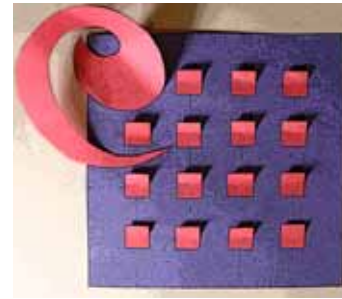


# Learning difficulties and executive functions

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Executive functions are specific brain abilities, and the activities that require them are very frequent. Throughout schooling, the impairment of these functions can significantly reduce the capacity of students to perform

school tasks, to resolve problems, in short, to adjust to the requirements of the school environment, regardless their other intellectual capacities.

At every level of schooling, **certain learning and behavioural difficulties** related to executive dysfunction can be observed among students with neurological impairments. These difficulties are often characterized by:

- a **lack of initiative** due to a lack of planning that may be confused with a lack of motivation or laziness;
- an **ineffective working memory** and poor information management that may be confused or combined with an attention problem;
- a **lack of cognitive flexibility** that may be confused with stubbornness; or
- a **lack of inhibition**, of restraint in their actions, of self-control or of control of their thoughts.

## Manifestations of a lack of initiative

Students are unable to commit to a task, initiate actions toward a goal or plan their work. They may be distracted (they are said to be in their bubble), or else, they might occupy themselves otherwise. They may also disturb others once everyone has started a task following the teacher's explanations. And yet these students know that they have a task to accomplish. They see before them a manual, an exercise book, a

ruler and a pencil, but they don't know what to do or how to go about coordinating all that. They heard the instructions but they do not grasp why or how. These reactions are often mistakenly confused with a lack of interest or laziness.

Samuel has before him a collection of objects to do some mathematical experiments. He is not interested in these objects; he is not seeking to explore, assemble, count, etc. Since these objects are not significant to him and he doesn't know what to do with them, he prefers to use them for another purpose. And yet, he sees his team mates get busy, but it's happening too fast for him, he doesn't know how to get going, toward a specific goal that he has forgotten.

Artchie is in his geography class. After a lesson on identifying the Canadian territories, he must follow a plan to determine the borders and identify the regions. Artchie sees the map in front of him; it looks like lines that make no sense. He does not understand what this represents and doesn't know how to make the link between theory and practice. He doesn't understand the purpose, he is unable to plan the steps, and he doesn't know what material he could use to help himself. He looks lost, but doesn't ask for help, because the very act of asking for help is part of planning the work, and he doesn't know how to articulate it.

## Manifestations of an ineffective working memory and poor information management

Working memory makes it possible to keep in mind various elements that are either retrieved from long-term memory or that have just been proposed. Working memory has a limited "storage" capacity, and to maximize its potential, the information must be synthesized and grouped together and the ideas must be organized in order to reduce the elements that must be retained to perform the task and also to ensure effective long-term encoding.

Antony, a high school student, must read several articles on the floods in Louisiana. He must mentally manipulate several information elements to synthesize them and answer essay questions on the topic. He must therefore establish links between the different texts, group similar items, make contrasts between ideas, etc. He is unable to do this, as there is too much information for him at the same time; at best, he directly draws passages from the texts without establishing any links between them, drawing any general ideas from them, issuing any hypotheses or making any deductions.

Jasmine must resolve a mathematical problem. To succeed, she must keep in mind the people involved in the situation of the problem and target certain numbers and key words that will help her figure out which operation to perform. She must recognize and eliminate any useless information. In addition, she must retrieve from her long-term memory the different algorithms that she will need and the steps to follow. This makes a lot of things to manage.

### **Manifestations of a lack of cognitive flexibility**

Cognitive perseverance is surprising and may have an impact on learning and social relations. A new element or a change in the routine can destabilize students (move, change of schedule, substitute teacher, special outing, visit, etc). A new visual presentation or a new format can make students forget what they used to be able to do, as they are so lost in the new element.

In concrete terms, students have difficulty in going from one activity to another, in putting away books and taking out others or in shifting from one topic to another. They must constantly be brought back to the current situation, as they are still stuck on the previous topic. When they change tasks, they continue to produce answers for the previous task. They have difficulty in changing their opinion or their perception of a concept. For simple or more complex things, and even if there are obvious arguments, they persevere. Likewise, they will have difficulty in correcting themselves when they make an error. They don't see it and they constantly repeat it, as they are unable to modify their actions or their thoughts (like a train that cannot modify its trajectory). They also tend to take things literally; it is difficult for them to understand inferences,

insinuations or jokes because they represent a new way to present words, sounds, expressions, images and ideas.

