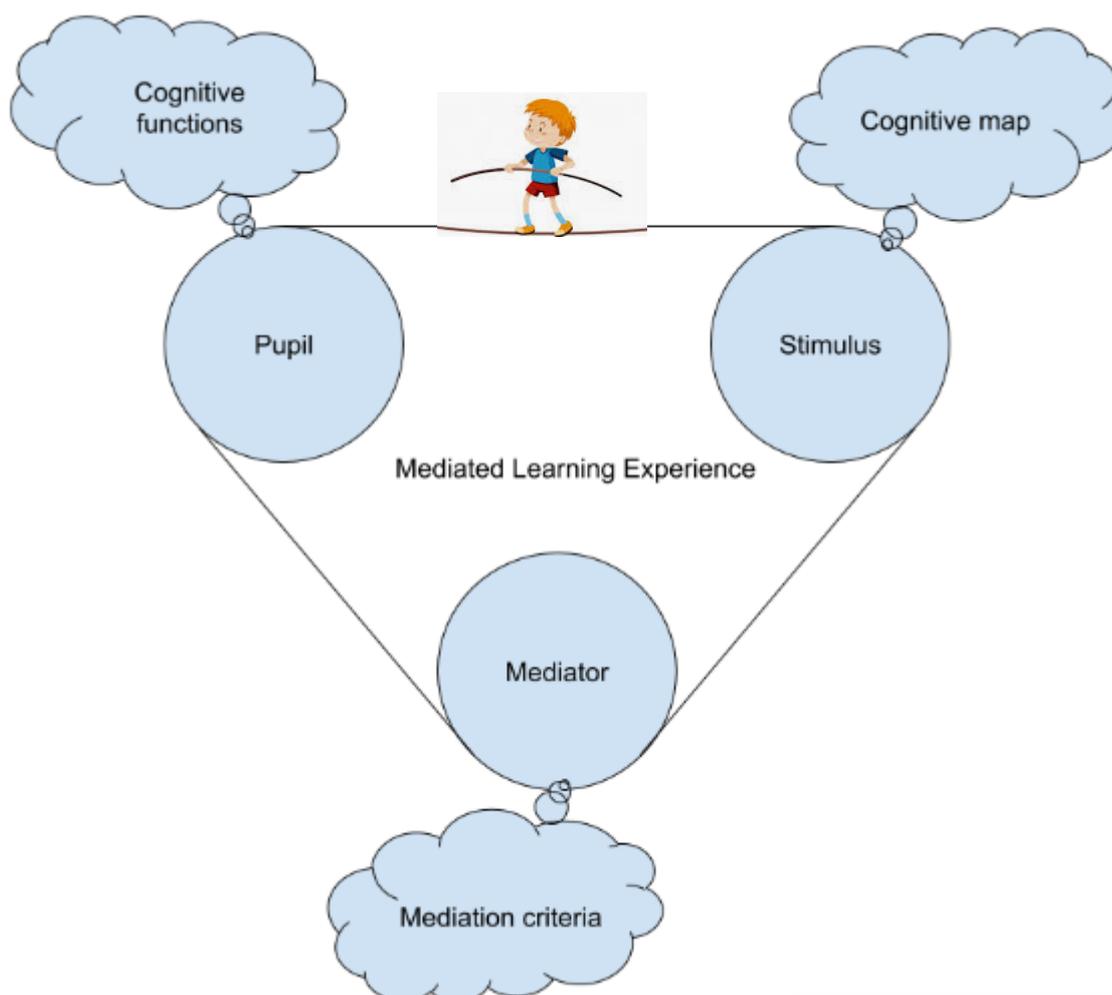


## Mediate while you teach

Mediation is a very strong way of teaching a student to make use of their already developed cognitive functions and to help them to develop these functions to a higher level.

With the need to focus on cognitive functions, to be able to recognize them and to address them, teachers also have the need to recognize the deficient cognitive functions. And, if teachers are able to develop the cognitive functions by mediation, they will also have the need to re-mediate the deficient cognitive functions.

