STUDENTS WITH MOTOR IMPAIRMENTS

LOOKING BEYOND APPEARANCES...

USING EXPERT KNOWLEDGE TO HELP STUDENTS ACHIEVE SUCCESS

Reference Document for Education Consultants

Québec

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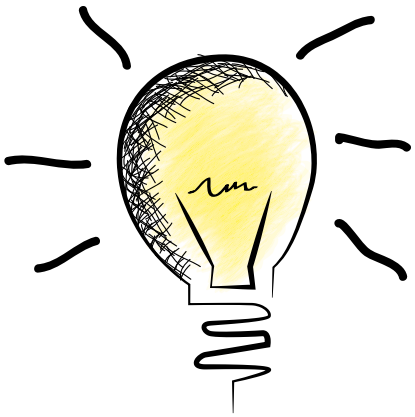
INTRODUCTION

The goal of this document is to equip education consultants so that they are able to provide preschool, elementary and secondary teachers with assistance and guidance in their professional development as it relates to their work with students with motor impairments.

Almost all students with motor impairments are integrated into regular classes, but the teachers concerned have few opportunities to develop their expertise; as a result, they require substantial support. This document is designed to help provide that support, with adjustments for specific educational settings.

How can teachers provide effective support for students with motor impairments without being overprotective or failing to acknowledge their differences? How can they make informed pedagogical decisions to guide these students toward success? Looking beyond appearances, that is, beyond the basic need to change the physical layout of the classroom, how do motor impairments interfere with student learning?

The individualized education plan is presented here as the best way to improve the success of students with motor impairments. The process promotes the development of a comprehensive, long-term vision. It must begin as soon as the students start school. In other words, urgent action is required to maximize the effectiveness of interventions. Schools must remain focused on their mission to instruct, socialize and qualify students in the best possible way.



The individualized education plan is designed to support all phases in the process of reflecting, planning and making decisions concerning interventions for special needs students, especially those with motor impairments. Of course, teachers are not alone; assistance from complementary educational services is crucial at all phases.

Part One of this document is intended to clarify the meaning of "motor impairment." It focuses on the characteristics of motor impairments that have repercussions for student learning, rather than on the medical aspects. Part Two discusses the importance of developing a comprehensive, long-term vision to guide these students along the path to success. Part Three looks at how to respond to student needs with differentiated instruction, and Part Four presents various ways to support teachers.

This document can be used to support teachers individually or as a group.

GAINING A BETTER UNDERSTANDING OF STUDENTS WITH MOTOR IMPAIRMENTS

When teachers learn that their class will include a student with a motor impairment, they are bound to wonder how that student will differ from the others. Which specific characteristics of the motor impairment will affect the student's learning? Which aspects will require the teacher's attention?

Part One of this document is designed to answer these questions.

1. GENERAL INFORMATION

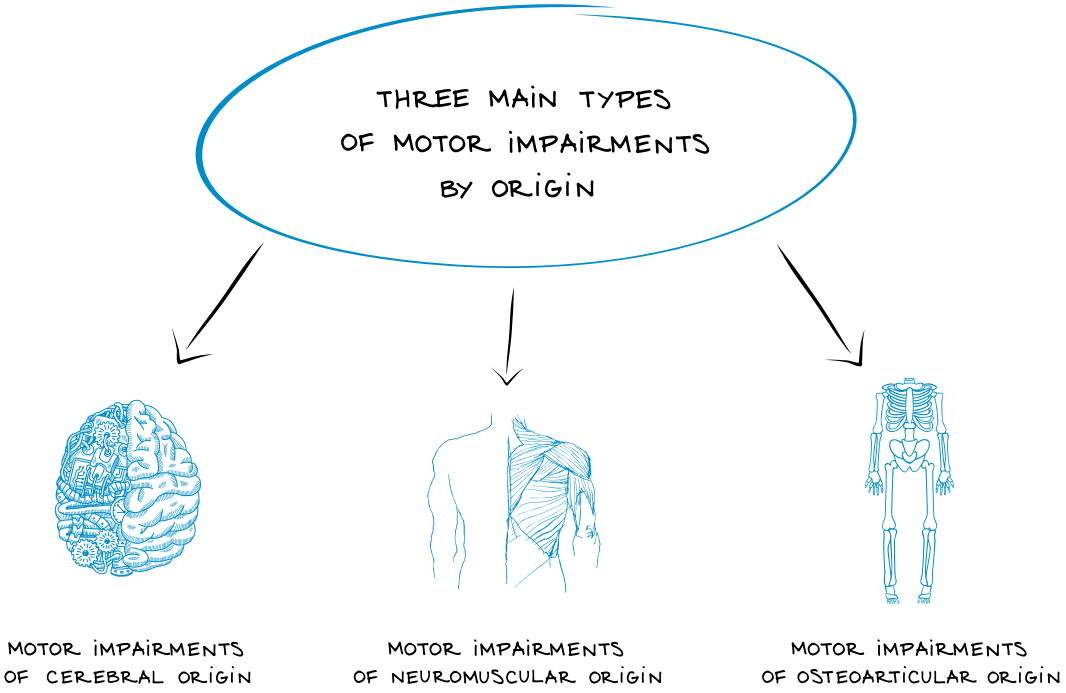
DEFINITION

According to the document *Organization of Educational Services for At-Risk Students and Students with Handicaps, Social Maladjustments or Learning Difficulties,* published by the Ministère de l'Éducation, du Loisir et du Sport, "Students are deemed to have a . . . motor impairment when . . . a neuro-motor examination shows that they have one or more nervous, muscular or osteoarticular disorders that affect their movements."[1]

1. Québec, Ministère de l'Éducation, du Loisir et du Sport, *Organization of Educational Services for At-Risk Students With Handicaps, Social Maladjustments or Learning Difficulties* (Québec, 2007), 15 and 18.

TYPES OF MOTOR IMPAIRMENTS

There are many different types of motor impairments, forming a diverse group of conditions that can be defined in a variety of ways. The following diagram distinguishes between impairments based on their origin.



Searching for and using Web-based information

Many Web documents and sites provide information on each type of motor impairment, but it is important to select reliable sources. The most important thing is to look primarily for information on the cognitive characteristics of motor impairments and their repercussions for student learning.

Remaining attentive . . .

It is important to remember that information from the Web is general information applicable to all possible situations, and may not be relevant to the situation of a specific student.

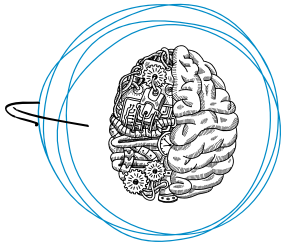
IN OTHER WORDS, EACH SITUATION IS UNIQUE!

MOTOR IMPAIRMENTS OF CEREBRAL ORIGIN

Motor impairments of cerebral origin result from "very early lesions of brain structures . . . or from later damage from brain trauma, cerebrovascular accidents or brain tumours."[2]

The main motor impairments of cerebral origin are:

- cerebral palsy
- Friedreich's ataxia
- cranial trauma

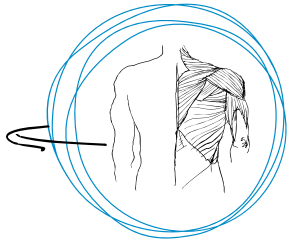


MOTOR IMPAIRMENTS OF NEUROMUSCULAR ORIGIN

Motor impairments of neuromuscular origin originate "within the motor nerve cell, the nerve, or the muscle, [and] the most commonly experienced symptoms . . . are varying degrees of muscle weakness and wasting."[3] "These disorders vary according to characteristics such as pattern of inheritance, origin of the genetic mutation, incidence, symptoms, age of onset, rate of progression, and prognosis."[4]

The main motor impairments of neuromuscular origin are:

- Duchenne muscular dystrophy
- myotonia congenita
- myotonic dystrophy (Steinert's disease)
- spinal muscular atrophy

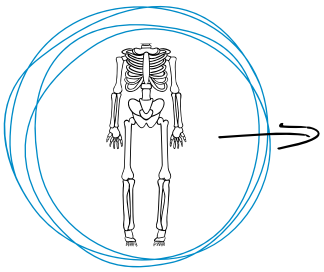


2. Ministère Éducation Nationale, *Guide pour les enseignants qui accueillent un élève présentant une déficience motrice* (Paris: Handiscol, 2001), 5 [*translation*]. http://www.integrascol.fr/documents/guide%20Handiscol%20H%20motrice.pdf.
3. Muscular Dystrophy Canada, *A Guide to Neuromuscular Disorders* (2007), 12. http://www.muscle.ca/fileadmin/National/Muscular_Dystrophy/Disorders/Guide_to_NMD.pdf.
4. *Ibid.,* 18.

Because of the progressive nature of these motor impairments, schools must be careful not to transmit medical information of which the student is not aware (e.g. concerning the progression of the disease). Some pedagogical adjustments may be required in difficult periods of transition for the student. For example, a teenager who experiences a major loss of muscle strength may become unhappy and rebellious, and be less academically motivated for a certain time. Where this is the case, the pedagogical requirements may be reviewed and support may be offered to help the student get through this difficult period.

MOTOR IMPAIRMENTS OF OSTEOARTICULAR ORIGIN

Motor impairments of osteoarticular origin may be due to: a malformation (missing or abnormal limb, joint malformation), a bone formation disorder, rheumatic lesions (rheumatoid arthritis), infectious lesions (osteitis), rachidian deviations (scolioses and cyphoscolioses), accidents resulting in amputation, and, in the case of hemophiliacs, intra-articular hemorrhages.[5]



The main motor impairments of osteoarticular origin are:

- congenital malformations
- spina bifida
- amputations
- juvenile rheumatoid arthritis

5. *Guide pour les enseignants qui accueillent un élève présentant une déficience motrice,* 10. http://www.ac-grenoble.fr/ash38/IMG/pdf/guide_eleves_deficients_moteurs_116356.pdf.

2. SPECIFIC CHARACTERISTICS OF MOTOR IMPAIRMENTS THAT HAVE REPERCUSSIONS FOR STUDENT LEARNING

Some specific characteristics are associated with all types of motor impairments. Some are inherent to the motor impairment itself, while others are consequences of it. In both cases, however, it is extremely important to take them into consideration in order to provide the student with more effective support in the learning process. Awareness of these specific characteristics can prevent teachers from making incorrect assumptions when interpreting the presence or absence of certain difficulties or behaviour. Instead, they are able to analyze each situation more accurately, and the resulting understanding of each student's specific circumstances will ensure that support is tailored to his or her needs.

SPECIFIC CHARACTERISTICS ASSOCIATED WITH MOTOR IMPAIRMENTS

2.1 Motor disabilities and different or limited motor experience

2.2 Greater dependency on other people

2.3 Frequent cognitive disorders

2.4 Uneven progress in terms of the student's awareness of his or her difference and limitations

2.5 A relatively precarious state of health that may affect learning

2.6 Slower assimilation of the rules when the student starts school

2.1 MOTOR DISABILITIES AND DIFFERENT OR LIMITED MOTOR EXPERIENCE

The motor capabilities of a student with a motor impairment differ from those of other students. The differences are obvious at an early age, and despite medical progress, some disabilities are permanent. As a result, some of the student's motor experiences are either delayed or never occur. These motor disabilities may limit access to certain environments; in this case, the student's experience of those environments will be limited or non-existent. In addition, students are often required to apply their motor potential when acquiring and demonstrating learning, leading to daily repercussions for students with impaired motor skills.

Different motor capabilities include:

- fine motor difficulties
- gross motor difficulties
- small range of motion
- great muscle weakness
- paralysis
- physical disability affecting spoken language or major speech disorder
- slow performance
- extreme tiredness

Disability or limitation →	Impact on life experience →	Impact on learning or participation in the classroom
Fine motor skills	Difficulty holding a pencil, lack of scribbling experience	Difficulty writing
Fine motor skills	Poor coordination, lack of experience using building blocks and handling small objects	Difficulty handling materials in math and science
Gross motor skills	Motor limitations, lack of experience in certain activities (camping, bouncing on inflatable structures, using a swing, etc.)	Limited knowledge of vocabulary associated with these activities, difficulty talking or writing about the topic
Speech	Major speech disorders, less feedback from other people to adjust the pronunciation of certain common words	Difficulty spelling certain common words for which the student's pronunciation has never been corrected

2.2 GREATER DEPENDENCY ON OTHER PEOPLE

Although it is legitimate to consider that a child with a motor impairment needs more protection, there is a risk that educators will overestimate this need and be overprotective of the child.

EXAMPLES

- A teacher may ask the students to place the materials for a task on their desks, but takes for granted that a student with a motor impairment will not be able to do so, and does it for the student without asking.
- During a team project, other students may rush to write down notes instead of allowing the student to do it.
- A teacher may inquire after a student by addressing the person who is with the student, even though the student is fully able to answer.
- Other students may treat a student with a motor impairment as though he or she were younger than his or her actual age; for example, they may hold the student's hand, cuddle him or her during recess or applaud when he or she manages to stay still for a school photograph.

2.3 FREQUENT COGNITIVE DISORDERS

The cognitive disorders associated with certain motor impairments are increasingly well-documented. These disorders are often linked to cerebral lesions, and affect some, but not all, cognitive skills; this is referred to as cognitive heterogeneity.

Awareness of the nature and frequency of these disorders, in connection with a specific motor impairment, helps teachers to adopt a preventive approach and make hypotheses concerning the difficulties observed. A cognitive assessment by the school psychologist will specify the exact nature of the disorder and identify the student's cognitive strengths and capabilities, along with the best differentiated instructional strategies to help the student succeed. It is important to note that cognitive assessments may be challenging for some students with motor impairments because of their handling or speech difficulties.

It is important to emphasize that each situation is unique:

- Cognitive disorders are frequent, but are not associated with all motor impairments.
- Disorders are frequent for a number of motor impairments, but are not always present in all cases.

The most frequent cognitive disorders are:

- visuospatial disorders and motor dyspraxia
- attention disorders
- executive function disorders
- memory disorders

Some school staff members may lower their pedagogical requirements because of a student's motor disabilities, believing that there is necessarily a link between physical and intellectual ability. In these cases, it is essential to distinguish between motor potential and intellectual potential. A student's cognitive disorders must be documented, and the maximum development of the student's intellectual skills should always remain the key focus.

IT IS EXTREMELY IMPORTANT TO KEEP ABREAST OF RESEARCH FINDINGS IN ORDER TO ENSURE THAT SCHOOL STAFF BENEFIT FROM NEW KNOWLEDGE THAT WILL HELP THEM MAKE THEIR INTERVENTIONS MORE EFFECTIVE.

Cognitive disorders	Examples of difficulties in learning situations	Risks for educational success
Visuospatial disorders (disorders connected with neurovisual and spatial functions)	The student: • skips words or lines when reading • counts certain objects twice, or fails to count other objects • has difficulty aligning figures based on the algorithm rules • has difficulty constructing geometric forms • has difficulty tracing letters and numbers	• In reading, the student may lose the meaning of what is being read because he or she is concentrating on gathering information; this may lead to an assumption that the student has reading comprehension difficulties. • In mathematics, the student may make technical calculation errors; this may lead to an assumption that the student has failed to understand mathematical concepts.
Motor dyspraxia (a motor programming disorder, resulting in varying degrees of difficulty in planning and executing intentional actions)	• Learning to write can be a laborious process. • Written productions are sometimes illegible and the quality of the handwriting tends to fluctuate. • Learning to use mathematical tools (protractor, compass, ruler, etc.) is very difficult. • The student is clumsy at sports.	• The student concentrates on the motor and sequential aspects of writing each letter, and focuses less on the writing process. • Fluctuations in writing tasks or other fine motor tasks may give the impression that the student is not trying hard enough.

Cognitive disorders	Examples of difficulties in learning situations	Risks for educational success
Attention disorders Attention disorders are connected to "the selection of information, attention and focusing, use of attention-related resources in concentration and effort, resistance to being distracted, flexible and consistent control of activity, variations in attention-related efficiency during the day or over a long period.[a]"	The student: • has difficulty getting organized and may lose objects, etc. • is easily distracted by environmental stimuli • makes careless mistakes • has difficulty remaining focused on a task	• Some behaviour could be interpreted as a lack of willingness or motivation on the part of the student. • Some teachers could be tempted, unwisely, to use breaks such as recess or classes such as Physical Education and Health to give the student time to finish the work. This does not fulfill the student's need for breaks between work periods.
Executive function disorders "The 'executive functions,' which are involved in many aspects of cognition, include all the functions required to control and carry out new, non-automatic, complex tasks. They manage the operations that allow for the action to be implemented and controlled.[b]"	The student: • has difficulty solving problems • has difficulty completing two tasks at the same time • has difficulty moving from one activity to the next	• The student may not work on a task independently because of his or her difficulty in planning the stages. • The student may have to read the instructions for a task several times. • The student may resist a change in strategy when the initial situation is modified.
Memory disorders (episodic declarative memory, more specifically "didactic knowledge" and/or working memory)	The student has difficulty with: • numerical facts and operational tables • spelling • "encyclopedic" knowledge • reading comprehension	• Some epilepsy medication may cause memory problems. • Students who have suffered craniocerebral trauma may find it hard to locate, process and reuse new information.

a. Michèle Mazeau, *Neuropsychologie et troubles des apprentissages* (Paris: Édition Masson, 2005), 202 [*translation*].

b. For further information on executive functions, see Christina Rogan, "Les fonctions exécutives," Neurologie.com, vol. 2, no. 7, September 2010, at neurologie.com: http://www.jle.com/fr/revues/medecine/nro/e-docs/00/04/60/82/article.phtml.