Charline, in the first year of the second cycle, is answering the last questions on a text about the Inuit. She writes her sentence but with the wrong answer, repeating an item of information heard earlier. Even if the teacher incites her to verbalize the right answer before writing the sentence, she obstinately insists on writing the same wrong answer.

Jason is in his French class, and he must finish a team project for a presentation on food. Halfway through the period, the teacher explains the project that will have to be presented for literature week, and she leaves the students a few minutes to write down an idea. Jason hands in his idea for a project, which consists in writing an advertisement on the foods available at the cafeteria. Within the same period, Jason was unable to conclude the first project and move on to the next one; he got stuck on the first topic about food.

Frédérique is in the sixth grade. She has before her a mathematical problem situation. To get the right answer, she must successfully complete a series of steps, using hints given throughout the text. Frédérique has above-average intelligence and does very well in school. When she finishes, she hands in her answer to the teacher, convinced that it is the right answer. The teacher tells her that it isn't, that she will find some hints in a given place and that she must proceed differently. While everyone around her is working hard on resolving the puzzle, approaching the problem from all angles and trying different ways, Frédérique is unable to imagine another viewpoint. She reads the text again and still stays stuck on the same information. She gives up in the end.

### **Manifestation of a lack of inhibition**

Inhibition is the capacity to restrain a response to a stimulus. When there is a lack of inhibition, it is a manifestation of impulsiveness. In terms of relational behaviour, this can produce inappropriate behaviours depending on the context, gestures that do not respect social conventions or an attitude that may offend the person being addressed. On a motor level, it is action-reaction. From a cognitive standpoint, it is

a predetermined answer to a model question. The student produces an answer without thinking, an answer that is often inappropriate.

Inhibition serves as a filter. Giving an automatic answer that is thought to be right without taking into account all the elements may compromise the correctness of the answer. This can also hinder relations with others, through the expression of inadequate gestures. Paying too much attention to certain details rather than taking a general view often results in being on the wrong track. An impulsive answer eliminates the possibility of adjusting and adapting the answer or behaviour. However, temporarily restraining an idea would prevent the storage of wrong information and make it possible to adjust on the way, return to previous information and establish links: **inhibition allows for cognitive flexibility**. Lastly, precipitating actions and disregarding working steps (or logical order) can generate confusion.

Nicolas is working with a software application where he must manipulate jumbled words to make logical sentences. He sees a few words that he recognizes and immediately starts putting them in the spaces. He quickly confirms his answer, convinced that he has the right one and finds himself very disappointed because he did not succeed. He reacted to the words by establishing links to what he knows or has already heard or to what he believes to be true, or else, he assembled the words two by two without linking them to the overall meaning. He did not consider the instructions, the hints (capital letters and punctuation) or the syntactic organization of the sentence.

André must follow the steps of a science experiment in a predetermined order. He must read the list of ingredients, look for specific materials that are described but not named, and follow the order of the steps. He does not obtain the correct result, especially since he relies on what he hears or sees from his peers and takes ideas here and there without checking.

Mateo functions well in class but at the day-care centre or during recess, he acts impulsively, creates conflicts and always starts over, even after several interventions and consequences. He pushes the boys in the back during play. He

hangs around too close to the girls, enters into their discussions and hugs them. As a result, the children tend to keep away from him, and Mateo experiences these situations as failures.

## Conclusion

The situations chosen as examples are real and were observed among students with neurofibromatosis or Tourette syndrome. Observing these manifestations shows how much more effort these students have to put in to complete a task. Perhaps you recognize yourself or your child in one of these situations? Let's hope that they will help you establish links and identify one or more problems. When difficulties related to executive functions are identified, the next step consists in targeting means and identifying strategies that will help the persons perform their task. These means may be developed in a school intervention plan that will follow the children throughout their schooling. Several strategies are listed in the document from which this text was drawn. This document (in French) is available at the Association. However, if you have any other questions, please feel free to e-mail me at [nf\\_sgt@yahoo.ca](mailto:nf_sgt@yahoo.ca).

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