In this document we will focus on deficient cognitive functions. We will name the cognitive function and the corresponding deficient cognitive function. We will describe the behavior the student will probably show when a cognitive function is deficient and describe alternative behavior of the teacher in order to develop the cognitive function in a proper way.

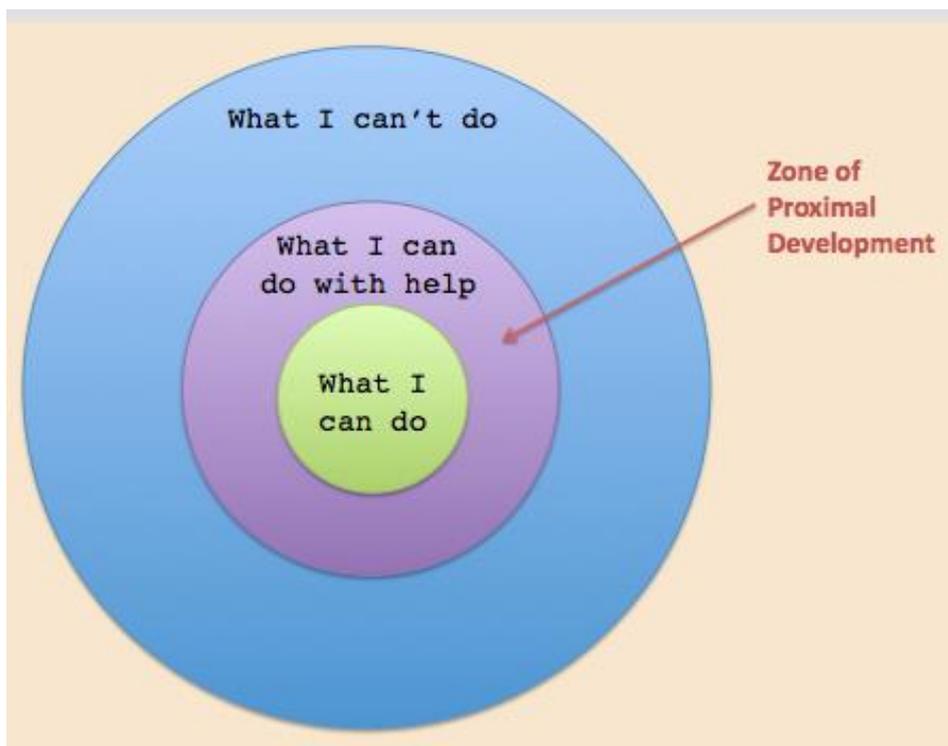


Bron: Feuerstein, e.a. 1980

The triangle shows that there must be a relation, a certain balance between already developed cognitive functions of the pupil/student, the task that is given, and the amount of mediation that is needed in order to be able to develop the students cognitive abilities to a higher level. It is important to know how much and what kind of mediation a student needs in order to develop his cognitive functions. The task that is given should be in close relation with the cognitive function(-s) that are going to be addressed by the mediator.

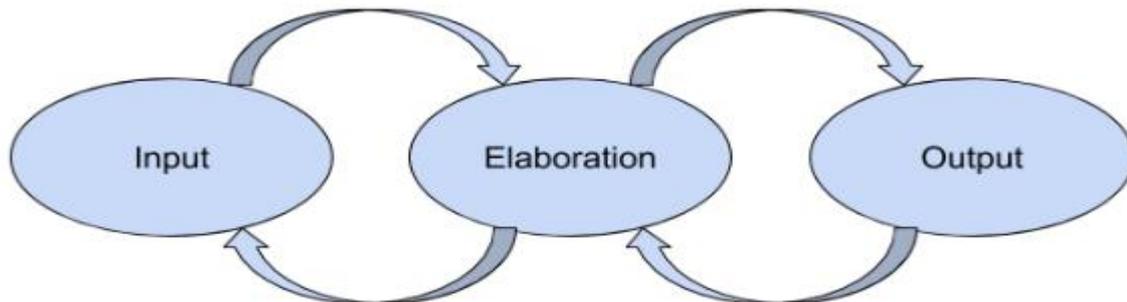
According the “cognitive map” we can change the task on 7 different parameters: the content, the phase (input, elaboration or output), the cognitive function(-s) that will be addressed, the modality, the complexity of the task, the abstraction level and the efficiency level that is needed. All these 7 parameters we can change to make a task more easy or more difficult in order to adjust the task to the students.