2.4 UNEVEN PROGRESS IN TERMS OF THE STUDENT'S AWARENESS OF HIS OR HER DIFFERENCE AND LIMITATIONS

Young children with motor impairments soon observe differences between their own physical abilities and those of other children; for example, they may be unable to do the same things, or to complete their own projects. They may become upset or angry as a result. The progress they make in their own awareness of their difference and limitations varies from child to child, but it is often a long and difficult path.

It can often be hard to establish "peer to peer" interpersonal relations when one of the students is physically dependent. Students with motor impairments are often embarrassed by the inconvenience they cause to other people; for example, they may feel badly about their slowness, speech problems or clumsiness.

Students with a progressive disease, and their families, have an even more difficult path to follow. Mourning the loss of motor capabilities may relegate educational success to second place, at least for a certain time. However, their interest in learning, which they may regard as compensation for the loss of motor capabilities, may return and, in some cases, become even stronger. Empathy and support are essential in the periods when the disease is most obviously gaining ground.

An effort to make other students aware of the situation, with the agreement of the affected student and his or her parents, may help to make the student feel more comfortable and better understood, and provide ongoing support.

EXAMPLES

- Despite trying hard, a student may hold a team project back and feel uncomfortable as a result.
- A student may always be the last person chosen for a team, and may feel upset as a result.

2.5 A RELATIVELY PRECARIOUS STATE OF HEALTH THAT MAY AFFECT LEARNING

Some types of motor impairments require frequent medical monitoring. For example, some students with progressive diseases have reduced respiratory capacity, while others cannot feel pain and are more vulnerable to bone fractures or injury. In other cases, surgery may be a source of anxiety and cause students to be absent from school. Physical discomfort may prevent a student from paying attention and using all his or her cognitive resources. During periods of absence, or periods when learning is more difficult, the school must provide regular monitoring and appropriate pedagogical support to avoid "gaps" in the student's learning. To continue with his or her learning, the student must be able to make connections and rely on a strong and continuous process.

EXAMPLE

A student has major surgery coming up and, like her parents, is very anxious. She has trouble paying attention in the classroom.

2.6 SLOWER ASSIMILATION OF THE RULES WHEN THE STUDENT STARTS SCHOOL

Children with motor impairments receive physical rehabilitation care from an early age, and are in frequent contact with the rehabilitation team. Throughout their early childhood, they bond with "their" therapist, who provides guidance, physical proximity, personalized instructions and attention when requested, in a calm and spacious setting. Their experience during rehabilitation, combined with the fact that they are less familiar with the realities of daycare, may mean that they find it hard to assimilate the school rules. This can lead to a lack of attention or collaboration, and may be detrimental to their learning. However, if they receive help in understanding the rules, they will be able to adjust quickly to the school environment.

EXAMPLES

- In a kindergarten class, a student does not feel concerned by what the teacher says to the group.
- A young student asked to complete a task alone does not know where to start.
- A student tries to create a “bubble” with the teacher or assistant, even after being at school for several years.
- A student is much more comfortable with the teacher or assistant but fails to develop relationships with other students.

IN BRIEF

Students with motor impairments are both similar to and different from other students.

It is possible to get to know them and their differences by becoming familiar with:

- the different types of motor impairments
- the specific characteristics associated with motor impairments and their repercussions for learning:
  - motor disabilities and different motor experiences and their impacts on a student’s learning or classroom participation
  - greater dependency on other people
  - the possibility of cognitive disorders associated with a motor impairment
  - uneven progress in terms of the student’s awareness of his or her difference and limits
  - a potentially precarious state of health
  - slower assimilation of the school’s rules, which are very different from the rules that apply during physical rehabilitation

DEVELOPING A COMPREHENSIVE, LONG-TERM VISION

Questions will begin to emerge when a student is in preschool, and will continue to arise throughout Elementary Cycle One. In each case, important decisions with long-term impacts must be made. The ongoing process of the individualized education plan is used to help students progress in their learning, and provides an opportunity to discuss issues, objectives, possible choices and their long-term consequences. Only a comprehensive, long-term vision will ensure that the "right decisions" are made over time, providing support up to the end of secondary school and giving the student an opportunity to succeed. By taking a long-term view, the consequences of certain choices that appear advisable in the short term, but that may prove disadvantageous in a broader context, can be placed in perspective and compared. This reduces the risk of expending energy on short-term objectives, and also of wasting time, failing repeatedly and making unsatisfactory progress despite the often enormous efforts made by everyone concerned. Teachers, like parents and the students themselves, often need support in order to take a long-term view.

Continuity ensures long-term consistency. Providing information at the start of each new school year, and especially when a student moves from elementary to secondary school, or from school to adult life, is crucial. It is extremely important for everyone concerned to meet and prepare these transitions carefully. Knowledge of the rules governing the certification of studies, from the start of elementary school, will mean that it is easier to make informed decisions that will increase the likelihood of a student earning a Secondary School Diploma. These decisions must be reviewed throughout the student's school career to ensure that he or she progresses as realistically and as far as possible.

3. HELPING STUDENTS ACQUIRE SKILLS THAT WILL COMPENSATE FOR THEIR DIFFICULTIES

Students with motor impairments, because of poor fine motor skills, slow performance, muscle weakness, extreme tiredness, paralysis or reduced range of motion, are at a disadvantage in some learning situations, compared with other students. However, they may be able to compensate for this by acquiring certain skills.

It is therefore extremely important to help students acquire these skills, as soon as possible and over the long term, so that they can become as effective as possible in learning situations. Planning the methods that will be used to acquire and develop these skills over time is crucial to ensure that subject-specific learning is not compromised or delayed.

3.1 EFFECTIVE ORAL COMMUNICATION

It is important to help students with motor impairments acquire and develop oral communication skills so they can express themselves clearly, accurately and effectively. For example, when they are unable to do a task themselves, they must be able to explain what they want, give clear instructions, and help another person perform the task for them. The student is in charge: he or she verbalizes what needs to be done and another person performs the task.

EXAMPLE

Explain to another person (student, classroom assistant, teacher) how to draw an axis of symmetry for a geometric figure.

If a student is able to communicate effectively, the teacher can use oral communication as a method to complete certain tasks. This can save both time and energy and increase the opportunities for consolidation of learning. The student can verbalize the learning process, which is an excellent way to acquire and demonstrate learning.

It is hard for the student's assistant to remain impassive, but this is the only way for the student to take responsibility for his or her own successes and failures. This must become a habit to ensure that:

- the student learns to risk being wrong, like other students
- the teacher is able to observe what the student can do, and the type of mistakes he or she makes
- the teacher can give feedback that matches the student's needs
- the pedagogical evaluation provides an accurate picture of what the student has learned

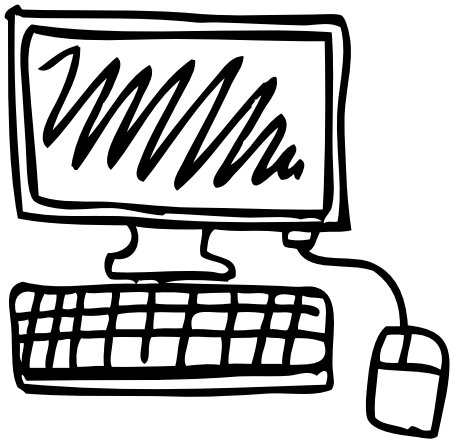
Starting with the proposals made in the Québec Education Program, the teacher can provide assistance to help students develop oral communication competencies and ensure that:

- the student gets to the point: if needed, the teacher can help the student to reformulate
- the student is proficient in the vocabulary specific to each subject: the teacher explains that the student must express himself or herself clearly so that the teacher can determine if the student has acquired the targeted learning and has understood it; the teacher models frequently, suggests a better word or expression, and so on
- oral work is an effective alternative: the teacher uses it regularly to help the student improve

3.2 USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

Schools must establish the best possible techno-pedagogical environment to help students develop their competencies in the field of information and communication technologies (ICT).[6]

"The best possible techno-pedagogical environment comprises the computer hardware, human resources and educational resources available to the student. This environment is at the service of the student's learning and success. It becomes the 'best possible' environment for the student through realistic consideration of the constraints, limitations and potential of the human, pedagogical and technical resources available, including the student himself or herself."[7]



6. Nicole Lachance, *Un environnement techno-pédagogique optimal pour les élèves du premier cycle du primaire présentant des difficultés de motricité fine.* Pedagogical development and expertise development project (Measure 30054), Direction de l'adaptation scolaire et des services complémentaires, Ministère de l'Éducation du Québec (Québec: Gouvernement du Québec, 2004) [*translation*], http://www.recitadaptscol.qc.ca/ecrire/FCKFiles/File/etpo/projet.html. [Resources can be found in English at http://learnquebec.ca/en/content/pedagogy/insight/intech/assistive_technology/index.html].
7. *Ibid.,* 2 [*translation*].

The creation of a technico-pedagogical environment is based on the following elements:

3.2a A detailed analysis of the student's abilities and motor impairments

3.2b The belief that "the computer is both a tool and a resource for the student"[8]

3.2c Various guiding principles, including:

- developing the student's ICT competencies as soon as possible
- helping the student to become proficient in using ICT
- establishing procedures for cooperation between the various people concerned
- targeting efficiency

3.2A DETAILED ANALYSIS OF THE STUDENT'S ABILITIES AND MOTOR IMPAIRMENTS

Some choices may be hard to make. Is it better to invest time and energy to learn handwriting, use compensatory tools to sidestep the problem, or plan both types of learning? Only the individualized education plan can shed light on the question. It is important to balance the effort required and the pace of the student's anticipated success with the student's success factors over the short, medium and long term.

3.2B BELIEF THAT "THE COMPUTER IS BOTH A TOOL AND A RESOURCE FOR THE STUDENT"[9]

"It is a way to consult different documentary sources, to produce, to create and to communicate . . . transforming the student into the principal artisan of his or her learning . . . ."[10] For the student, "information and communication technologies can accelerate the development of many cross-curricular and subject-specific competencies in the Québec Education Program."[11]

8. *Ibid.,* 5 [*translation*].
9. *Ibid.,* 5 [*translation*]. http://www.recitadaptscol.qc.ca/ecrire/FCKFiles/File/etpo/projet.html.
10. *Ibid.,* 5 [*translation*].
11. Québec, Ministère de l'Éducation, du Loisir et du Sport, *Québec Education Program: Preschool Education, Elementary Education, Approved Version* (Québec, 2006), 28.

Technological tools to compensate for the learning difficulties of a student with . . .

- major motor difficulties
- slow motor execution
- extreme tiredness
- great muscle weakness
- small range of motion
- visuospatial disorders

EXAMPLES

- Computers can be used to consult electronic documents (dictionary, grammar guide, etc.), allowing the student to save time, be more independent and expend less physical effort.
- Computers can be used instead of handwriting to draw geometric shapes, record the steps in a problem-solving process, etc.
- Computers can be used with text to draft, correct, insert, erase, underline, etc.

3.2C GUIDING PRINCIPLES

Developing the student's ICT competencies as early as possible

Students with motor impairments need to begin using computers as soon as they start school, and the school must therefore develop their ICT competencies quickly. This preventive approach is intended to promote equality of opportunity, a key factor for the success of students with motor impairments.

Special tools, such as magnetic materials, offer an alternative to writing, while allowing the student to become proficient in using technology and giving him or her the opportunity to acquire and demonstrate learning from preschool onward.

Helping students become proficient in using ICT

- Plan for the required computer equipment:
  - Select equipment to match the student's learning needs:
    - The equipment must perform at a level that matches the student's learning needs: it is not necessary for it to perform at the highest possible level. The equipment should be selected as part of a joint approach, described on the Web site *RÉCIT national en adaptation scolaire.*[12]
    - Software functions that are adaptations and those that are modifications must be clearly defined. The distinction between an adaptation and a modification is made in the *Guide on the introduction of technologies to special needs students*, prepared by the Comité de développement régional TIC-EHDAA des régions de la Mauricie et du Centre-du-Québec.[13]
  - Select equipment that is as close as possible to the equipment used by other students and friends.
  - Select open, versatile software that the student will be able to use for several years.
  - Give priority to free software[14] so that the student can also use it at home.
  - Take into consideration the time needed to become proficient in using the software, and the ease of use; it is best to select only a small number of tools.
- Give the student enough time to concentrate exclusively on becoming proficient in using ICT so that his or her cognitive resources are used essentially to meet the cognitive challenge of the pedagogical task. Plan other means during this period to ensure that the student's subject-specific learning is not delayed.
- Use the *ICT notebook*[15] to support the learning process.
- Make sure the student can locate letters quickly on the keyboard. (A simple, effective method can be found in the Appendix.)
- Make sure the student has become proficient in using word processing software.
- Provide the student with quality feedback.

12. http://www.recitadaptscol.qc.ca/spip.php?article42.
13 http://www.learnquebec.ca/export/sites/learn/en/content/pedagogy/insight/intech/documents/Assistive_Technologies_document_2012_EN.pdf.
14. http://www.motricite.recitmst.qc.ca/.
15. http://www.recitadaptscol.qc.ca/ecrire/FCKFiles/File/etpo/documents/CarnetTIC.pdf (in French only).

- Have realistic expectations: despite its potential, technology will not meet all the student's adaptation needs, so it is important to determine in which situations it will be used, and also to plan other methods of adaptation.
- Plan for gradual use in the classroom, based on a range of parameters: the student's ICT competency, the duration of the task, the legibility of the student's handwritten texts, and the possibility of accessing reference tools.

Establishing procedures for cooperation between various partners

Even before students with motor impairments start school, an occupational therapist will have introduced them to ICT. Throughout their time at school, various educators will be involved in helping them to become proficient with ICT. It is extremely important that a procedure be established to transmit information on their level of proficiency with ICT, and that choices be made jointly:[16]

- The child's educators and occupational therapist:
  - Plan a procedure to inform educators about occupational therapy work completed before a child starts school.
  - Use the *ICT notebook*[17] as a tool for communication between the school and the rehabilitation centre.
  - Verify whether the student's situation requires the establishment of an individualized, intersectoral services plan (IISP).

Any sharing of information between the health and social services sector and the education sector must comply with the recommendations made in the document entitled *Concilier le respect de la confidentialité et le partage de l'information*.

- Teacher and classroom assistant, if any:
  - Introduce joint procedures for the student's educational program and the gradual use of computers in the classroom, in a way that is consistent with the expertise and mandate of each person.

16. http://www.recitadaptscol.qc.ca/spip.php?article42.
17. http://www.recitadaptscol.qc.ca/ecrire/FCKFiles/File/etpo/documents/CarnetTIC.pdf (in French only).

Targeting efficiency

Remain vigilant when selecting processes for the student to learn; select only those that are the quickest and most efficient.

4. PROMOTING THE DEVELOPMENT OF EFFECTIVE WORK METHODS

A student's motor impairments have a major impact on his or her effectiveness in completing academic tasks. "Planning work to be done, ensuring that it is done on time, taking into account various obstacles, locating the available resources, and gathering the required materials are all aspects of what it means to be effective in doing work or carrying out activities."[18] For students with motor impairments, completing the work to be done is a special challenge, because of their slow motor execution, impaired motor skills and the motor energy needed to perform the task. For these students, it is extremely important to aim for maximum efficiency; in other words, producing maximum results with minimum expenditure of effort[19] is crucial because the students need to save their physical energy and compensate for their slowness through strict management of their time.

An adult who was left with a motor impairment following an accident has this to say about his new working methods: "I think about everything in advance. I get organized, I use my brain. I think first. You learn to evaluate . . . ." "Now, I need to be careful about what I'm going to do. I have to think: this first, this second, and this third."[20]

Good work methods can help students to become substantially more effective at completing tasks. If they are able to anticipate the effectiveness of a given method, they can select the most appropriate one for the context. By applying initiative, creativity and resourcefulness to find the most effective ways of completing tasks, they learn to take their own limitations into account and achieve their goals.

18. Québec, Ministère de l'Éducation, *Québec Education Program: Secondary Education, Cycle One* (Québec, 2004), 44.
19. Paul Robert, *Le Nouveau Petit Robert* (Paris, 1993), 721.
20. Jean-François Ravaud, *Insertion sociale des personnes handicapées: Méthodologie d'évaluation* (Paris, CTNERHI-INSERM, 1994) [*translation*].

