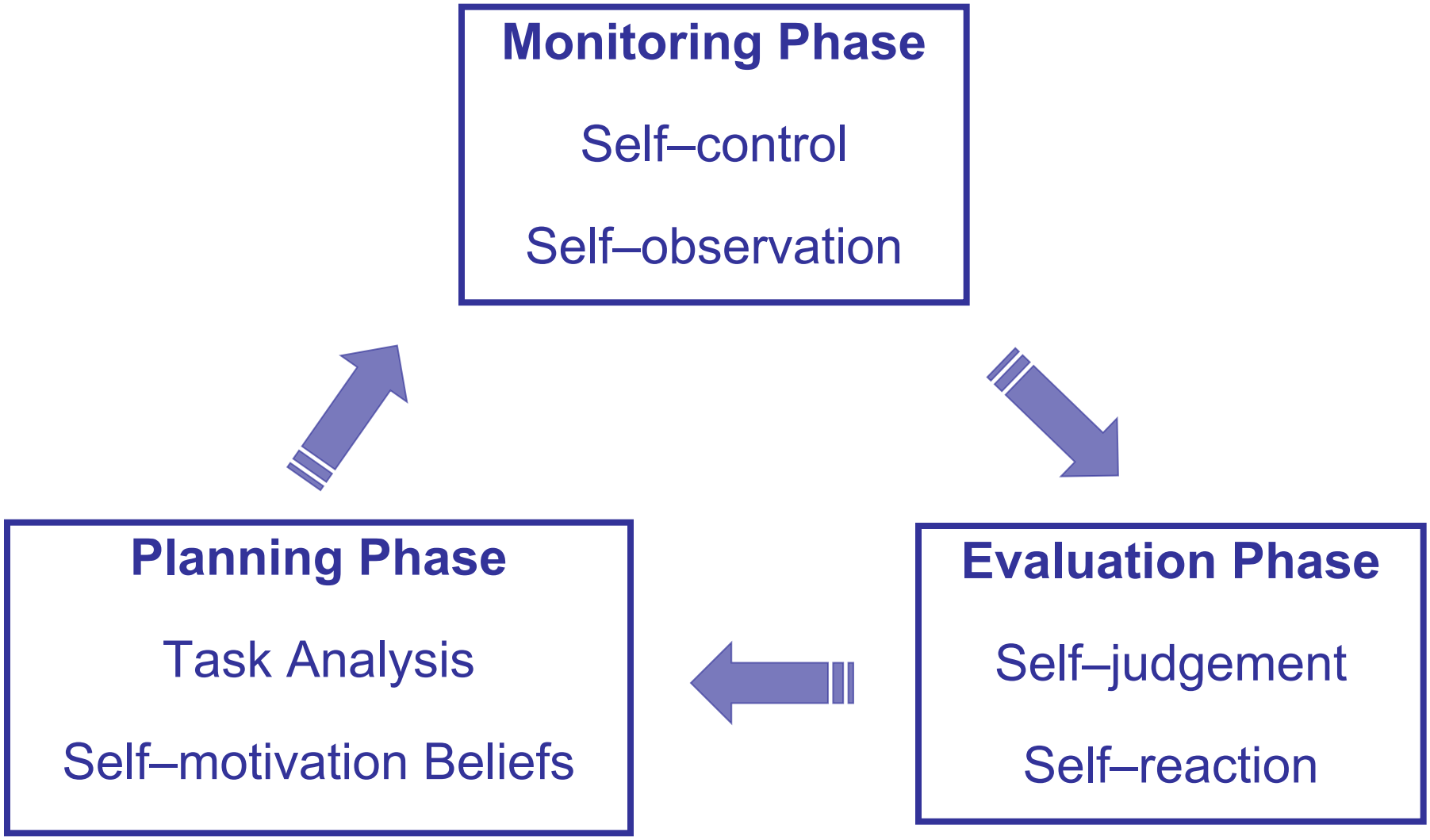

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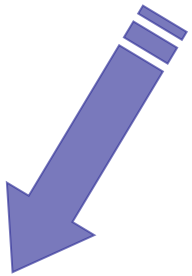
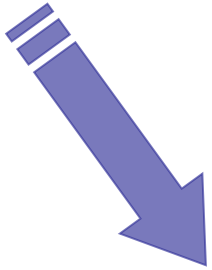
Phases of self regulation
after Zimmerman and Campilo 2003

LEARNERS

PROACTIVE VS REACTIVE





Planning and Monitoring phase

Post-performance self reactions

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PLANNING PHASE: Task Analysis Processes

Proactive learners
set specific, proximal and hierarchical goals for themselves.

They select specific strategic methods that enhance their performance.

Reactive learners
are unstructured and vague about their goals.

They have hazy plans.

Zimmerman and Martinez-Pons 1986

PLANNING PHASE: Self motivational Beliefs

Proactive learners have;

- enhanced perceptions of self efficacy,
- outcome expectations,
- intrinsic interest and
- learning goal orientation.