We need to address the students “proximal zone of development” (Lev Vygotsky). It is the level where mediation is needed. Where the student can develop his cognitive functions by meeting a task where certain cognitive functions are needed to solve the given problems.



Lev Vygotsky

Cognitive functions are the learning and thinking functions of the brains. We are able to develop them through our whole life. They are like a muscle: if you don't use them, you will lose them, if you train they sustain.



**Input:** where the incoming information is gathered by our five senses and send to the internal world.

**Elaboration:** where the information is processed.

**Output:** where the response is communicated to the external world.

## Cognitive functions and dysfunctions

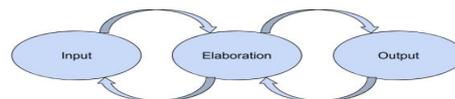
CF= Cognitive functions

CDF= Cognitive dysfunctions

⇒ = Behavior of the teacher to overcome the dysfunction.

### Input functions:

#### **Input functions and dysfunctions**



#### **1. Perceive**

CF: Take enough time to perceive and gather information. Clear perception.

CDF: Poor attention to specific features of that what has to be perceived. Blurred and sweeping perception. (reading "house" instead of "horse")

- ⇒ Encourage the student to use (the right) labels to describe the incoming information.
- ⇒ Reinforce the student to slow down his speed in order be very precise.
- ⇒ Reward students for sharing their strategy in successful data gathering and for being an model for others.

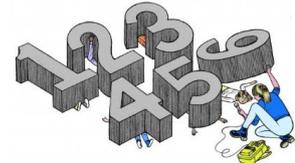


## 2. Systematic search

CF: Systematic search for information.

CDF: Impulsive and very global exploring the information that is given. (the student will rush into the task without gathering enough information to act properly)

- ⇒ Reinforce the student to explore the information in a systematic way, e.g. from left to right and from top to down.
- ⇒ Encourage a student to rephrase the incoming information in their own words.
- ⇒ Structure the environment.
- ⇒ Lower the quantity of stimuli that has to be explored.



## 3. Labeling

CF: Use the right verbal tools and concepts. Precise and accurate.

CDF: Difficulty with understanding language, misinterpret instructions and questions. Impaired use of language. (not understanding what to do, how to work, acting in a wrong way)



- ⇒ Give a student the right specific and accurate labels and concepts.
- ⇒ Do not use "baby-language".
- ⇒ Use a slightly higher level language than the language that is used by the student.
- ⇒ Relate concepts to the students' everyday experience.

## 4. Use of spatial labels

referring



CF: Use the right spatial concepts. Well developed use of words to place and space.

CDF: Not able to use left and right, up, top, down, etc. Impaired use of concepts referring to place and space. (pointing without using words to describe position)

- ⇒ Play games where spatial concepts have to be used: verbal instructions where to find a hidden object, write an instruction to walk through a room, a park, etc.
- ⇒ Model to the student the use of spatial concepts.



## 5. Use of time labels

CF: Well developed use the right time concepts.

CDF: Not able to tell what time it is, how long something will take, not aware of later, now, etc. (no possibility to use the concept of time in different tasks as planning, predict when something is ready, etc.)

- ⇒ Practice with the student the use of time concepts.
- ⇒ Let the student make plans with the use of different time concepts like: day, time, when it is started, when it will be ready, etc.
- ⇒ Discuss with the student the difference in experiencing time when you enjoy and when you are in a hurry.
- ⇒ Introduce different forms of time measurement: clock, digital clock, sun dials, egg timers, etc.
- ⇒ Play with life lines, Photo albums, family trees, etc.



## 6. Be aware of constancies

CF: Ability to conserve constancies.