Using the tools proposed in the Québec Education Program for the cross-curricular competency "Adopts effective work methods," the teacher can help students to:

- start working as soon as the instructions have been given
- be aware of the effectiveness of certain strategies for learning (for example, listening carefully in the classroom, doing homework regularly, frequently reviewing course notes)
- organize information in a more efficient way (for example, by making summaries or outlines, underlining important passages, using key words)
- use various tools to plan their work more efficiently, setting deadlines that match their own pace (for example, agenda, memory aid, checklist of things to do, short but frequent periods to complete homework)
- better organize their work tools, including management of their electronic files (for example, carefully selecting the materials to be used and laying them out properly on the desk, organizing books and binders logically, creating electronic files)
- use the most time-efficient method to respond, where appropriate (for example, using captions, colour codes, abbreviations of words and sentences, highlighting of answers in the text)
- listen carefully to the teacher's instructions when switching tasks

5. PROMOTING THE DEVELOPMENT OF STUDENT AUTONOMY

"Learners, autonomous learners, that is, are expected to assume greater responsibility for, and take charge of, their own learning."[21]

Further information is available in Appendix B, "Developing Student Autonomy."

21. Dimitrios Thanasoulas, "What Is Learner Autonomy and How Can It Be Fostered?" *Karen's Linguistics Issues*, December 2002, http://iteslj.org/Articles/Thanasoulas-Autonomy.html.

THE AUTONOMY OF A STUDENT WITH A MOTOR IMPAIRMENT IS MORE LIKELY TO BE DEVELOPED IN THESE SITUATIONS:

5.1 WHEN THE STUDENT IS EXPECTED TO TAKE ON AS MUCH RESPONSIBILITY AS OTHER STUDENTS

- Choosing academic materials to take to science class
- Managing a school agenda

5.2 WHEN AUTONOMY IS DEVELOPED DURING ALL SCHOOL SITUATIONS

This applies equally to functional autonomy, autonomy in learning situations and autonomy in socialization situations.

5.3 WHEN THE STUDENT MUST ACCEPT THE CONSEQUENCES OF HIS OR HER ACTION

The student is helped by a classroom assistant to prepare his or her school bag, but forgets to request that the math notebook be placed in the bag for homework. The consequence is the same as for any other student.

5.4 WHEN AUTONOMY OF EXECUTION IS NOT CONFUSED WITH DECISION-MAKING AUTONOMY

Autonomy of motor execution is often compromised in the case of students with motor impairments, but there is also a danger of undermining their decision-making autonomy, for example, by not giving them an opportunity

to make their own decisions. It is not always easy to do something on someone's behalf without also thinking and deciding for them. Constant vigilance is needed to avoid pointing out mistakes or speeding up an exercise by making decisions for the student. If teachers are to be able to support the student on a daily basis, they must be aware of the different elements that constitute autonomy.

5.5 WHEN THE LEVEL OF SUPPORT IS PROPERLY DEFINED AND PLANNED

- Assistance helps students to remain as autonomous as possible.
- The nature of the assistance required is clearly defined, along with the situations in which it is, or is not, required.
- The student is an active participant in decisions about "why" and "when" the assistance is required.

5.6 WHEN THE STUDENT CONCERNED AND HIS OR HER CLASSMATES ARE ENCOURAGED TO ADOPT ATTITUDES THAT FOSTER THE DEVELOPMENT OF AUTONOMY

In their haste to help a classmate with a motor impairment, the other students run the risk of becoming over-protective. They must be helped to acquire attitudes that promote the development of their classmate's autonomy:

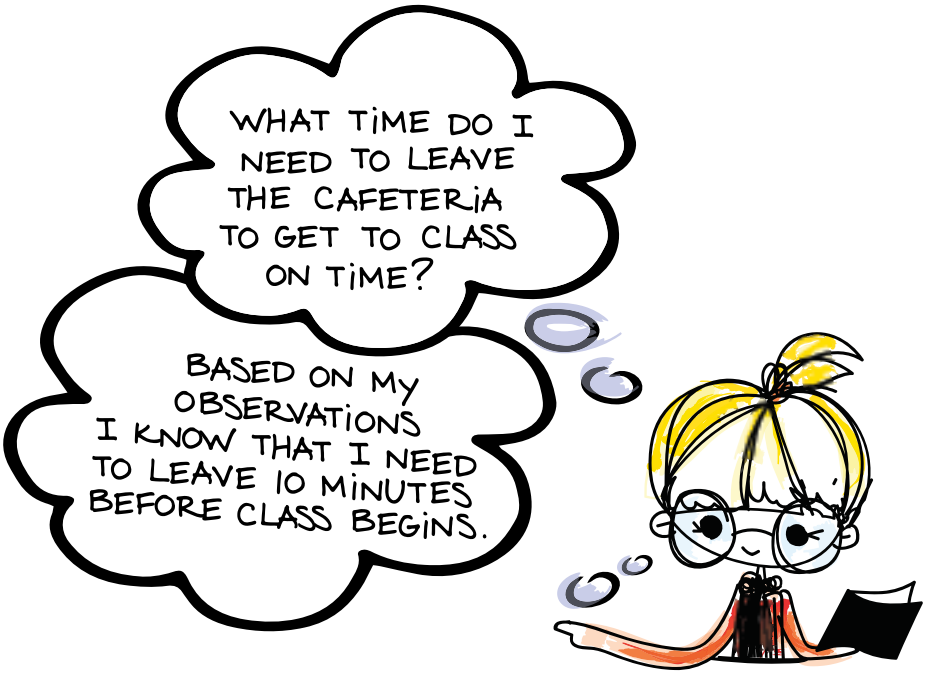
- Always offer assistance before providing it.
- Listen to the student's instructions when providing assistance.
- Comply when an offer of assistance is refused.

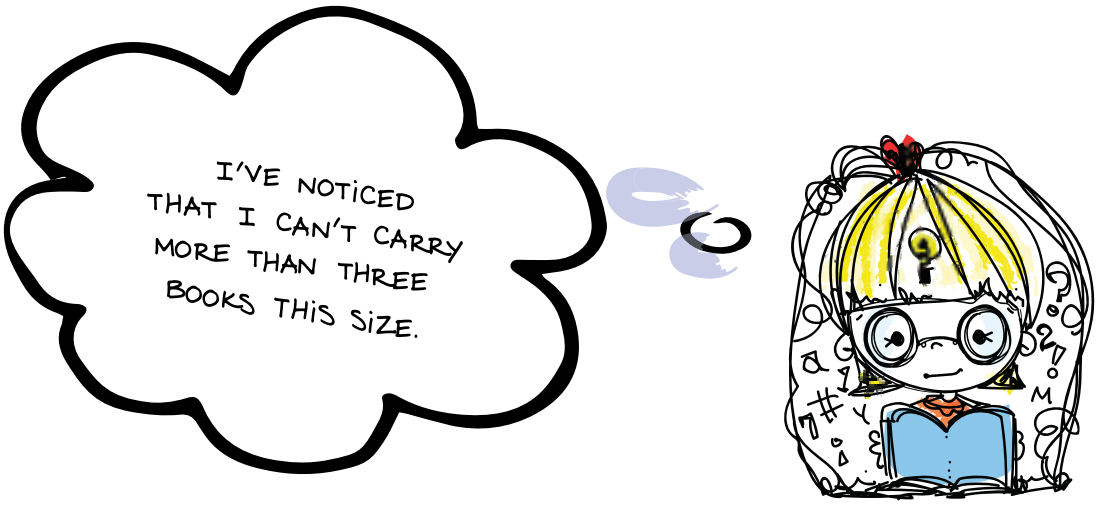
Students with motor impairments should only accept assistance if they need it; they must not take advantage of the situation. They can refuse assistance if they believe, even wrongly, that they can do something themselves. In other words, they can:

- accept assistance, and specify how it is to be provided
- refuse an offer of assistance

5.7 WHEN THE STUDENT IS SUPPORTED IN A PROCESS OF SELF-OBSERVATION AND CONSIDERATION OF THE RESULTS.

To make valid choices and informed decisions, students with motor impairments must be aware of their own abilities and disabilities, by practising self-observation in a variety of contexts. In doing so, they will gradually become more independent and take charge of their own situation.





6. HELPING STUDENTS CONSTRUCT A POSITIVE SELF-IMAGE

However hard they may try, students with motor impairments often perform poorly in graphic tasks (writing, drawing, creating diagrams, etc.) and motor-based tasks (handling tools, sports skills, etc.). They, like their fellow students, are aware that their results are unsatisfactory, and often see themselves in a negative light as a result. This personal awareness, combined with certain hurtful comments or behaviour (like the fact that they are chosen last for a team), makes it difficult for them to construct a positive self-image.

Here are various ways to help these students:

- Give them opportunities to take charge of their situation, and to take responsibility for their successes and failures.
- Set realistic expectations and "motor" requirements.
- Give honest feedback; in an empathetic, respectful way, give the students and their parents a true picture of the results achieved, and explore realistic goals and projects.
- Use as many different ways as possible to perform tasks, so that motor-impaired students have the same opportunities as classmates to learn quickly and effectively.
- Help the students to know themselves, and give them opportunities to acquire competencies in sectors that interest them.

- Ensure that the method used to perform a task allows the students to demonstrate their knowledge, and ensure that the evaluation focuses on the targeted learning.

Acknowledge the difference.
Do not ignore it.

BUT LEARN TO DEAL WITH THE STUDENT'S SITUATION IN A POSITIVE MANNER.

7. HELPING STUDENTS ACQUIRE SPECIFIC SOCIAL SKILLS THAT ARE LINKED TO MOTOR IMPAIRMENTS

Because of their difference, students with motor impairments are more at risk of being excluded. For these students, learning to "live together" is more of a challenge. However, they can be taught specific social skills to reduce the risk of exclusion and improve the quality of their interactions.

EXAMPLES OF SPECIFIC SOCIAL SKILLS[22]

- Reaching out to others
- Learning how to be able to talk about their motor impairment
- Talking with fellow students about activities and interests that they share
- Understanding that others will be curious about their motor impairment
- Explaining to others how they can help
- Guiding others by giving clear instructions

22. Lyne Bertrand, Sophie Morier, Jean-Marie Boisvert and Yves Mottard, "Anxiété sociale et incapacité physique," *Revue francophone de clinique comportementale et cognitive*, 6 (2) (Université Laval, 2001), 27-34.

8. CONSIDERING THE CONSEQUENCES OF MOTOR IMPAIRMENTS FOR STUDENT QUALIFICATION

"Support in identity development should ideally be provided starting in the early years of schooling and continuing on in secondary education, because students develop at their own individual rate. This work is especially important with students with handicaps or learning or adjustment difficulties. It is essential that, before making plans for the future, students gather information, play a variety of roles, have different experiences and assume responsibilities in order to discover their strengths, weaknesses, interests, personalities, values and ambitions."[23]

For students with motor impairments, support in the form of information, or academic or career guidance, must take into account both their motor capabilities and their cognitive abilities. At the same time, these students must experience the academic and career guidance process, become aware of their difference, and adapt to their motor impairment. Throughout their time at school, everyone concerned must support these students in an empathetic and respectful way, since their disabilities or difficulties may limit their academic or career choices. It is important to identify the students' potential as soon as possible, along with suitable career paths. If a long-term vision can be established, less energy will be wasted exploring non-viable options.

An analysis of the motor skills required for the semiskilled trades listed in the directory reveals that, for most trades, physical strength, a wide range of motion, fine and gross motor skills and rapid execution are all important. The situation of each student is unique, however, and all "possible" options must be considered, even though a realistic assessment of the student's motor limitations will determine the real issues faced by the student in choosing a career path.

For some students with a major motor impairment, the best route to achieving the most active possible role in society is to obtain a Secondary School Diploma, continue on to higher education, and master technology. These students can achieve success by sidestepping motor obstacles to acquire learning, and through adaptation of the teaching/learning process. It is not productive to focus on refining certain motor skills if the consequence would be to delay the learning prescribed by the Québec Education Program without improving access to certain trades because the gap is too great to have any hope of meeting labour market requirements.

23. Québec, Ministère de l'Éducation, *Making Dreams Come True – Achieving Success Through the Guidance-Oriented Approach* (Québec, 2002), 21. http://www.meesr.gouv.qc.ca/fileadmin/site_web/documents/dpse/adaptation_serv_compl/SEC_AppOrientante_19-7030A.pdf.

It is extremely useful to establish a plan for transitioning from school life to adulthood as a continuation of the support received by the student at school.

IN BRIEF

To develop a comprehensive, long-term vision, it is important to ensure the continuity, consistency and effectiveness of all actions taken throughout the students' time at school, in order to support their success.

The goal must be for the students to learn and be able to demonstrate their learning, using effective, "customized" measures.

Students must receive support to:

- acquire the skills needed to communicate orally and use information and communication technologies (ICT) effectively
- develop effective work methods
- optimize the development of their autonomy
- construct a positive self-image
- acquire the skills needed to ensure social integration
- identify the best path to qualification

USING DIFFERENTIATED INSTRUCTION TO PROVIDE A BETTER RESPONSE TO THE NEEDS OF STUDENTS WITH MOTOR IMPAIRMENTS

Differentiated instruction is extremely important in helping students with motor impairments to achieve success. Every day, teachers must choose the best way to respond to the needs of this group of students, and their choices must be based on both a good understanding of the students and a number of necessary conditions. Various approaches to differentiated instruction can be applied to meet the students' specific needs. Examples of collaboration between teachers and classroom assistants show how differentiation may be applied as part of the teaching/learning process.

9. GOOD UNDERSTANDING OF THE STUDENT

If they are to play their role fully, and as early as possible, teachers must gather personalized information about the student. They must consolidate all the information they have acquired about the motor impairment and about the student's situation. What applies specifically to this student? What are the student's "personal" characteristics and specific needs? How are these characteristics and needs apparent in the classroom context? This gathering of information is an essential step in assessing the best differentiation approaches to meet the student's needs, and gives the teacher an opportunity to ask: Am I differentiating too much, or not enough? Is it equitable or not? It also helps the teacher to reflect on his or her own actions. Personal information is available from a variety of sources, including the student's individual support file, the individualized education plan from previous years, discussions with educators who worked with the student in previous years, and so on. A Physical Education and Health teacher can, at

the same time, gather more detailed information about the student's abilities and motor impairments. Appendix D, Physical Education and Health and Students With Motor Impairments, suggests a range of ways to gather information.

Any sharing of information between the health and social services sector and the education sector must comply with the recommendations made in the document entitled *Concilier le respect de la confidentialité et le partage de l'information*.

TARGETED OBSERVATION IN AN ACTUAL CLASSROOM CONTEXT

In some cases, teachers are unable to determine whether a student refuses to participate in a task because he or she is genuinely unable to meet the requirements due to a motor or cognitive impairment, or because he or she is unwilling to make the effort. Is the teacher helping the student to achieve his or her full potential? Strict observation targets must be established, based on the questions raised as a result of the various situations experienced by the student in the classroom.

EXAMPLES OF OBSERVATION TARGETS

Observe at different times and in different contexts.

- Comparison of the time needed to write a text by hand and using a computer.
- Impact of fatigue at the end of the day: comparison of the quantity of work completed for the same task at the start and end of the day.
- Comparison of the time needed by the student to complete a task, compared with other students.
- Some observation targets connected with motor difficulties appear in the checklist taken from the *Trousse de matériel didactique pour les élèves du premier cycle du primaire ayant des problèmes importants de motricité fine.* An English version of the checklist can be found in Appendix E, Observation Checklist – Fine Motor Difficulties.

OBSERVATION METHODS

After setting an observation target, the observer will focus on spontaneous behavioural displays and watch how the student acts in a real classroom context. From time to time, the observer will ask the student open questions, such as “Can you show me how you do this?” or “What approach will you take?” or “Can you explain it to me?”

Teachers carry out their own observations, and also ask colleagues for assistance. Key information emerges, placing the teachers concerned in a better position to apply differentiated instruction.

Some key elements to consider

- Do not take abilities or disabilities for granted.
- Remember that a disability is observable in all contexts, even when a student is engaged in a favourite activity.
- Find out whether a student has mastered certain specific methods, or if the student has access to specialized materials designed to reduce his or her impairment at school, and has been shown how to use them by a therapist.
- See whether a student tries to get the teacher to do something in his or her place, or tries to do everything for himself or herself.

INFORMATION RECORDING TOOL

Teachers can use the information checklist in Appendix F to compile information on a student's abilities and disabilities. A good understanding of the student is required for differentiated instruction, and the tool can easily be modified to take into consideration an individual student's physical and cognitive characteristics. It can also be used to help identify observation targets. The tool is flexible and should be adjusted over time to make sure it is as effective as possible.

10. CONDITIONS FOR STUDENT SUCCESS

To decide what kind of differentiated instruction is needed in a given context, teachers must first ensure that they have established the conditions required for student success.