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Zimmerman and Martinez-Pons 1986

MONITORING PHASE: Strategy Use

Proactive learners deploy strategies that were planned during the planning phase.

Reactive learners tend to plunge into learning tasks.

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Zimmerman and Martinez-Pons 1986

Monitoring Phase Self Observation

Proactive learners engage in systematic self observation, such as metacognitive self monitoring and self recording.

Reactive learners are struggling so hard to learn they often cannot think metacognitively.

Zimmerman and Martinez-Pons 1986

EVALUATION PHASE Self-judgments

Proactive learners

Self evaluate by comparing their learning performance to their planning phase goals.

Causal attributions:
Controllable variables
e.g. learning strategies

Reactive learners

Fail to evaluate because they failed to set specific goals. Fall back on social comparisons with peers

Causal attributions:
Uncontrollable variables
e.g. fixed ability

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Zimmerman and Martinez-Pons 1986

Evaluation Phase

Self-reactions

Adaptive & defensive inferences	Helplessness/ procrastination/ task avoidance/ cognitive disengagement/ apathy
Self-satisfaction	Elation/ anxiety

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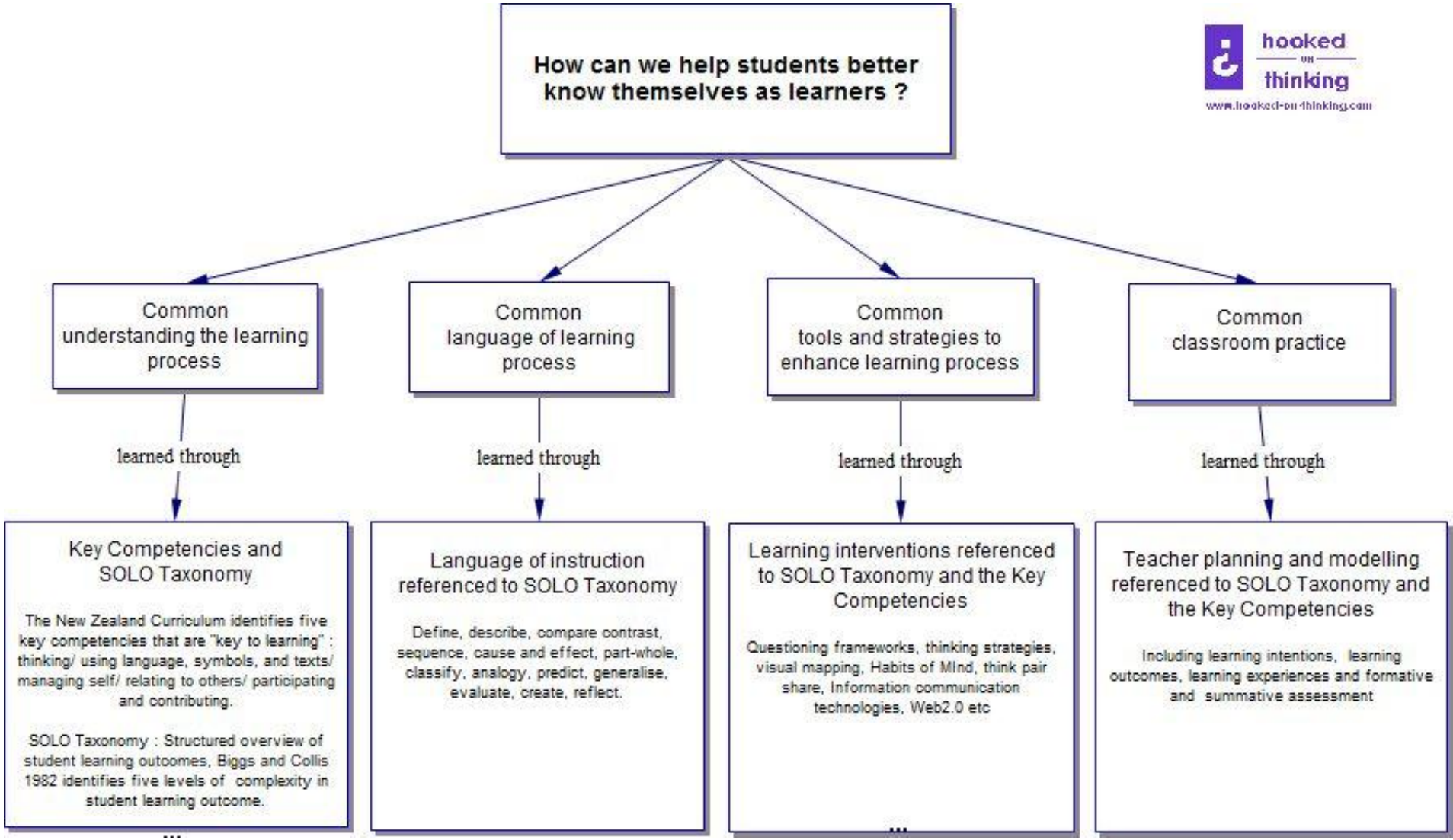
Zimmerman and Martinez-Pons 1986

Helping students become self-regulated learners



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