CDF: Not able to conserve constancies. (not able to see that “A, a, α” are the same, not aware of the fact that  $3+5$  is the same as  $5+3$ )



- ⇒ Let the student experiment with concrete materials like water pouring in cups with different sizes.
- ⇒ Make the student aware of the change of cloth but staying the same person.
- ⇒ The amount of money stays the same although the size of the coins has been changed.
- ⇒ Invite students to find as many solutions you can find for a math problem.

## 7. Data gathering

CF: Precise and accurate data gathering.

CDF: Sloppy and not precise collecting data. (presents work that is incomplete, far too detailed, missis important points or parts, etc.)



- ⇒ Make students aware of the fact that not relevant information can distract you from the task.
- ⇒ Make students aware of the importance of being precise in giving the right information for example by using 500 ml water instead of 50 ml.
- ⇒ Demonstrate how overlooking details can lead to chaos.

## 8. Use of more sources of information



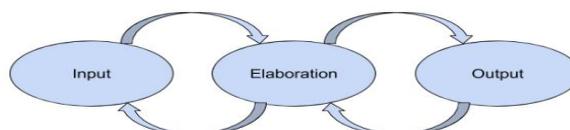
CF: Focus on more than one source of information.

CDF: Impossible to take more than one sources of information into account. (taking just a random pencil instead the red pencil where you asked for)

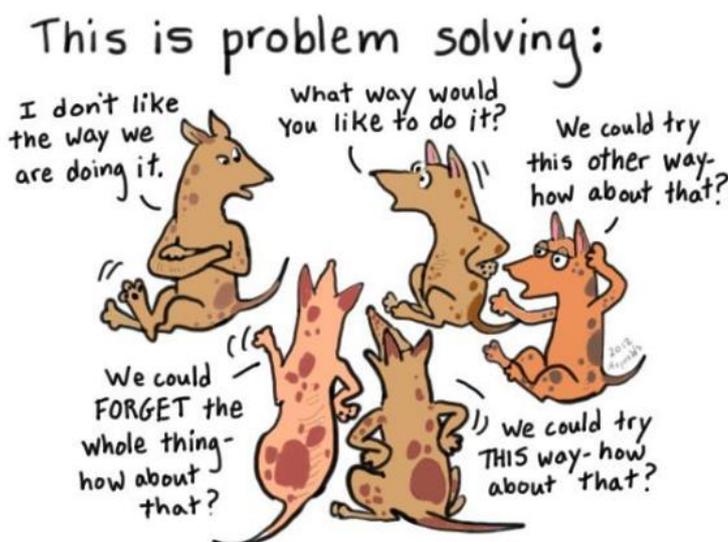
- ⇒ Encourage students to be aware of and attend to various kinds of input, e.g. auditory, visual and tactile.
- ⇒ Model to your students relative thinking by showing them how to use more sources of information in considering if someone is a bad or a good gay.

### Elaboration:

#### Elaborations functions and dysfunctions



### 1. Recognition of the problem and define the problem



CF: Being aware of the problem and be able to recognize the sources of information that are important to see the goal and to solve the problem.

CDF: Not able to define the problem precise and accurate and miss some of the important sources that can be helpful to define the problem.

- ⇒ Let students model to others how they recognize and define a problem.
- ⇒ Make students aware of a good practice: start with an overview over the whole page before you start.
- ⇒ Make students aware of the importance to label everything they see on the page and make relations between the different sources of information.

### 2. Select relevant information

CF: Be able to select and to use the correct and appropriate information that is needed for this specific task and goal.

CDF: Problems to find the main points of a text, having difficulty to find the moral of a story. Not able to select the specific information that is needed for this task.



- ⇒ Ask students to describe the problem, the task, in their own words in order to have the possibility to mediate them if they use irrelevant information or leave out relevant information.
- ⇒ Encourage students to be actively involved in defining problems by analyzing all the information parts systematically and breaking problems and tasks into smaller parts.
- ⇒ Mediate the search for relations or non-relations between information parts.

### 3. Spontaneous comparative behavior



CF: spontaneous search for similarities and differences among items which will lead to the organization and integration of information parts  
 CDF: “episodic grasp of reality”: items are seen as separated, no relation is made between items, difficulty with comparing items and generalizing solutions and goals.