To support student learning and promote success, teachers must make sure they establish appropriate conditions

- Focus on the development of a competency, not on the methods used to develop it.
- Take into consideration a student's specific motor and cognitive characteristics: the methods and procedures proposed must match the student's motor and cognitive skills.
- Aim for the best possible use of the student's motor and cognitive potential.
- Ensure that the student is receptive to learning, given the motor effort required to complete the task and the rate of motor execution needed to keep up.
- Draw up a plan providing a sufficient number of opportunities for the student to consolidate his or her learning.
- Offer support and appropriate tools to the student. Support should be neither above nor below the required level, and it must be planned to ensure that it is always available when needed.
- Present situations that are, as far as possible, similar to those presented to other students.
- Propose methods and tools that are easy to use and master.
- Keep preparation simple.
- Offer the student methods and procedures that match his or her level of autonomy.
- Optimize the student's participation in learning and evaluation situations.

11. VARIOUS APPROACHES TO DIFFERENTIATED INSTRUCTION

A variety of approaches to differentiated instruction are presented here. For each approach, a brief description is followed by an outline of its potential and examples of the context in which it is used, along with words of caution. The approaches are designed to take advantage of the student's abilities and to sidestep his or her difficulties. They should be selected on the basis of each student's characteristics and needs. Careful planning will enhance their effectiveness. They should be easy to apply and master, and versatile enough so that teachers can make adjustments as needs emerge during a learning situation. By mastering these approaches, teachers will be able to find their professional bearings and gain self-confidence. The approaches offer realistic challenges that will help students to learn and succeed.

The list of differentiation approaches presented here, while not exhaustive, is designed to meet some of the many specific needs of students with motor impairments. The approaches address the specific characteristics of motor impairments and allow for the development of a comprehensive, long-term vision.

Various approaches to differentiated instruction:

11.1 Adjusting the context in which tasks are carried out

- a) Using spoken language to complete tasks
- b) Reducing the amount of work involved in carrying out a task
- c) Increasing the time allotted for a task, depending on the student's needs
- d) Modifying the requirements associated with the precision of a task, depending on the student's needs

11.2 Providing students with appropriate tools, such as

- a) Electronic tools
- b) Educational tools designed to reduce the complexity of motor tasks
- c) Magnetic tools

11.3 Adapting activities requiring visuospatial or praxic skills

a) Using sequential verbalization to support the performance of motor tasks

b) Using horizontal layouts for mathematical operations

c) Facilitating counting

d) Providing visual frameworks or references

11.4 Adapting activities requiring attentional and executive functions

a) Supporting the acquisition of problem-solving strategies

b) Supporting the use of organizational structures

c) Organizing time and workspace

11.5 Adapting activities requiring memory-related functions

a) Promoting in-depth processing of knowledge

b) Allowing the use of memory aids

c) Creating events as part of learning situations

11.1 ADJUSTING THE CONTEXT IN WHICH TASKS ARE CARRIED OUT

Adjusting the context in which tasks are carried out involves offering students means that take into consideration, or sidestep, some of their difficulties. Thanks to these adjustments, students are able to meet the same cognitive challenges as other students without being disadvantaged by their motor impairments.

Below are some examples.

11.1A USING SPOKEN LANGUAGE TO COMPLETE TASKS

Description

In learning situations, based on their needs, students can:

- use spoken language to tell another person how to perform a task they are unable to perform themselves because of their motor impairment
- complete the task using spoken rather than written language; depending on the context, they can talk to the teacher, the classroom assistant or another student

EXAMPLES

- In a Science and Technology class, students with fine motor difficulties can instruct a classroom assistant to try out various possibilities with a battery and the materials provided.
- Students who are unable to solve three situational problems in the specified time can solve the first two in writing and the third using spoken language. They must take the time to think about and check their procedure by rounding off their calculations before telling the teacher the results.

Potential and context for use

This approach can save a great deal of time and energy. Oral work can be beneficial in many contexts and subjects, including for homework. Combined with other methods, it can help students to consolidate their learning.

Limitations and precautions

- To be effective, this differentiation approach requires students to have strong oral communication skills and good elocution. The student develops this competency on an ongoing basis and must receive regular support.
- For this approach to work, the teacher, classroom assistant or other students must have time available.

11.1B REDUCING THE AMOUNT OF WORK INVOLVED IN CARRYING OUT A TASK

Description

Sometimes it may be appropriate to reduce the amount of work that a student needs to do. If the student is unable to complete a task within the allotted time, the task can be shortened, based on previous observations. For example, if it was observed that the student could probably complete only two thirds of a task, then one third could be removed. In this case, the teacher selects two thirds of the most relevant activities that will allow the student to acquire the targeted learning. The goal is not to reduce the level of the cognitive challenge, but to carefully target the activities to ensure that the mobility-impaired student faces the same degree of complexity as the other students. The reduction should not be random, but should be carefully planned.

EXAMPLE

Three-digit addition:

From the ten additions the group has been asked to do, the teacher selects the seven that are the most relevant in allowing the mobility-impaired student to learn three-digit addition. For example, like the other students, the mobility-impaired student must complete additions with and without carrying.

Potential and context for use

This approach to differentiation helps ensure that the student's specific needs are taken into account in a planned way. The teacher only has to take a few minutes to ensure that the motor-impaired student has the same learning opportunities as the other students. This approach may also be used for some types of homework.

Limitations and precautions

- The student and his or her parents often need to be informed and reassured about the validity and benefits of tasks involving less work, since they may be wrongly perceived as reducing the learning requirements or as a reduced expectation of learning.
- Some learning and evaluation situations cannot be reduced quantitatively, since their components are all inseparable and interdependent.
- It is through evaluation that the teacher can check whether this approach has given the student enough opportunities to consolidate his or her learning. It may be necessary to plan other situations that will allow for additional consolidation.

11.1C INCREASING THE TIME ALLOTTED FOR A TASK, DEPENDING ON THE STUDENT'S NEEDS

Description

This approach involves giving the student more time than the rest of the class to complete a given task. It is not a question of giving an unlimited amount of time, but rather of giving the extra time required, based on the teacher's observations.

The teacher's observations have shown that a student with a motor impairment needs 20% more time to complete a task, and therefore allots an extra twelve minutes if the time initially set for the task was one hour.

Potential and context for use

When sufficient time is allotted for a task, students are given an opportunity to demonstrate their competency. It is neither an advantage nor a disadvantage; they simply have the same opportunity as their fellow students to work in a context that generates no extra stress and allows them to complete the task. This approach may be applied for both short-term and long-term tasks.

Limitations and precautions

- It is not always easy to allocate extra time. Teachers can avoid problems by planning ahead.
- Allocating unlimited extra time is unfair.
- Without a deadline, students will not learn to manage their time effectively. If unlimited time has been allotted, the teacher may even feel that it is inappropriate to use the students' work to judge their competency.

11.1D MODIFYING THE REQUIREMENTS ASSOCIATED WITH THE PRECISION OF A TASK, DEPENDING ON THE STUDENT'S NEEDS

Description

For students with fine motor skill impairments or visuospatial disorders, requirements associated with precision must be adjusted to match their abilities and disabilities. The key point to remember is that the students' energy and cognitive abilities must be focused on the cognitive challenge of the task, and not on their motor skills or lack thereof.

EXAMPLES

- The students are asked to write a sentence using the two vocabulary words for the week. A student with a motor impairment can still write it by hand, even if the words drift outside the lines, because his or her handwriting is quick and legible.
- The students are asked to draw a diagram of the water cycle, clearly showing each stage in the process. The drawing of a student with a motor impairment may not be as "fluid" as those of the other students, but may be sufficiently clear to show that he or she has understood.

Potential and context for use

It is important to continue to ask students to use their handwriting and drawing skills when they are suited to the requirements of the task. The use of this motor potential is important if students are to acquire greater functional autonomy and succeed in maintaining their potential. In the classroom, this potential allows them to complete short tasks where presentation is less important, because writing by hand is quicker in these situations than using a computer.

Drawings can be supported by oral explanations if they are not sufficiently clear to meet the pedagogical requirements.

Limitations and precautions

In some contexts, quality of presentation is important. If this is the case, the student should use a computer instead of handing in work that looks like a rough draft. The student should be helped to identify contexts where it is preferable to use a computer.

11.2 PROVIDING STUDENTS WITH APPROPRIATE TOOLS

The tools made available to a student with a motor impairment should allow him or her to complete the same tasks as the other students. If these tools are selected to meet the student's specific needs, they will help him or her to undertake learning tasks and take as much responsibility for them as possible. When planning their lessons, teachers must consider whether the student can in fact use the tools. In some cases, it is possible to promote the student's autonomy and learning simply by using materials already available in the classroom.

11.2A ELECTRONIC TOOLS

Description

The technological environment is made up of several components. It may include a computer, screen, mouse, keyboard, printer, scanner and software. By identifying the student's specific learning needs in different subjects, it is possible to choose the "best" tools for his or her particular situation.

EXAMPLES
OF THE USE OF ELECTRONIC TOOLS

- The student makes changes to a text he or she has composed directly on the computer, by moving sentences or making them more complex, deleting other sentences, switching the order of paragraphs, etc.
- For students whose handwriting is illegible, word processing software can be used as a compensatory tool.
- A student uses a USB memory stick instead of carrying a computer back and forth between home and school.
- A student in Elementary Cycle One with major fine motor difficulties can use the *Croquis-Math* software application.

Potential and context for use

Technological tools are essential in helping students with major motor difficulties to develop competencies. The performance and user-friendliness of these tools is increasing all the time, and for many mobility-impaired students, technology provides a way to continue on to higher education and join the labour market. In addition, technology is extremely effective in helping to socialize the students, since it removes distance and architectural barriers.

Limitations and precautions

- Despite its potential, technology cannot meet all the needs of differentiated instruction. Other differentiation approaches, such as the use of spoken language, must also be planned.
- It is important to take into account the student's need for support in developing his or her ICT competencies for learning purposes, since these competencies are not the same as those used in computer games. Continuity and collaboration are vital in ensuring that the tools are used in a way that helps the student to learn and become more independent.
- The cost of acquiring technology can be high. However, an increasing number of good-quality software applications are available free of charge.
- It is important to keep abreast of the rules governing copyright, since it is possible that digitization of documents for educational purposes will become more acceptable in the future. Electronic versions of some textbooks are already available.

11.2B EDUCATIONAL TOOLS DESIGNED TO REDUCE THE COMPLEXITY OF MOTOR TASKS

Description

The term "adapted" materials refers to tools that can be used by a student to facilitate motor tasks. Some are common classroom tools that have been "modified" and can be used for other purposes, while others have been designed specifically to meet the special needs of students with motor impairments. There are many possible adaptations, and the magnetic materials described in the next section are just one example of "adapted" materials.

EXAMPLES

- A page can be enlarged to reduce the need for motor dexterity.
- NCR paper (paper designed to produce several copies in different colours) can be used by a classmate to take notes, so that the motor-impaired student does not need to do so, and can concentrate instead on what the teacher says. The other student can simply hand over one of the copies at the end of the class.
- A page can be plasticized or placed in a protective cover to simplify the writing task. In some cases, the student can write with a dry-erase marker and re-use the page.
- A non-slip base or sticky substance can be used to stabilize a page.
- A book can be set aside specifically for the student, who can be allowed to write in it, thereby avoiding the need to transcribe long passages of text.

Other suggestions

- Use a book support.
- Use a calculator with larger buttons that are easier for the student to press.
- Use a ruler with a handle.
- Use geometric shapes that have handles, or add handles to existing shapes.
- Use paper with raised lines for students who are learning to write by hand.
- Use a specially shaped gluestick that is easier to grasp.
- Use a compass that can be fixed in position.

For Physical Education and Health classes:

- Use a lighter racquet with a larger head and a shorter handle.
- Lower the height of the basketball hoop.
- Use a foam ball.

Potential and context for use

Adapted materials should be chosen to suit the student's specific needs. For example, enlarging a page will help students with impaired fine motor skills and visuospatial difficulties. Clearly, the need to facilitate the student's life at school extends to the choice of all school materials, including school bags and pencil cases. In some cases, both the student and his or her parents must be made aware of the everyday benefits of their choices. If a student enjoys better working conditions and is more available for learning, his or her chances of success will be considerably improved.

Limitations and precautions

If materials must be adapted, it is important to ensure that the adaptations do not take up too much time.

11.2C MAGNETIC TOOLS

Description

Students whose fine motor skills are significantly impaired can manipulate magnetic tools quite effectively, as long as the magnetic elements do not move around too easily. There are many magnetic tools available on the market, and some classroom materials can also be magnetized, simply by adding a self-adhesive magnetic strip or magnetic tape. The level of magnetic force can be adapted to the student's motor skill level by adjusting the length of the magnetic strip or tape.

It is very important that the chosen tools be easy to grasp. For example, students with motor impairments will often be able to draw a straight line without assistance if they have access to a thicker, magnetic ruler. Tools such as these reduce the number of situations in which the student is at a disadvantage, by opening up kinesthetic approaches to learning and allowing the student to work more independently. The material's attractive visual appearance is also stimulating for classmates, who will be keen to work with the student as a result.

Of the wide range of tools available, most are better suited to elementary school students, although some can also be used by secondary students. Using a small magnetic board and paying attention to what facilitates certain tasks may inspire numerous adaptations.

Potential and context for use

A list of magnetic tools can be found in Appendix G, Potential and Context for Using Different Magnetic Tools. Although the list is by no means exhaustive, it is sufficient to illustrate the potential of this approach to differentiated instruction. The examples given will help educators to identify adaptations that will meet their students' specific needs. The tables presenting the tools include brief descriptions of each tool's potential uses and suggest some possible contexts for use.

Limitations and precautions

- The use of magnetic materials to replace handwriting should be discussed with the occupational therapist, in the context of the individualized education plan. It is important to understand the student's motor potential and how it affects his or her handwriting ability. The decision to use magnetic materials should always be based on the student's learning needs.
- Magnetic letters or numbers should not be used to replace handwriting in cases where large numbers of words or figures must be written. As tools, they can be extremely useful in the early stages of learning, but in subsequent stages every possible step should be taken to ensure that the student improves his or her ICT skills as quickly as possible.
- The student will need a fairly large work surface in order to use magnetic materials, and the teacher should check to see whether the student also needs help.

Storage of magnetic materials should be planned in such a way that the student can be as independent as possible.

Magnetic materials, whether purchased or prepared by the school, can be used by many students over time. School boards should therefore know where they are located, so that other students can take advantage of them.

11.3 ADAPTING ACTIVITIES REQUIRING VISUOSPATIAL OR PRAXIC SKILLS

Visuospatial disorders and motor dyspraxia are cognitive disorders often associated with motor impairment. It is therefore important to adapt activities requiring visuospatial or praxic skills. Visuospatial skills are often used in learning situations, and involve the ability to use and produce graphic representations. Praxic skills are also required; praxis is the "ability by which we figure out how to use our hands and body in skilled tasks like playing with toys, using a pencil or fork, building a structure, straightening up a room, or engaging in many occupations."[24] The level of difficulty with visuospatial and praxic skills varies, with some students experiencing only slight difficulty while others encounter significant problems. Vigilance is therefore required to avoid attributing a student's problems to the fact that he or she has not understood the instructions or has not mastered the concepts. The drawings, diagrams and manipulations sometimes used by teachers to help students are of no use in these cases, and can even be a hindrance. It is only by using the student's strengths, such as his or her conceptual abilities, that progress can be made with learning. The following sections present some approaches designed to adjust learning tasks requiring visuospatial or praxic skills.

11.3A USING SEQUENTIAL VERBALIZATION TO SUPPORT THE PERFORMANCE OF MOTOR TASKS

Description

Sequential verbalization of a motor task involves verbally explaining instructions so that the student is able to perform the task step by step. The goal of this is for the student to use verbalization independently, so that verbalization becomes a form of inner language.

"The five classic phases are:

1. The adult performs a task while speaking out loud. The child observes and listens. For example: "I take the red ball out of the box, I walk to the basket and I put the ball in the basket."
2. The child performs the task under the adult's supervision, and the adult comments on the action as it takes place.
3. The child performs the task alone, while speaking out loud.

24. A. Jean Ayres, "Sensory Integration and Praxis Tests (SIPT), http://childrenstherapy.org/sensory-integration-praxis-tests/. See also "Dyspraxies: Définition, scolarisation," http://sylviecastaing.chez.com/diapraxies.pdf.

4. The child repeats the task, but this time only whispers.

5. Last of all, the child uses inner language with no external verbalization."[25]

Sequential verbalization is also known as self-instruction. The teacher can gradually allow the student to explain the different steps of a task independently, checking the accuracy of the verbal description by performing the task according to the student's instructions. This allows the student to perfect his or her verbalization skills.

EXAMPLES

The student can draw a letter, using a previously memorized chant.