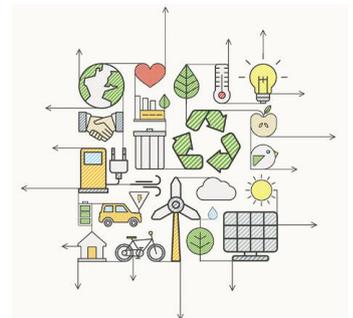
- ⇒ Mediate comparisons by naming them and asking the students to find the relations.
- ⇒ Work with students on relevant and irrelevant characteristics. Let them explain why an item is relevant or is not.
- ⇒ Make students aware of the fact if a characteristics is relevant or not is depending on the task or problem and the goal off that task or problem.

### 4. Mental field

CF: Keep information together, retrieve information from earlier storage, combine different sources of information. Broad and wide mental fields give students the possibility to oversee more ways to solve a problem.

CDF: Not able to use more sources of information. Poor storage of information, bad long term memory. Narrow and limited mental field gives the student the handicap of seeing only one track of solving a problem.

- ⇒ The teacher must provide a larger stimulus: louder, more intense, make use of colors, etc.
- ⇒ The teacher must be sure that the student knows the meaning of what should be memorized.
- ⇒ Encourage the student to explain the information that has to be stored in memory, in his own words.
- ⇒ Make the student aware of the importance of repetition.
- ⇒ Les the student make use of drawings, songs, etc. to memorize.



## 5. Spontaneous summative behavior

CF: spontaneous counting objects, happenings, etc. to organize, to group with the aim of drawing conclusions.

CDF: Unable to summarize data and to organize data in a meaningful way by using numbers, lack of understanding of mathematical concepts.

- ⇒ Teach by mediation mathematical concepts.
- ⇒ Make transfers from mathematical concepts to daily life happenings.
- ⇒ Encourage students to make use of summative behavior.
- ⇒ Model this behavior and mediate the usefulness of it.



## 6. Make clear relations between (virtual) information



CF: Make relations between parts of information by recognizing the relevant parts of information that can be connected in order to find the strategy to solve a problem. Be able to restructure certain combinations. Make virtual relations clear.

CDF: To be unable to see relations between information parts and the inability to restructure relations in order to find an new relations. Inability to recognize virtual relations.

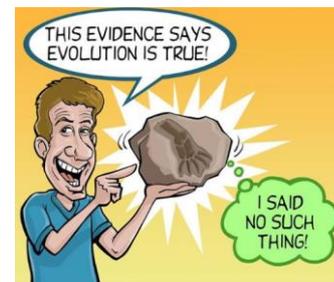
- ⇒ Provide insight and awareness when you mediate looking for new relations and flexible thinking.
- ⇒ Encourage students to share different relations: thinking out of the box.
- ⇒ Allow students to find and to share different ways of reaching a certain goal.

## 7. Search for logical evidence

CF: A need for the search for logical evidence for the way of solving a problem and for finding the solution.

CDF: Accepting a solution without questioning the strategy to solve the problem and the found answer.

- ⇒ The teacher should ask the students to clarify the strategy they have used to solve a problem and the answer they have found.
- ⇒ The teacher can also ask why a certain answer is not correct.
- ⇒ Present controversial topics to the students and allow them to formulate their own opinions giving logical reasons to support their views.



## 8. Internalize information or events



CF: The ability to use stored information, to make relations between other stored items and to manipulate this information and to generalize to a more abstract level.

CDF: The student relies on concrete materials, unable to use more than one source of information and to think in an abstract level.

- ⇒ Mediate always the transfer from concrete to abstract when working with concrete materials.
- ⇒ Encourage students to think about what can happen if....
- ⇒ Encourage reflective thinking.
- ⇒ Emphasize relationships between pieces of information.