To draw the radius of a circle, the student first explains that the radius is a straight line connecting a point on the circumference with the centre of the circle. Before drawing the line, the student states that he or she must choose a point on the circumference and then draw a straight line between that point and the centre of the circle, using a ruler. When drawing the line, the student explains that the ruler must touch both the circumference point and the centre of the circle.

Potential and context for use

Sequential verbalization is useful for students with impaired visuospatial skills who must reproduce graphic representations. It can also be useful for students who need it to connect actions that they find difficult due to motor dyspraxia.

25. Jean-Michel Albaret and Régis Soppelsa, "Utilisation des programmes d'auto-instruction auprès des enfants présentant des dysfonctions non verbales." In *Actes du Symposium sur les dysfonctions non verbales: Les défis du diagnostic et de l'intervention*, ed. J. Flessas and F. Lussier (Montréal: CENOP-FL, 2004), 136 [*translation*].

Limitations and precautions

- The type of learning to which sequential verbalization may be applied should be chosen carefully, depending on the level of visuospatial or praxic difficulty experienced by the student.
- It is important to come to an agreement with the student on the words that will be used during verbalization.
- The level of support required from the teacher will vary according to the student's needs.
- Some students may find it difficult to generalize the use of sequential verbalization.

11.3B USING HORIZONTAL LAYOUTS FOR MATHEMATICAL OPERATIONS

Description

The use of horizontal layouts for mathematical operations consists in placing the operations horizontally and explaining the connections between each step.

EXAMPLES

Numbers are added by means of decomposition, commutativity and associativity, rather than by the short method.

128 + 411 + 457 =
(100 + 20 + 8) + (400 + 10 + 1) + (400 + 50 + 7) =
(100 + 400 + 400) + (20 + 10 + 50) + (8 + 1 + 7) =
900 + 80 + 16 =
900 + 80 + 10 + 6 =
900 + 90 + 6 = 996

Multiplication is done by decomposing and distributing numbers.

25 X 32 =
25 X (30 + 2) =
(25 X 30) + (25 X 2) =

For subtraction, *Défi mathématique*[26] suggests an algorithm with negatives that can be very useful to students with visuospatial problems.

341 – 157 =
3 hundreds – 1 hundred = 2 hundreds or 200
4 tens – 5 tens = –1 ten or –10
1 unit – 7 units = –6 units or –6
200 – 10 = 190
190 – 6 = 184

Potential and context for use

Horizontal layouts, combined with the student's reasoning skills, can help to mitigate the student's visuospatial or motor problems by making every step of the process explicit. Students with this type of impairment are at a considerable disadvantage if required to use a vertical layout that involves aligning elements in columns. By using a horizontal layout, they have the same chances of success as their classmates, along with a solid foundation for their mathematical learning. Once they have mastered the operation, they can use a calculator for the remainder of their studies.

Good mental arithmetic skills and the use of rounding off are both assets for the long term, since students only need to calculate their answers accurately at the end of the process, for example when solving a mathematical problem.

Limitations and precautions

- In some cases, the horizontal layout is not as quick as other, shorter methods.
- It is more difficult to use a horizontal layout for division.

26. Mathadore, "La soustraction: Du concret au symbolique." *Défi mathématique,* vol. 6, no. 211 (2006) [*translation*] http://www.defimath.ca/mathadore/vol6num211.html.

EXAMPLES
OF A HORIZONTAL LAYOUT FOR A DIVISION WITHOUT A REMAINDER

This algorithm is based on the distributivity of division over addition.

148 ÷ 4 =
(100 + 40 + 8) ÷ 4 =
(100 ÷ 4) + (40 ÷ 4) + (8 ÷ 4) =
25 + 10 + 2 = 37

11.3C FACILITATING COUNTING

Description

Students with fine motor difficulties or visuospatial disorders find it hard to count a collection properly—in other words, to count each element only once, and not to forget any. What must be done is to move the objects one at a time, at the student's pace, and place them in a different space. The pace at which the student recites the number song will indicate the pace at which the objects can be moved, and will ensure that each count is accurate.

EXAMPLE

To help a student count a collection of objects, the teacher can move one object at a time, at the pace indicated by the student, and drop each object, in turn, into a box so that it makes a noise.

Potential and context for use

This approach can be used for all activities that involve counting a collection of objects. It is based on a good understanding of chanting, the number line and the function of numbers. Without this assistance, counting activities can lead to learning difficulties. Use of the fingers when counting does not help, since students with motor impairments often find it hard to isolate their fingers.

Limitations and precautions

- It is easier to control counting activities with solid objects than with “drawn” objects.
- However, solid objects should no longer be used once the student has understood the concepts, is able to apply the reasoning, and counts accurately.

11.3D PROVIDING VISUAL FRAMEWORKS OR REFERENCES

Description

Often, in subject-specific learning, visual frameworks or references can help students with visuospatial disorders. They allow students to understand spatial positioning while avoiding visual overload.

EXAMPLES

- A green dot can be used to indicate the start of a line, and a red dot to indicate the end.
- A finger, ruler or paper can be used to hide the text and read one line at a time.
- A coloured border around the sheet of paper on which the student is drawing will help ensure that the space is used more effectively.
- A grid can be used for operations requiring a vertical layout. Different colours can be used for different positions.

Potential and context for use

This approach can be useful in many subject areas. For example, it can help students read texts from left to right, it can provide points of reference for handwriting, and allows students to situate their work on the sheet or identify specific positions in a table. The use of colour is a very effective way to highlight specific elements and support visual exploration.

Limitations and precautions

- Frameworks and references must be used in a consistent way.
- The teacher must check regularly to see whether their use can be reduced.

11.4 ADAPTING ACTIVITIES REQUIRING ATTENTIONAL AND EXECUTIVE FUNCTIONS

Attentional and executive functions are basic mental processes that are required for all types of learning. They are closely linked and are often affected by early cerebral damage, to the extent that attention disorders and executive function disorders are among the cognitive disorders most often associated with motor impairment.

Attentional functions affect "information selection, attention focusing, use of attentional resources in concentration and effort, resistance to distraction, consistent and flexible control of activities, and variations of attentional efficiency during the day or over longer periods."[27]

"The 'executive functions,' involved in many aspects of cognition, include all the functions needed to control and carry out new, non-automatic, complex tasks. The term covers operations required to implement and control action."[28] These functions "use two main types of mechanisms: inhibition of automated, routine or environmentally dependent behaviours . . . (excessive inhibition or inhibition failure) and the choice and application of a proper strategy."[29]

The following differentiated instruction approaches are intended to serve as examples only. Many other approaches are also possible. Owing to the complexity and potential scope of the disorders, the teacher must understand each student's individual cognitive profile, in order to identify and select the most effective approaches.

27. Michèle Mazeau, *Neuropsychologie et troubles des apprentissages* (Paris, 2005), 202 [*translation*].
28. Christina Rogan, "Les fonctions exécutives", Neurologie.com, vol. 2, no. 7, September 2010 [*translation*].
29. Michèle Mazeau, *Neuropsychologie et troubles des apprentissages* (Paris, 2005), 207 [*translation*].

11.4A SUPPORTING THE ACQUISITION OF PROBLEM-SOLVING STRATEGIES

Description

Students with motor impairments need help with situations that involve problem-solving, because they find it hard to consider several sets of data at once, and to plan a series of operations. Many of the strategies associated with solving situational problems, such as understanding, organizing, solving, validating and communicating, as presented in the Québec Education Program (Mathematics),[30] can be extremely valuable. The use of these strategies must be supported in a structured and detailed way.

EXAMPLE

A (real or fictional) surprise party!

A student plans a surprise party for a friend's birthday. He or she decides to invite six people, including the friend whose birthday is being celebrated. The student and his or her friends share the expenses, with each person contributing $20. They decide to give a gift worth $40. The goal of the activity is to plan a menu that falls within the remaining budget.

The student is asked to undertake this task, and must reformulate the problem in his or her own words. The teacher asks the student to visualize or imagine the situation and take the time to think about each step.

With the teacher's help, the student breaks the task down into a series of steps:

- Find the number of people attending the party (draw a diagram).
- Find the number of people contributing to the expenses, and the total amount of money available (choose the calculation method).
- Find the amount available to buy food.
- Choose a menu and draw up a grocery list (discussion with friends).
- Calculate the amount of food to buy for each element (prepare an image showing what will be on each plate), etc.

30. Québec, Ministère de l'Éducation, *Québec Education Program, Secondary Education, Cycle One* (Québec, 2004), 220.

Potential and context for use

The support given by the teacher should be designed to help the student become more effective and independent. It may be extended to all types of situational problems, giving the student many different opportunities to practise and become proficient in using problem-solving strategies.

Limitations and precautions

Some students may need a significant amount of support. The complexity of the problems should be adjusted according to the student's executive abilities, and less support should be given as the student progresses. It is important to encourage the student to use his or her logical and reasoning competencies.

11.4B SUPPORTING THE USE OF ORGANIZATIONAL STRUCTURES

Description

Students with motor impairments find it hard to implement and control action. Help, in the form of guidance concerning the tools used to build an organizational structure, or suggestions for an organizational model, can be extremely beneficial. Students can refer to this support, and adjust it when necessary.

EXAMPLES

Using a school agenda in the classroom

- Always bring your agenda to class.
- Write down the homework that you need to do.
- Write down the dates of mini-tests or exams.
- Write down the dates on which work must be handed in.
- Write down the topic of each class in the appropriate box.
- Add colours, symbols and abbreviations where necessary.[31]

31. Oxford Learning, *Use Your School Agenda Like a Pro*, Http://www.oxfordlearning.com/letstalk/wp-content/uploads/2012/09/12_agenda_checklist.pdf and École secondaire Lucien-Pagé, *Guide méthodologique*, http://www2.csdm.qc.ca/LPage/images/Guide%20metho.pdf.

In the second step of a research task

Step 2 Search for information

- Do an initial keyword search in **Wikipedia** or another encyclopaedia.
- Save articles of interest in your **Favourites**.
- Do a second keyword search using search engines such as **Google**, and save sites of interest in your **Favourites**.
- **Cut and paste** short, relevant excerpts onto a Word page (open in the background). Cut and paste the Web references at the bottom of the page.
- Print the excerpts if you wish.
- **Highlight** relevant information in colour.
- Circle key words related to the subject.
- If necessary, consult the Web sites of local **libraries** to find more documentation.
- **Write down the reference** for each document you consult.
- Reformulate the main question and try to answer it mentally, in your own words.
- **Rework the work plan.** Plan one major idea in each paragraph and add any interesting details that you discovered during your research.
- Make sure the work plan still meets the stated **requirements**.
- Begin to **write**.[32]

Potential and context for use

For students, this represents a learning opportunity, since outside assistance can gradually become a basis that will allow them to guide themselves through the task. Students must use organizational structures in every sphere of life at school; for example, to organize their locker, folder, study period and workspace, and to carry out the steps in a research task or in the writing of a text.

32. http://www.devoirsetrecherches.com/trucs%20et%20astuces/les_10_etapes_d_un_travail_de_recherche.html.

Limitations and precautions

It is important not to propose too many different organizational structures. The structures proposed will be easier to use if the underlying logic is as similar as possible. The level of complexity of the structures should be correlated directly with the student's abilities.

11.4C ORGANIZING TIME AND WORKSPACE

Description

Students with attentional and executive function disorders find it hard to be attentive, resist distraction, maintain their attentional efficiency over long periods, and undertake and maintain the pace of a task. They therefore need help to organize both their time and their workspace.

It is very helpful for students to have a calm, well-ventilated workspace without clutter or visual overload. They will also be better able to meet the requirements of a given task if they have more time to complete it, and if the task is broken down into shorter work periods, with alternating work time and breaks.

EXAMPLE

The student could be allowed to take an examination in a separate room, with proper supervision.[33]

Potential and context for use

Adjustments such as these ensure that students are given realistic challenges. They are better able to perform the task at hand and progress with their learning. The type of organization will depend on the student's needs and the characteristics of the task (i.e. its duration and the level of attention required to complete it successfully).

33. Québec, Ministère de Éducation, du Loisir et du Sport, *Administrative Guide for the Certification of Studies* (version of 2011-02-18) (Québec, 2011), Chapter 5.

Limitations and precautions

It may be difficult, if not impossible, to allow for arrangements such as these if a task must be completed in collaboration with classmates, or outside the classroom context.

11.5 ADAPTING ACTIVITIES REQUIRING MEMORY-RELATED FUNCTIONS

Memory is closely linked to the attentional and executive functions, and "refers to the processes that are used to acquire, store, retain and later retrieve information."[34] A memory disorder may occur as a result of brain trauma or early brain damage. Memory-related functions are used throughout the learning process, and it is essential to use differentiated instruction when they do not work properly. The following sections present some examples.

11.5A PROMOTING IN-DEPTH PROCESSING OF KNOWLEDGE

Description

There are several ways to enhance the processing of new knowledge. For example, graphic organizers illustrate links with the student's prior learning. The teacher helps the student to identify important information and logical links to support comprehension. The information is summarized, prioritized, extracted, highlighted or illustrated, and the student is then asked to manipulate it using different sensory methods (auditory, visual, kinesthetic) and to give meaning to it.

34. http://psychology.about.com/od/cognitivepsychology/a/memory.htm.

EXAMPLES

- To memorize the spelling of a word, the student is asked to associate it with words from the same family, understand its meaning, use it in different contexts, associate it with a real-life experience, spell it, copy it, visualize it and chant it out loud, dividing it into syllables.
- The student takes an informational text explaining the differences between the three material states (solid, liquid and gas), underlines the titles, key phrases and subtitles, and builds a table highlighting the differences. The student then makes drawings to illustrate the three states of water, associating each state with a place or photograph. He or she can then carry out experiments to see how water moves from a liquid state to a solid and a gas.

Potential and context for use

The processing of information inherent in basic learning should be as in-depth as possible, and should also be consolidated as far as possible. Identifying the most effective methods for memorizing information encourages students to use only the ones that work best for them. The use of appropriate means to classify and consult evidence helps to enhance the benefits of in-depth information processing.

Limitations and precautions

Care is needed when selecting the information that is to be processed in detail. The benefits and energy required must be weighed and compared with the impacts of using compensatory tools. The challenge should always be a realistic one, based on the nature and level of the student's memory disorder.

11.5B ALLOWING THE USE OF MEMORY AIDS

Description

Michèle Mazeau describes the reason for using memory aids as follows: "In the classroom, students should be allowed to set out a certain amount of information on their desks, as support for more complex activities. The information in question should be that which they are unable to remember for themselves (memory 'prosthesis')."[35] With the teacher's help, the student can be asked to draw up lists, diagrams, tables and representations that he or she can consult quickly and easily. He or she should also have access to different memory aids, such as addition and multiplication tables, a calculator, a spelling corrector, and so on.

EXAMPLE

A show is to be held in the school gymnasium. The gymnasium measures 10 metres by 15 metres, including the space of a stage measuring 3 metres by 4 metres. If each class group occupies an area of roughly 30 square metres, how many class groups can attend the show at the same time?

The student may use a calculator and a math glossary to help solve the problem.

Potential and context for use

The use of memory aids helps students to address learning situations that include true cognitive challenges, and hence to progress in their learning and use the cognitive skills that have been "preserved." Memory aids can be used for a variety of subject-specific learning.

Limitations and precautions

In some cases, the memory disorder will be so significant that the student's progress will be slow and difficult in spite of the adapted support measures. A general, long-term vision therefore becomes extremely important as part of the individualized education plan or the school-adulthood transition plan.

35. Michèle Mazeau, *Neuropsychologie et troubles des apprentissages*, 194 [*translation*].

11.5C CREATING EVENTS AS PART OF LEARNING SITUATIONS

Description

Here, “scenarios” and “dramatic” contextual enactments of unusual events are created to help students memorize what they have learned. The intention is to offer a contrast, to break with the routine and provide the students with a multi-sensory, emotional experience.

EXAMPLE

An exhibition can be organized to present constructions designed by the students. The constructions are of different shapes, but all have the same volume. The exhibitors for the different constructions are available to explain their methods to visitors. The exhibition can be visited by students and staff at the school.

The event will help the students to memorize the procedure for calculating the volume of different shapes.

Potential and context for use

Events such as these are “memorable” for students, and memory triggers become anchored in their minds. This type of “scenario” is suited to all subjects. Combined with other differentiated instruction approaches, events are an excellent way to consolidate learning. The learning goal should be chosen according to the importance of the target knowledge.

Limitations and precautions

Events such as these cannot be used regularly because they require a significant investment of time and energy.

12. EXAMPLES OF COLLABORATION BETWEEN TEACHERS AND CLASSROOM ASSISTANTS IN THE THREE PHASES OF THE TEACHING/ LEARNING PROCESS

The teacher is responsible for differentiated instruction and the teaching/ learning process, and he or she is often the only person to apply the planned approaches. However, in situations where a student has significant motor impairment and is accompanied by a classroom assistant, the teacher and assistant must work together to ensure success. What, then, are the elements of this type of collaboration within the context of the teaching/ learning process? The following tables present a brief review of the roles played by the teacher and assistant, at each phase of the process. They are designed to show how the two roles can be combined to provide the best possible support for the student. They also highlight some of the pitfalls to be avoided.

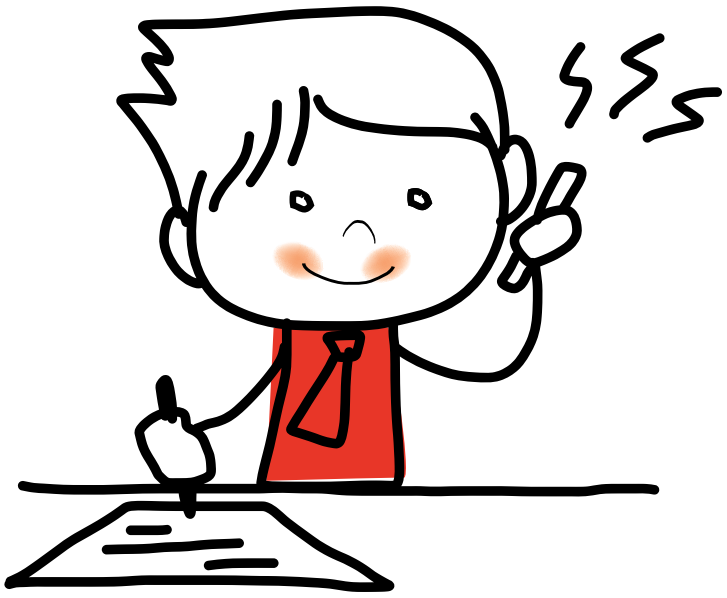
It is up to the teacher to inform the assistant of the phase he or she will intervene in, provide an overview of the goal, and stipulate what role the student can play to take full advantage of the learning opportunities offered. At the same time, the teacher and assistant can agree on the best way for the assistant to play his or her role, depending on the differentiation approach used for each specific learning situation. The division of roles between the teacher and the assistant throughout the teaching/learning process is also described in the document entitled *Le role de l'accompagnateur dans la réussite de l'élève.*[36]

36. Rose-Anne Bourdages and Nicole Lachance, *Le rôle de l'accompagnateur dans la réussite de l'élève. Un guide pour le praticien réflexif. Quoi faire?... Jusqu'où?* (Québec, 2007), 81-84. See also Michael F. Giangreco et al., "Helping or Hovering? Effects of Instructional Assistant Proximity on Students with Disabilities," Exceptional Children, vol. 64, no. 1 (1997), 7-18.

Here is a brief overview of the student's role.

When students play their role as learners, they:

- are committed and attentive, and give personal meaning to the information based on their prior learning and personal experience
- think and make connections between their prior knowledge and the new elements of information
- ask questions and express views
- try things, experiment, plan, revise, adjust, accept help, etc.
- interact with classmates
- share their new knowledge
- become aware of their strategies, etc.



Examples of collaboration between teachers and classroom assistants

	Teacher's role	Assistant's role	Pitfalls to avoid
Preparation phase	• Presents the learning context: Goal, procedure, tools, duration, requirements • Activates prior knowledge • Supports the organization of knowledge	• Monitors the procedure as presented by the teacher • Creates the best possible conditions so that the student can be attentive and available for the process For example: In the case of a student who writes very slowly, the teacher agrees that the assistant should write down the examples, so that the student can concentrate on the explanations given by the teacher.	• There is too much physical proximity between the student and the assistant. • The student relies on the assistant to make up for his or her lack of attention and inability to take charge. • During the teacher's explanations, the student directs questions to the assistant instead of to the teacher.
Implementation phase	• Explicitly and systematically teaches cognitive and metacognitive strategies through modelling, guided practice and independent practice • Supports the reorganization of knowledge	• Guided practice: Removes obstacles so that the student is able to carry out the task in the way suggested by the teacher and in accordance with the learning objectives for the task For example: In the case of a student with impaired fine motor skills, the teacher asks the assistant to help the student hold the device used to measure the length and width of the classroom floor; the assistant follows the student's instructions. • Independent practice: Provides vital help with the task, depending on the adaptation measures for the evaluation of learning, as set out in Chapter 5 of the *Administrative Guide for the Certification of Studies*	• The assistant takes control of the task, rather than the student. • The teacher has no involvement with the student. • The assistant corrects mistakes made by the student, and leaves no evidence of them for the teacher. • The student asks for a sign of approval at every stage of the task. • There is no distinction between independent practice and guided practice, in terms of the help given to the student.

Examples of collaboration between teachers and classroom assistants

	Teacher's role	Assistant's role	Pitfalls to avoid
Integration phase	• Works with the students, based on an organizational diagram, to review what they have learned, how they learned it, the procedure they used, and any problems they encountered • Plans situations in which knowledge can be transferred	• Removes obstacles so that the student can carry out the transfer activities in accordance with the instructions given by the teacher	• The phase is skipped.

IN BRIEF

Differentiated instruction aimed at meeting the needs of a student with a motor impairment is based on:

- a good understanding of the student's specific needs
- the conditions required to promote the student's learning and success

Differentiated instruction can include:

- adjusting the context in which tasks are carried out
- providing appropriate tools for the student
- adapting activities requiring visuospatial or praxic skills
- adapting activities requiring attentional and executive functions
- adapting activities requiring memory-related functions

The teacher and classroom assistant must work together to help ensure the student's success. This takes place within the context of the teaching/learning process.

SUPPORTING TEACHERS OF STUDENTS WITH MOTOR IMPAIRMENTS

It is extremely important to support the integration of students with motor impairments into regular classes. The success of this process—in other words, ensuring that it is a rewarding professional experience for the teacher and an opportunity for the student to learn in the best possible conditions—depends on that support. Teachers do not often face this type of challenge, and as a result, most of them do not have much experience in teaching students with motor impairments. They therefore need support, which can be given in a variety of ways, including:

- training at the beginning of the year, and subsequent follow-up meetings
- support as requested, based on the student's specific needs

TRAINING AT THE BEGINNING OF THE YEAR, AND SUBSEQUENT FOLLOW-UP MEETINGS

Training can be offered at the regional level or by a school board. It should be offered to teachers at the beginning of the new school year, and given toward the end of September, when the teachers have had time to gauge the impacts of the motor impairment on "their" student's education. This first meeting can be open to all teachers, regardless of the type of impairment "their" student has.

Individual meetings, or meetings in small groups, can then be organized to provide support in a context where teachers can share their successes and ask questions. These meetings break the isolation of the teachers, while encouraging them to examine and preserve evidence of the process of educating students with motor impairments.

SUPPORT AS REQUESTED, BASED ON THE STUDENT'S SPECIFIC NEEDS

To support the teacher, the resource must gather information on the student's impairment and plan for observation times in the classroom, so that he or she has a better idea of how the student functions and can help the teacher to examine the overall situation. In addition, the resource must support the teacher in drawing up and carrying out the individualized education plan.

GATHER INFORMATION ON THE STUDENT'S MOTOR IMPAIRMENT

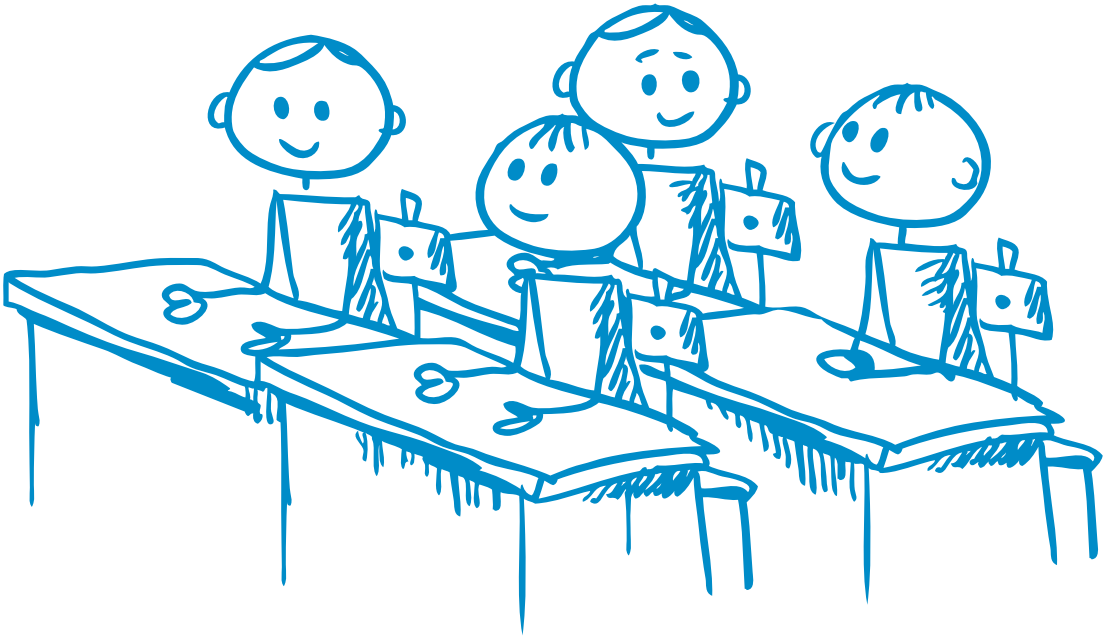
- Definition, manifestations, associated problems
- Associated cognitive profile, impact on the educational plan

When a teacher asks for help, it is extremely important to research the possible existence of cognitive disorders associated with the motor impairment in order to make an informed analysis of the situation. Tables showing the cognitive disorders associated with certain motor impairments can be found in the appendices to this document. However, it is impossible to provide an exhaustive list of all cognitive disorders associated with all motor impairments. The examples are given for information purposes only, and also to show the importance of the nature of this information.

OBSERVE THE STUDENT IN THE CLASSROOM

Classroom observation is extremely useful in providing customized support for the teacher, and in gathering the information required to analyze the situation properly. It provides an opportunity to identify the student's cognitive and motor profiles, and to establish their respective impacts on the student's learning. For example, is the student slow to perform motor tasks because of motor slowness or does he or she have difficulty meeting the cognitive challenges of the task?

During observation and subsequent discussions, it is not unusual to find that the help actually needed differs from the help originally requested. Classroom observation may last several hours, and the student should not be told that he or she is being observed. However, it is important for the teacher to feel comfortable with the observation.



SOME INDICATORS FOR OBSERVATION TARGETS

OBSERVATION TARGET	I OBSERVED THAT . . .
Manifestations of the student's ability to meet the cognitive challenges that he or she faces Examples: • The student manifests his or her understanding of concepts when interacting with the teacher. • Generally speaking, the student succeeds in carrying out the tasks without the need for additional explanations.	
Pedagogical support given to the student	
The student's attentional and organizational abilities	
The student's ability to take charge of his or her learning	
The student's oral communication ability	
The student's use of information and communication technologies (ICT) and the context in which ICT is used	
Support given to the student by the classroom assistant	
How the student takes part in cooperative learning situations	
The student's functional autonomy with respect to dressing/undressing, and managing his or her school materials	
Methods used by the student to move around the classroom and school	
Physical arrangements inside and outside the classroom (storage of the student's school materials, the place he or she occupies in the classroom, access to documentation in the classroom, access to the library, etc.)	
Adjustments to the student's timetable to allow him or her to move around the school	
Transitions between tasks and between classes	
Help given by classmates	
Interactions with classmates	
Student's handwriting (speed, legibility)	

HELP THE TEACHER TO PREPARE A GENERAL ANALYSIS OF THE STUDENT'S SITUATION

The information required to analyze the student's situation can be obtained beforehand, from classroom observations and from discussions with the teacher.

The following elements can be taken into consideration.

1. Questions raised by the school staff in general, and by the teacher in particular
2. General information on the motor impairment (definitions, manifestations, associated problems, prognosis, associated cognitive profile, impacts for the educational plan)
3. "Personal" information about the student:
   - academic results
   - intellectual abilities and cognitive profile
   - physical abilities and disabilities, including slow performance, fatigability, medications taken and their impacts on the student's experience at school
   - any differentiated instruction already applied
   - the tools to which the student has access
   - acceptance of the handicap by the student and his or her parents
   - life skills

It is extremely important to check whether the steps already taken are allowing the student to progress to the full extent of his or her capabilities. If not, the support measures must be adjusted and remedied appropriately.

Problems with Physical Education and Health classes, and questions concerning exemption from these classes because of motor impairments, are common. Appendix D sets out the benefits students will probably derive from Physical Education and Health classes, along with various approaches to differentiated instruction and the types of personal information required.

SUPPORT THE TEACHER IN THE CONTEXT OF THE INDIVIDUALIZED EDUCATION PLAN

All the above steps form part of the process set out in the individualized education plan, which also involves several other educators in addition to the teacher. The support given to the teacher by the education consultant at the preparatory phase is very important, since it allows the teacher to feel more comfortable with the importance of focusing on the student's success when agreeing on intervention goals with rehabilitation staff.

The choices made must always result in a situation where the student has the greatest possible chance of learning. For example, given the fact that the student needs more time to move around the school, is it preferable for him or her to leave before the end of a class, or to be late for the next class? The two teachers concerned need to discuss the problem. There is no single "right" answer, and careful consideration of the student's absence from class, along with its potential consequences for his or her learning, is required. The individualized education plan is an excellent way to create the best possible conditions for the student's success.

IN BRIEF

Most teachers have very little experience of working with students with motor impairments, and it is very important that they be supported.

Support can be given in a variety of ways.

- Training at the beginning of the school year, and subsequent follow-up meetings
- Support as requested, based on the student's specific needs:
  - Gather prior information on the student's motor impairment
  - Observe the student in the classroom, using a variety of checklists
  - Carry out a general analysis of the information obtained, using different parameters
  - Support the teacher in the context of the individualized education plan

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APPENDICES

APPENDIX A

CODE DEFINITIONS FOR STUDENTS WITH MILD OR SEVERE MOTOR IMPAIRMENTS[37]

Code	Diagnostic evaluation and conclusions drawn by a professional	Limitations or disabilities	Examples of generally observed academic difficulties
	Students are deemed to have a mild motor impairment when:		
33 **Mild motor impair-ments**	• they have been diagnosed by a **general practitioner** or a **medical specialist** • a neuromotor examination shows that they have one or more nervous, muscular or osteoarticular disorders that affect their **movements** The main **motor impairments** are: • **neurological:** – Friedreich's ataxia – paraplegia and tetraplegia – cerebral motor deficiency – cranial trauma – uncontrolled epilepsy – etc. • **muscular:** – muscular dystrophy, – etc. • **osteoarticular:** – congenital malformations – spina bifida, – amputations, – juvenile rhumatoid arthritis – etc.	• their ability to carry out **everyday activities** is **significantly and persistently** limited • a functional evaluation shows that, **even with technological aids**, they have one or more of the following characteristics: – difficulty carrying out tasks involving **grasping** (manual dexterity) – difficulty carrying out **daily activities** (personal hygiene, eating) – limitations in **mobility** hindering their ability to get around • these characteristics may be accompanied by **difficulty in learning to communicate**	**In terms of learning:** • Motor difficulties that have an impact on the performance of learning-related tasks, such as: – writing, drawing, handling small rulers, handling measuring instruments, performing certain physical education activities, playing a musical instrument, etc. • Major difficulties with articular movements that have an impact on all school-related activities and that can involve using alternative means of communication • Learning difficulties caused by cognitive disorders resulting from cerebral lesions **In terms of the student's ability to function in school:** • Difficulty carrying out everyday activities such as: – getting around at school, getting dressed, eating, using the washroom, going to school, etc.
	Support measures: regular support		

37. Québec, Ministère de l'Éducation, du Loisir et du Sport, *Organization of Educational Services for At-Risk Students and Students With Handicaps, Social Maladjustments or Learning Difficulties* (Québec, 2006), 15.