## 9. Hypothetical thinking

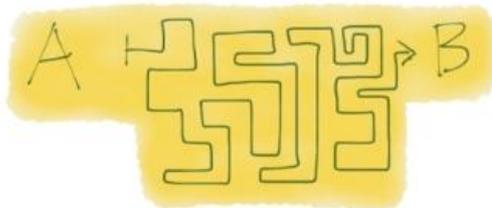
CF: The ability to make valid generalizations and inferences based on experiences or logical thinking.

CDF: Not able to use logical reasoning, to make “if ...then” relations and/or to use the relevant information to formulate a hypothesis.

Theory:



Practice:



- ⇒ Model hypothetical thinking to your students.
- ⇒ Encourage students to formulate different hypothesis.
- ⇒ Ask students to make their thinking processes explicit and to formulate their conclusion in an appropriate way by using the right concepts and the right verbal tools.
- ⇒ Encourage students to use the right “if...then” relations.

## 10. Strategies for hypothesis testing

CF: The student can make use of different strategies to test their hypothesis. They are able to test the right issues and are able to select the relevant hypothesis that have to be tested and to use the appropriate strategy.

CDF: Unable to choose the right strategy, often fixed to one rigid strategy; unable to see what has to be tested and to select the relevant information.



- ⇒ Encourage the student to establish a habit of checking their answers.
- ⇒ Encourage them to verbalize their strategies they use to control their thinking processes.
- ⇒ Model yourself the hypothesis testing you use.
- ⇒ Encourage students who already use good strategies for hypothesis testing to model them to their peers.

## 11. Planning behavior



CF: Ability and the need to plan in the near future, to plan ahead; to make use of systematic planning behavior and work on complex problems in a systematic way.  
CDF: Lack of any planning behavior; no idea and no attention to of what has to come first and what next, not able to order things in a logical way.



- ⇒ Model goal-directed behavior.
- ⇒ Encourage students to break down a complex task in small steps towards a certain goal.
- ⇒ Encourage students to formulate their sub-goals in terms of development instead of goals to achieve.
- ⇒ Encourage students to evaluate their goal-directed behavior, the plan they followed and the learning-steps they took.

## 12. Elaboration of cognitive categories

CF: Ability to use verbal labels that are connected to abstract concepts and underlying principles and elaborate verbally on how gathered data can be organized into relevant categories.

CDF: Lack of correct labels and verbal tools to organize information, to verbalize thoughts and to relate to underlying concepts and principles.

- ⇒ Model thinking out loud.
- ⇒ Encourage students to explain abstract concepts like “love”, etc.
- ⇒ Encourage students to verbalize their problem solving strategies.
- ⇒ Encourage students to verbalize the relations between the different abstract concepts they have used.



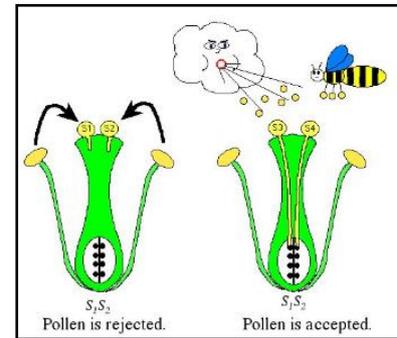


## 2. Make underlying relations visible

CF: Ability to clarify underlying relations between facts and processes by being able to analyzing and show these relations.

CDF: Not being able to discover and see relations between facts and processes by just focusing on what is seen and what is there. Not able to draw visual relationships.

- ⇒ Show the student how to draw relationships with lines, arrows, diagrams, etc.
- ⇒ Encourage the student to make use of statistics, diagrams, etc.
- ⇒ Encourage the student to look for these relations and to explicit them.



## 3. No blocking behavior

CF: Ability to try again despite previous failure; show interest in solving new problems, having a positive attitude towards more challenging tasks.

CDF: Lack of motivations and confidence to start a new, more challenging task; not trying again after failing or/and emotional responses.



- ⇒ Encourage students to make mistakes.
- ⇒ Encourage students to go over wrong and right answers in order to learn from both.
- ⇒ Share controlling behavior with all students in order to make from mistakes a “happy moment of learning together”.
- ⇒ Mediate problem solving behavior.
- ⇒ Model breaking difficult tasks in smaller steps.

## 4. No trial and error behavior

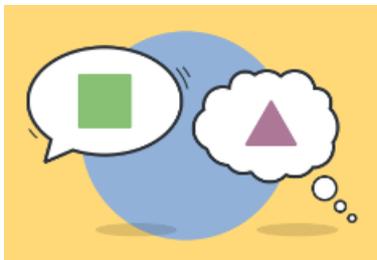
CF: Ability to work systematically and the ability to order a complex task in logical steps to a clear formulate goal.

CDF: Randomly and impulsive guess at answers, not planning any answers, making the same mistakes without learning from them; not goal orientated, no plan to reach a certain goal.



- ⇒ Encourage the student to take enough time to think.
- ⇒ Ask questions after the student had given an impulsive answer in order to let the student use the right strategies to come to the right answer.
- ⇒ Encourage the student to formulate a goal and the steps to take to come there.
- ⇒ Model systematic working and thinking to the student: think out loud when doing that.
- ⇒ Let the student always control the given answer and correct the wrong answer themselves with using the right strategy.
- ⇒ Mediate bridging's and transfer with the used strategies.

## 5. Make use of the correct verbal tools



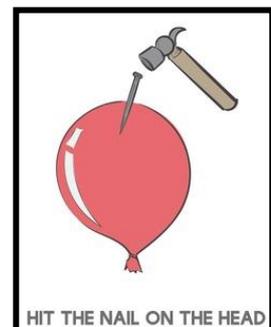
CF: Ability to use the correct words to say what you mean and to give clear and precise descriptions by using the right labels to describe the process.  
CDF: Unable to use the right words to communicate thoughts, pointing instead of using language; using bad sentences and lack of labels in order to formulate clearly.

- ⇒ Determine first what the origin is of the disability. Determine also if it is verbal and written or only one of them.
- ⇒ Model the correct verbal tools by repeating the students sentence in a natural way, without telling the student that it is not correct.
- ⇒ Encourage the student to use language by asking questions and to think out loud.
- ⇒ Encourage the student to read books and articles and to tell others about the content.
- ⇒ Encourage the student to write essays, reports, etc.
- ⇒ Encourage active interests and active verbal participation in subjects of the students interest.

## 6. Be precise

CF: Ability to formulate clear and precise answers.  
CDF: Not able to formulate clear answers, leave out important information and details or put in irrelevant details.

- ⇒ Encourage students to control their answers and to focus on relevant and irrelevant parts.
- ⇒ Give students a text with too much information and give them the task to shorten the text as much as possible.



- ⇒ Encourage the student to make use of study skills to improve accurate communication of gathering information e.g. looking for the main idea, summarizing key words, detailing important facts.
- ⇒ Encourage the student to give arguments why some facts are irrelevant and some are relevant in a text about political issues, newspaper articles, speeches, etc.

## 7. Correct data transport from the elaboration

CF: Ability to transport information correct from the elaboration to the output.  
CDF: Making mistakes in the process of answering. Writing down the wrong answer, using the wrong labels although the correct labels are known.



- ⇒ Encourage the student to take more time for producing the answer.
- ⇒ Make the student aware of the mistake in the process of transporting the information.
- ⇒ Give the student more opportunities to control the given answer.
- ⇒ Encourage the student to take more time to verbalize the correct answer in his head before giving the answer.

## 8. No impulsive behavior

CF: Ability to think before action is taken.  
CDF: Take too less time to overthink an action, an answer, etc. The job is already done before the mind has taken control over the task.

- ⇒ Encourage the student to use “one moment, let my think”.
- ⇒ Model the thinking behavior by thinking out loud.
- ⇒ Encourage the student to put down the pencil until the student is sure about the right answer.
- ⇒ Encourage the student to give logical evidence for his answer before starting to write, or to act.