APPENDIX A

CODE DEFINITIONS FOR STUDENTS WITH MILD OR SEVERE MOTOR IMPAIRMENTS [38] (*CONT.*)

Code	Diagnostic evaluation and conclusions drawn by a professional	Limitations or disabilities	Examples of generally observed academic difficulties
	Students are deemed to have a mild motor impairment when:		
36 **Severe motor impairments**	• they have been diagnosed by a **general practitioner** or a **medical specialist** • a neuromotor examination shows that they have one or more nervous, muscular or osteoarticular disorders that affect their **movements** The main **motor impairments** are: • **neurological:** – Friedreich's ataxia – paraplegia and tetraplegia – cerebral motor deficiency – cranial trauma – uncontrolled epilepsy – etc. • **muscular:** – muscular dystrophy – etc. • **osteoarticular:** – congenital malformations – spina bifida – amputations – juvenile rhumatoid arthritis – etc.	• their ability to carry out **everyday activities** is **extremely and persistently** limited • a functional evaluation shows that, **even with technological aids**, they have one or more of the following characteristics: – **severe functional** limitations in carrying out everyday activities – difficulty carrying out **daily activities** – **significant** limitations in **mobility** • these characteristics may be accompanied by **severe** limitations in their ability **to communicate**	**In terms of learning:** • Motor difficulties that have a major impact on learning-related tasks or that make their performance impossible: – writing, drawing, handling small rulers, handling measuring instruments, performing certain physical education activities, playing a musical instrument, etc. • Major difficulties with articular movements that have an impact on all school-related activities and that can involve using alternative means of communication • Learning difficulties caused by cognitive disorders resulting from cerebral lesions **In terms of the student's ability to function in school:** • Major difficulties in carrying out everyday activities such as: – getting around at school, getting dressed, eating, using the washroom, going to school, etc.
	Support measures: regular support		

38. Québec, Ministère de l'Éducation, du Loisir et du Sport, *Organization of Educational Services for At-Risk Students and Students With Handicaps, Social Maladjustments or Learning Difficulties* (Québec, 2006), 15 and 18.

APPENDIX B
DEVELOPING STUDENT AUTONOMY

"To become more autonomous, I need to:

- recognize my strengths, skills and personal abilities, and believe in them
- discover, name and respond appropriately to my needs
- develop and appreciate my ability to find creative solutions to my problems
- make decisions for my personal well-being and not just to please others
- learn to love and appreciate myself
- give myself the right to refuse requests and not meet other people's expectations, wishes and desires
- recognize, name and accept my emotions
- learn to trust myself in action, and in my relationships with others
- make sure I am respected, and respect others
- be proud of myself
- recognize my behaviours and achievements, and appreciate them
- give myself the right to be different and to accept difference in others
- be able to make decisions and take initiative
- be able to think, act and evaluate the results of my actions"[39]

39. G. Duclos, D. Laporte and J. Ross, *L'estime de soi de nos adolescents* (Montréal: Éditions du CHU Sainte-Justine, 1995), 79 [*translation*].

APPENDIX C
A SIMPLE AND EFFECTIVE METHOD FOR FINDING LETTERS ON THE KEYBOARD[40]

The best way to choose an appropriate method for students who use electronic devices instead of writing by hand is to ask the student's occupational therapist for information on how the student uses the keyboard. Can the student use both hands and all fingers? Has the student begun to learn to identify the letters?

Some students may be able to use *Tap Touche* software, if the "time limit" function is deactivated. However, others will need an "adapted" method. Testing has shown that the following method is effective:

- Ask the student to choose a word to type using the keyboard.
- Ask the student to find the first letter of the chosen word on the keyboard. This exercise takes only a few seconds, but must be repeated regularly (e.g. twice a day). It can be done with a paper keyboard, or with a keyboard that may or may not be connected to a computer. To make the exercise more effective, the chosen word should be used in a sentence.
- Repeat the exercise enough times to ensure that the student is able to find the letter quickly on a keyboard on which all the letters have been blanked out. It is important for the letter in question to be identified easily before moving on to the next letter.
- Move on to the next letter in the chosen word. Come back regularly to letters that the student can already identify.

LOWER-CASE LETTERS CAN BE ADDED TO THE KEYBOARD KEYS.

IT MAY BE HELPFUL TO SEPARATE THE LEFT- AND RIGHT-HAND SECTIONS OF THE KEYBOARD.

40. Nicole Lachance, *Un environnement techno-pédagogique optimal pour les élèves du premier cycle du primaire présentant des difficultés de motricité fine,* Part 2, 14-17.

APPENDIX D
PHYSICAL EDUCATION AND HEALTH AND STUDENTS WITH MOTOR IMPAIRMENTS

Students with motor impairments are often exempted from Physical Education and Health classes because of disabilities or for health reasons. In these cases, the time that becomes available is often used to allow the students to complete their classroom assignments. However, there is some question as to whether this practice truly benefits the students, or whether the students' inability to perform certain tasks is sufficient justification for an exemption.

In situations such as these, an analysis of the students' needs generally reveals that they are unable to perform certain movements or actions. However, in the vast majority of cases, not only is it possible for the students to develop many of the features of the competencies from the Physical Education and Health program, but it is also essential that they do so, for the sake of their education. Just as for their classmates, the course helps to support the social integration of students with motor impairments and gives them an opportunity to develop an interest in physical activity (even as spectators). It may even open the door to adapted sport, not to mention the benefits of the "health" component, which is also extremely valuable to students. In addition, before thinking about exempting a student with a motor impairment from the Physical Education and Health course, it is important to consider the possibility of adapting or altering the tasks, so as not to deprive the student of the learning he or she will gain from the elementary and secondary programs.

- Understanding the musculo-skeletal system
- Understanding the rules of the game and the rules of ethics for different sports
- Understanding the benefits of healthy lifestyle habits and the effects of unhealthy habits

Students also acquire certain attitudes and behaviours through group activities, even if the activities are adapted. They include:

- respect for others
- compliance with the rules
- cooperation

Once the situation has been examined in detail, if an exemption must still be considered, it is important to consult the *Administrative Guide for the Certification of Studies and Management of Ministerial Examinations*[41] regarding the possibility of exempting a student from the requirements of the Physical Education and Health course because of serious and extended health problems.

SOME QUESTIONS TO BE CONSIDERED WHEN A STUDENT WITH A MOTOR IMPAIRMENT IS IN A PHYSICAL EDUCATION AND HEALTH CLASS

- Am I familiar with the student's motor limitations (e.g. muscular strength, ability to engage in physical effort, speed of execution, balance)?
- Is the student able to take part in the activity as planned?
- Can I adapt any of the following:
  - the tools used (e.g. use a soft ball instead of a hard one)
  - the rules (e.g. nobody can block the student' s throws)
  - the time, quantity, duration or intensity of the activity
  - the student's role in the activity (e.g. referee, goalkeeper, line judge)
  - the groups (e.g. pairs instead of groups of four)
- Should I change any of the following:
  - the course content
  - the expectations
  - the evaluation criteria
- Does the student have a classroom assistant? In my plan, have I considered what role this assistant might play in the activity?

41. http://www.meesr.gouv.qc.ca/references/publications/resultats-de-la-recherche/detail/article/administrative-guide-for-the-certification-of-studies-and-management-of-ministerial-examinations-20/?tx_ttnews%5Blang%5D=1.

- Could the activity as planned pose a danger to the student or to the other students in the class? (Refer to the precautions in the table below.)
- Have I told the school principal about my proposed adaptations and modifications, to ensure that they are included in the individualized education plan?

SOME EXAMPLES OF DIFFERENTIATED INSTRUCTION[42]

- Move the start or finish line.
- Identify an area in which the student cannot be intercepted by a player from the opposing team.
- Lower the target or bring it closer.
- Use lighter, larger balls.
- Use lighter racquets with a larger head and shorter handle.
- Change the size of the basket or target.
- Increase the number of attempts or strikes.
- Start a relay race when the preceding runner or a member of the opposing team has covered half the distance to be run.
- Include rest periods for students who tire easily.
- Allow players to be substituted.
  (For example: In kickball, allow a teammate to hit or run in the student's place.)
- Introduce a rule stating that other players cannot block or interfere with a handicapped student's passes.
- "Kick" a soccer ball with an indoor hockey stick instead of the feet.
- Allow the student to serve by placing the birdie on the surface of the racquet.
- Have the student play in a safer position, or in a different role (e.g. referee).
- Allow the student to make passes using his or her hands, and to block using the wheelchair wheels.
- For the Physical Education and Health course, ask about the special needs of every student[43] with a motor impairment.

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42. The learning and evaluation context will allow you to decide whether the differentiation is an adaptation or a modification.
43. Remember that every student's situation is unique, and that these precautions do not necessarily apply to all students with motor impairments.

Student's name: _____

Date: _____

Precautions or contraindications for the student	Examples	Due to the possibility of
The student's positioning • Allows for stabilization of different parts of the body, leading to more precise movements and greater independence for the student	• Need for support • Skin fragility	• Discomfort • Injury • Clumsiness due to instability
Difficulty avoiding mobile objects due to slow performance, lack of balance, lack of coordination or eye problems	• In games involving obstacles • In ball games	• Injury • Lower self-esteem
Spasticity	• In exercises or activities requiring repetitive movements, and in the execution of rapid movements • During swimming (water temperature)	• Increase in spasticity • Reduction of independence
Level of muscle use	• For example, climbing stairs for a student with a neuromuscular disease	• Excessive fatigue • Pain • Worsening of the student's physical condition
Fatigability	• Fatigue caused by physical effort	• Reduced vigilance
Travel during outings	• On hilly terrain, when exploring a forest • Over long distances • On steep slopes	• Inability to access certain sites • Fatigue • Duration of the wheelchair battery • Accidents

Notes:

Notes (*cont.*):

Any sharing of information between the health and social services sector and the education sector must comply with the recommendations made in the document entitled *Concilier le respect de la confidentialité et le partage de l'information*.

APPENDIX E
OBSERVATION CHECKLIST – FINE MOTOR DIFFICULTIES

Because motor difficulties arise in all everyday activities and learning activities, the only way to create conditions in which students can learn and demonstrate their learning is to make sure those difficulties are taken into consideration.

Some activities are directly connected with learning and others less so. However, all activities are very important in ensuring that students are open to learning.

For example, the time and energy spent on tasks such as preparing learning materials and handling the materials at the beginning of the day and between tasks are examples of how slow performance or an inability to be "ready on time" can compromise the student's attention to explanations or instructions given by the teacher. The type of support, and its timing, must always be chosen with a view to providing the student with conditions conducive to learning.

A targeted observation will clearly show the scope of the problems and the support to be given in each circumstance.

The following checklist is taken from the *Trousse de matériel didactique pour les élèves du premier cycle du primaire ayant des problèmes importants de motricité fine.*[44]

44. Nicole Lachance, *Trousse de matériel didactique pour les élèves du premier cycle du primaire ayant des problèmes importants de motricité fine* (Fonds de développement coopératif des régions de Québec–Chaudière-Appalaches, 2000), 36-39 [*translation*].

AN OBSERVATION CHECKLIST
FINE MOTOR DIFFICULTIES – ELEMENTARY CYCLE ONE

Activities	Difficulties observed	
	Yes	No
Carrying learning materials		
Organizing learning materials		
Turning pages		
Keeping learning materials steady on the work surface		
Drawing a straight line using a ruler		
Dressing and undressing		
Eating		
Producing legible letters and figures		
Holding a pencil correctly		
Forming letters correctly		
Spacing words correctly		
Punctuating a text		
Handling pictograms and word cards		
Correctly placing a token, label or card		
Writing equality and inequality symbols and basic mathematical operations		
Constructing solids		
Using cubes, blocks, string, dice or sticks		
Cutting		
Drawing		
Colouring		
Binding		
Gluing		
Placing an X or a check mark		
Circling		

APPENDIX F
INFORMATION RECORDING CHECKLIST

Student's name: _____

Based on information gathered and observations, I have learned the following:	
Cognitive disorders	☐ The student has no specific cognitive disorder. ☐ The student has certain specific cognitive disorders: ☐ Visuospatial disorder ☐ Motor dyspraxia ☐ Attention disorder ☐ Executive function disorder ☐ Memory disorder Other _____.
Other factors relating to the motor impairment or state of health that affect learning	☐ The student executes movement at a good pace. ☐ The student is extremely slow in executing movement, which reduces the volume of work he/she can produce and makes it difficult to transition between tasks and between classes. Compared with his/her classmates, this student's pace is roughly _____% slower. ☐ The student has a good level of physical endurance. ☐ The student tires easily, which impacts his/her ability to take part in educational activities both at school and at home. ☐ The student is worried about upcoming surgery. ☐ The student believes in his/her ability to successfully complete the proposed tasks. ☐ The student often says that he/she does not feel able to successfully complete the proposed tasks. ☐ The student often complains of discomfort or physical ailments.
Development of autonomy	Most of the time: ☐ The student shows a willingness to do things for himself/herself. ☐ The student prefers someone else to do things for him/her.
Process of adapting to the motor impairment	☐ The student is progressing gradually and is increasingly able to deal with his/her situation. ☐ The student finds it difficult to deal with his/her situation: significant outbursts of sorrow, frustration, refusal to participate, loneliness, etc.

Based on information gathered and observations, I have learned the following:	
Understanding of the school rules	☐ The student needs help to understand the school rules. Example: _____. ☐ The student is comfortable with the school rules.
Development of skills that allow the student to compensate for his/her difficulties	☐ The student is increasingly effective in his/her oral communications. ☐ The student finds it very hard to express himself/herself. ☐ The student uses a computer as a means of writing, and the ICT notebook has been completed.
Physical disabilities and abilities in the school environment	☐ The student needs help to obtain reference documents in the classroom and in the library. ☐ Possible accommodations: _____. ☐ Planning of help: _____. ☐ The student writes quickly, and his/her handwriting is legible. ☐ The student has fine motor difficulties that impact his/her handwriting (speed, legibility) and drawing. The student needs more time than his/her classmates: roughly _____ times more. Legibility compromised _____. ☐ The student has no gross motor difficulties. ☐ The student has gross motor difficulties that make it hard for him/her to perform certain tasks in Physical Education and Health, and that reduce his/her ability to take part in certain games or sports during recess. ☐ The student's muscular strength is good. ☐ The student is not strong enough to lift heavy books. ☐ The student has good diction. ☐ The student has diction difficulties.
Physical disabilities and abilities in the school environment	☐ The student is able to move independently around the school and the classroom. ☐ The student moves around as quickly as his/her classmates. ☐ The student moves slowly around the school and the classroom. He/she needs more time than his/her classmates: roughly _____. times more. ☐ The student does not need assistance to access reference documents in the classroom or library.

Signature: _____

Date: _____

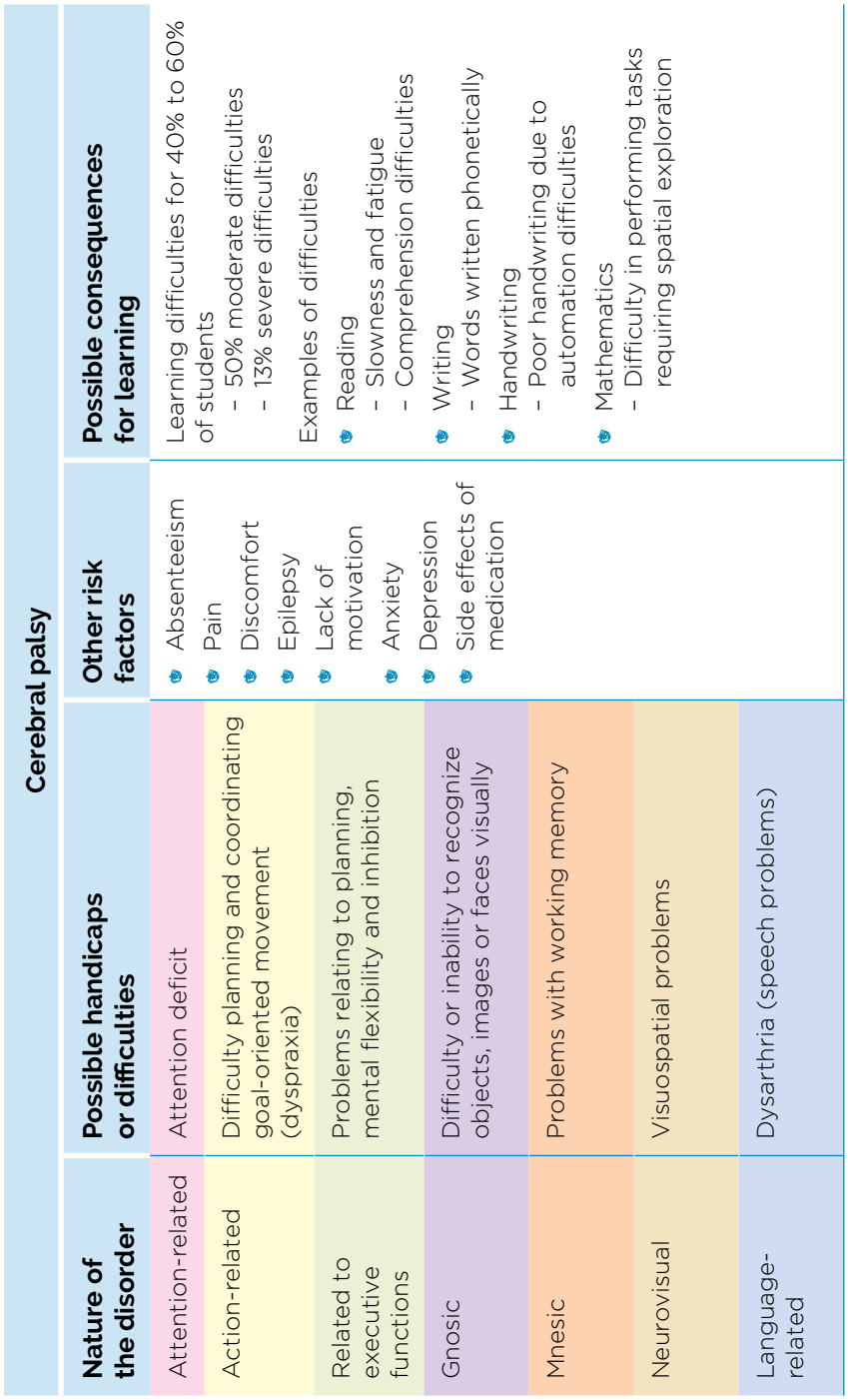
APPENDIX G
POTENTIAL AND CONTEXT FOR USING DIFFERENT MAGNETIC TOOLS

Name of tool	Potential and context for use
Dry-erase magnetic board (several formats available)	• Surface required for magnetic tools • Permanent (large format) work surface set up on the student's desk or occasional (small format) work surface • Greatly reduced need for manipulation, and easier manipulation; possibility of sliding objects without lifting them • Versatile tool; several tools available for learning • Possibility of placing a page from a book or activity booklet directly on the magnetic table, keeping it in place with small magnets • Possibility that the student will be able to work more independently • Pleasure associated with being a physically active learner • Attractive, motivational tool • A dry-erase surface if used with the proper markers
Magnetic letters, numbers and mathematical symbols Avoid elements that are too toy-like; choose letters in a font that is as similar as possible to the font used in class	• Used to replace handwriting for early learning in Elementary Cycle One: writing of syllables, words, sentences, numbers, equations, etc. • Possibility of installing visual cues on the magnetic board to help with the alignment of letters and spacing between words • Can be put to good use for school work done at home
Wooden blocks in different colours (magnets to be added)	• Used in combination with laces or a dry-erase marker to make groups (e.g. group together according to different bases) • Representation of different objects (e.g. using different-coloured fruits for numbering exercises and sequence construction) • Easy to grip
Laces (magnets to be added) **and markers**	• Separation of the magnetic surface into different spaces (e.g. object classification) • Use with wooden blocks or tokens for numbering exercises • Construction or reproduction of dual-entry tables; construction of simple graphs • Open or closed curved lines • Easy to slide from one area to another