## Self-Mediation.

### What do I do when I think?

A. Input: Collect information:			
1.	Perception.	I use all my senses (hear, see, feel, taste, smell and balance). So I can collect all necessary information and ensure that everything is clear.	<b>I take the time to observe and investigate.</b>
2.	Systematic search.	I work step by step to avoid that I forget important things, or that I always do the same.	<b>I work systematically.</b>
3.	Label.	I give a name to what I see, hear, feel, smell or taste. What is it? How shall I label it? So it is better to remember and reflect.	<b>Everything has a name.</b>
4.	Make use of spatial concepts.	I find the words to describe where something is located. "Where is it?"	<b>I ask myself "where"?</b>
5.	Make use of time concepts.	I first look if time and sequence are important in my information. I'm looking for words to describe when and in what order it happens.	<b>I wonder: "When and in what order?"</b>
6.	Ability to conserve constancies.	I find out what characteristics of persons, objects and events remain the same, and what might change.	<b>What changes and what stays the same?</b>
7.	Accurate and precise.	I find it necessary to be accurately and careful.	<b>As accurate and precise as possible.</b>
8.	Consider more than one source of information.	I'll add the data from multiple sources together.	<b>What is here and what is there? What should go together?</b>

<b>B. Elaboration: elaboration of the received information:</b>			
9.	Definition of the problemen.	I recognize a problem and describe it clearly.	<b>Is there a problem? What exactly is the problem?</b>
10.	Select relevant cues.	I'm looking at the data I have collected, to the information that is useful. Some clues I do not need to troubleshoot the problem.	<b>What information do I need for this problem? And what data can I ignore?</b>
11.	Compare.	I wonder: What is the same and what is different in the information I have? I compare it with I already knew.	<b>What is the same and what is different? And what did I already know?</b>
12.	Take all information into account.	Did I take everything into account? I keep all the information in my mind.	<b>Do I have all the data together and in the right order?</b>
13.	Summative behaviour	I count how many I have. I make an overview of all information. I keep in mind how far I am in my process of problem solving.	<b>Counting and measuring to know everything.</b>
14.	Project virtual relationships	I ask myself questions like: "Do I recognize this?" And "Is there a connection with something else?"	<b>What makes me think of this?</b>
15.	Logical evidence	I'm wondering: "why is this so? Is this true? " I only accept what I can prove.	<b>First: search for proof.</b>
16.	Internalize events	I form a picture in my head of what I want to achieve and from the information I have.	<b>I can see it in my mind.</b>
17.	Inferential-hypothetical thinking.	I'm considering several options and ask myself again what would happen if ..... I check what I could deduce from this information.	<b>What.....if?</b>
18.	Strategies for hypothesis testing.	I've thought of something, and find ways now to make sure my assumptions are correct.	<b>First check my assumptions.</b>
19.	Planning behaviour	I make a plan of all the steps I should take to achieve my goal.	<b>A good plan is the basis.</b>
20.	Elaboration of cognitive categories.	I wonder, "in what category fits this problem?" "Where do I find the answer?"	<b>Where can I find the solution?</b>
21.	Grasp of reality.	I understand how this information connects things/data in reality.	<b>I see clearly what information goes together in real life.</b>

<b>C. Output: give solutions:</b>			
22.	Express understandable.	I formulate my responses to others so that they are understandable. I move myself in the shoes of the listener.	<b>I care if someone understands me.</b>
23.	Make underlying related links visible.	I try to see connections that I did not immediately discover and bring them to expression.	<b>Is there more than I can see at first sight?</b>
24.	Quietly keep looking.	I stay calm when I do not know how to proceed. I delay my answer and try to find another solution to reach my goal.	<b>Stay calm, there must be a solution.</b>
25.	No trail and error behaviour.	I avoid it to just try one after the other solution until I happen to find by incidence the right solution.	<b>I will not just guess.</b>
26.	Use the right words.	I use the right words to give the solution that I made.	<b>I can explain what I know.</b>
27.	Precise.	Even when giving the answer I need to be as accurate and precise as possible.	<b>I work precise until the end of my task.</b>
28.	Transport.	I keep all information together until I need to give my answer. I make sure my answer is not lost or distorted during the process of transporting it from elaboration to the output moment.	<b>I keep all my information until the end.</b>
29.	Think before you respond.	I do not give my answer impulsively but I take enough time to think about it.	<b>I think before I answer.</b>