Name of tool	Potential and context for use
Round magnetic tokens of different colours	• Pointing to spaces or shapes • Responses to different instructions (e.g. underline, circle, draw an X, colour) • Replacement for colouring (e.g. colour the ball to the right of the girl yellow) • Period at the end of a sentence if magnetic letters are used
Math bars (magnets to be added)	• Easier to place, and juxtapositions easier to maintain • Used with magnetic ruler to illustrate equations
Ruler in centimetres (magnets to be added)	• Easier to move and maintain a position • Used with small magnetic math bars • Physically possible for the student to illustrate equations
Small rectangular magnets	• Very strong magnetic force to hold non-magnetic elements firmly in place on a magnetic board (e.g. work sheets, geometric stencils)
Set of geometric stencils (held on the magnetic surface by very strong magnets)	• Drawing of geometric shapes • Possibility of juxtaposing different geometric shapes
Different geometric shapes in different colours and formats, which are easy to hold (magnets to be added if not available commercially with magnets)	• Availability of precut shapes, ready to be used • Quicker to use than stencils in certain learning situations • Possibility of using them together without them moving too easily
Sticks of different lengths (multiples of 1 cm) (small wooden sticks roughly 2 mm in diameter, sold in hardware stores; magnets to be added)	• Availability of line segments of different lengths • Variety of uses (e.g. delimitation of space on the work surface; used with lined/squared paper or acetates, drawing of geometric shapes, drawing of trajectories, etc.)
Protractor (magnets to be added)	• Possibility for the student to measure angles or to mark the points when drawing angles

APPENDIX H

COGNITIVE DISORDERS ASSOCIATED WITH CEREBRAL PALSY[45, 46, 47]



45. Antoine Arents, *Troubles des apprentissages dans l'infirmité motrice cérébrale*, PowerPoint presentation. http://www.imc.apf.asso.fr/IMG/pdf/4_Antoine_Arents_neuropsy_IMC.pdf.
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47. La Fondation motrice, Recherche sur la Paralysie Cérébrale, *Les troubles cognitifs*. http://www.imc.apf.asso.fr/IMG/pdf/INFOMOTRICE8_WEB.pdf.

COGNITIVE DISORDERS ASSOCIATED WITH DUCHENNE MUSCULAR DYSTROPHY[48, 49]

Duchenne muscular dystrophy

Nature of the disorder	Possible handicaps or difficulties	Other risk factors	Possible consequences for learning
Mnesic	• Verbal memory • Working memory	• Absenteeism • Fatigability • Low self-esteem • Loss of motivation • Frustration • Phobias • Anxiety • Depression	Learning difficulties for roughly 30% of students Examples of difficulties • Reading - Decoding - Text comprehension • Spelling • Mathematics - Mathematical reasoning - Mental arithmetic • Frequent problems with social development
Related to executive functions	• Attention or shared attention • Mental flexibility		
Language-related	• Understanding of complex verbal information (more time required) • Phonological process		
Emotional	Emotional interactions		

48. G. Gratton, N. Lachance, S. Morin and F. Thomas, *La déficience motrice et organique. Une simple question d'aménagement physique?* Presentation to regional school adaptation officers at the Ministère de l'Éducation, du Loisir et du Sport (2006).

49. Parent Project UK, *PPUK Learning and Behaviour toolkit for Duchenne Muscular Dystrophy* (2006).

COGNITIVE DISORDERS ASSOCIATED WITH SPINA BIFIDA WITH HYDROCEPHALUS[50, 51, 52, 53]

Spina bifida with hydrocephalus

Nature of the disorder	Possible handicaps or difficulties	Other risk factors	Possible consequences for learning
Related to executive functions	Difficulty with planning and organization, lack of mental flexibility	• Absenteeism due to surgery, wounds, fractures, urinary infections and other medical care • Social isolation • Worry • Low self-esteem • Problems doing school work at home due to fatigue and tasks relating to physical disabilities • Easily influenced	• Educational problems may emerge around Elementary Cycle Three. (The higher the lesion, the more likely the student is to exhibit cognitive disorders.) Examples of difficulties: • Reading – Problems understanding abstract texts • Writing – Problems with symbolic texts – Problems with coherence • Mathematics – Reasoning problems – Problem-solving difficulties
Attention-related	Attention deficit or difficulty concentrating		
Related to reasoning	Problems with conceptualization, abstraction, analysis and synthesis		
Language-related	Difficulties with language subtleties, even if verbal skills are good		
Neurovisual	Visuomotor difficulties		
Mnesic	Memory problems		

50. G. Gratton, N. Lachance, S. Morin and F. Thomas, *La déficience motrice et organique. Une simple question d'aménagement physique?* Presentation to regional school adaptation officers at the Ministère de l'Éducation, du Loisir et du Sport (2006).
51. Fanny Fourre-Renard, *Profil cognitif dans le Spina Bifida* (Fondation *AMPR*, 2010). http://ampr-nordpicardie.net/resources/Profil+cognitif+S+B.pdf.
52. Spina Bifida and Hydrocephalus Association of Canada, *Students With Spina Bifida and/or Hydrocephalus: A Guide for Educators* (Winnipeg, 1997).
53. Benoit Sénécal, *Le Spina Bifida avec hydrocéphalie: Du dépistage à la prise en charge; l'importance d'une évaluation neuropsychologique précoce pour une meilleure intégration sociale*. Speech given at the 2005 conference of the Association de spina-bifida et de l'hydrocéphalie (ASBH) (Québec, 2005).

APPENDIX I
CONTRIBUTION OF REHABILITATION CENTRE PROFESSIONALS

PHYSIOTHERAPIST

"Depending on the problem, physiotherapy provides different ways to reduce pain and inflammation, increase movement and endurance, regulate muscle tone, and re-educate muscular strength, motor control, flexibility and balance."[54]

Valuable information for Physical Education and Health teachers

OCCUPATIONAL THERAPIST

"Evaluating someone's functional skills, drawing up and implementing a treatment and intervention plan, developing, restoring or maintaining skills, compensating for disabilities, reducing situations of handicap and adjusting the environment to promote the highest possible level of independence."[55]

Valuable information on fine motor skills, hand-writing, use of computers to enhance writing skills, dressing and undressing

54. Ordre professionnel de la physiothérapie du Québec, *La physiothérapie… tout au long de votre vie*, p. 6 [*translation*]. http://www.biokin.ca/upload/PDF/La_physiotherapie_%20tout_au_long_de_votre_vie.pdf.

55. Ordre des ergothérapeutes du Québec, *La profession* [*translation*]. http://www.oeq.org/profession/profession.fr.html.

PSYCHOLOGIST AND SOCIAL WORKER

In the rehabilitation centre, the psychologist and social worker develop a close relationship with the child and the parents, in particular with regard to the parents' reaction to their child's handicap.

How do parents react to their child's handicap? It may be useful to obtain this information before the first parent-teacher meeting, since in many cases one or both parents may be angry or upset, or have no expectations regarding the child's success.

NEUROPSYCHOLOGIST

What is a neuropsychological assessment?

"In practice, neuropsychologists gather and examine information on an individual's social, emotional and intellectual development and educational path. They then perform a complete assessment to identify the person's strengths, weaknesses and cognitive (learning) style. A neurological assessment therefore identifies the nature or cause of an individual's problems during everyday activities and home life (e.g. at school, at work and during leisure time). Neuropsychological disorders and syndromes include:

- learning disorders
- dyslexia (alexia)
- dysorthographia
- dysphasis
- dyspraxia (apraxia)
- attention deficit disorder (with or without hyperactivity)

- dyscalculia
- memory disorders
- dysexecutive syndrome
- non-verbal dysfunction syndrome
- Asperger's syndrome
- autism
- Tourette's syndrome
- chromosomal syndrome (e.g. Kleinfelter, Turner)"[56]

I want more specific information on the student's cognitive functions.

Any sharing of information between the health and social services sector and the education sector must comply with the recommendations made in the document entitled *Concilier le respect de la confidentialité et le partage de l'information.*

56. Clinique d'évaluation neuropsychologique et des troubles d'apprentissage de Montréal, *L'évaluation neuropsychologique* (Montréal, 2012) [*translation*]. http://www.centam.ca/evaluation_neuropsychologique.html.

APPENDIX J
GLOSSARY

NON-EXHAUSTIVE LIST OF FREQUENTLY USED TERMS OR EXPRESSIONS RELATING TO MOTOR IMPAIRMENT AND COGNITIVE DISORDERS

Ataxia: Difficulty in coordinating voluntary movement, not resulting from a motor impairment. Strictly speaking, the term means damaged deep sensibility. In practice, it generally applies to the lack of coordination resulting from damage to the cerebellum (cerebellar ataxia).

Athetosis: Small involuntary ("abnormal"), irregular, slow, spontaneous movement, predominantly in the extremities (face, hands, etc.), exacerbated by emotion and mental activity. Athetosis is caused by damage to the extrapyramidal system and is encountered in certain types of cerebral motor impairment.

Cognition: Mental operation including all aspects of perception, thought, learning and memory.

Degeneration: A pathological mechanism characterized by the slow and progressive death of tissue cells and the gradual disappearance of normal tissue structures (especially nervous structures).

Diplegia: Paralysis of both lower limbs, not caused by spinal damage (e.g. premature spastic diplegia, a form of cerebral motor impairment.

Disability: A total or partial restriction of a person's ability to perform an activity in the manner or within the range considered normal. For example, walking, crouching, making a fist, etc. Also applies to situational activities such as getting up, washing, using the toilet, etc. (Source: World Health Organization).

Dysarthria: A speech disorder resulting from neurological or muscular damage.

Dysmorphia: A morphological (shape) abnormality of an organ or part of the body (face).

Dyspraxia: Difficulty in planning and coordinating the movements required to perform a new, goal-oriented action.

Dystrophy: In practice, the term is used to refer to degenerative diseases of undetermined cause (e.g. muscular dystrophy).

Encephalopathy: A disease affecting the encephalus in different ways. The term is often used to refer to unexplained damage, especially in the case of multiple handicaps.

Episodic memory: Memory that allows a person to remember events that he or she experienced in a given place, at a given time. The most distinctive characteristic of episodic memory is that the person sees himself or herself as an actor in the events in question. In other words, the subject memorizes not only the event itself, but also the context surrounding it. It is this component of memory that is most often affected by amnesia. In addition, the person's emotional load at the time the event occurs will determine the quality of the episodic memory. Also referred to as autobiographical memory.

Executive functions: A set of functions needed to control and perform new, non-automatic, complex tasks. They include operations to implement and control action.

Explicit (or declarative) memory: A term encompassing episodic memory and semantic memory.

Fine motor skills: The ability to localize the movement of a given muscle group, and to govern its scope and direction while coordinating pace with other movements. Fine motor skills result from fine, precise movements deriving from muscle control in certain specific parts of the body.

Gnosis: Recognition and integration of sensory or sense-related information. Gnosis does not refer to the perception of information (e.g. hearing, sensitivity), but to recognition of its meaning (recognizing a sound, or recognizing an object by touching it).

Gross motor skills: Motor activities involving some or all parts of the body (walking, running, jumping, throwing, swimming, etc.), requiring the involvement and coordination of major muscle groups. Gross motor skills require adjustments to muscle tone, control of balance and posture, simple segmental dissociation (where one segment of the body acts alone) and dual segmental dissociation (two segments execute two separate but associated movements).

Hemiparesis: Incomplete (partial) hemiplegia.

Hemiplegia: Paralysis of one half of the body (an encephalic lesion—brain or brainstem—affecting the main pyramidal motor system.

Hydrocephalus: Dilation of the brain (ventricular) cavities containing the cerebrospinal fluid, caused by excessive fluid accumulation.

Hypertonia: Excessive tone of the skeletal muscles. It can take different forms (spastic, extrapyramidal), depending on the mechanisms affected.

Hypotonia: Excessively diminished tone of the skeletal muscles.

Metacognition: A concept used to refer to a cognitive control process carried out through the subject's awareness of his or her own activity, allowing him or her to understand the procedure and activate self-knowledge in the relationship with learning, strategies and tasks. Metacognition allows students to become aware of what they know and how they know it, in terms of learning and strategies.

Microcephaly: Abnormally small head due to disorders in the development of the encephalus or skull bones.

Monoplegia: Paralysis of a single, entire limb.

Myotonia: Involuntary contraction of a muscle, which gives way slowly, triggered by a voluntary or involuntary contraction.

Neonatal anoxia: Cerebral anoxia (significant reduction in the amount of oxygen in the brain tissue) occurring during labour or immediately after birth (may cause cerebral motor impairment among other things).

Neuropathy: Damage to the peripheral nervous system (general term).

Orthosis: A system composed of a set of components that support, maintain or correct a part of the body. Along with prostheses (which replace a part of the body), they form part of the set of mechanical aids.

Paralysis: Complete loss (partial loss is called paresis) of muscular strength due to nerve damage.

Paraplegia: Paralysis of both lower limbs. In practice, the term is used to refer to paralysis of the lower limbs following damage (traumatic or other) to the spinal cord.

Paresis: Reduction of muscular strength due to incomplete or partial paralysis.

Posture: Maintenance of the body or part of the body in a given position (to correct or prevent a deformation).

Posturo-motor (development): Progression of learning in the area of general motor skills and fine motor skills.

Praxis: A set of coordinated movements directed toward a given goal or intention (according to Piaget). Praxis refers to "intention" or "mental programming" of actions.

Proprioception: The ability to perceive sensitive information from muscles, tendons, bones and joints (position in space, movement, etc.).

Prosthesis: A system composed of a set of components used to replace a part of the body. With orthoses, they form part of the set of mechanical aids.

Quadriplegia: A synonym for tetraplegia.

Recessive: A gene that only produces its characteristic phenotype when its allele is identical. By extension, the term also refers to the method of transmitting the gene.

Semantic memory: The system by which a person stores his or her knowledge of the world. The semantic memory is a knowledge database that every human being has and can access quickly and effortlessly for the most part. This is the memory that stores word meanings, rules and concepts. Semantic memory is independent of time and location. It allows us to remember, for example, the names of the world's major capital cities, social customs, what things do, what colour they are and how they smell. Semantic memory stores rules and concepts that can be used to build a mental representation of the world, independently of immediate perception. The content of semantic memory is abstract and relational, and is associated with the meaning of verbal symbols.

Spasticity: Spastic hypertonia, hypertonia resulting from an exaggerated muscle stretching reflex. The term is applied in particular to pyramidal damage.

Tetraplegia: Paralysis (usually complete) of all four limbs. In practice, the term usually refers to complete or incomplete paralysis of the four limbs caused by traumatic or non-traumatic damage to the spinal cord. (Also referred to as quadraplegia)

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