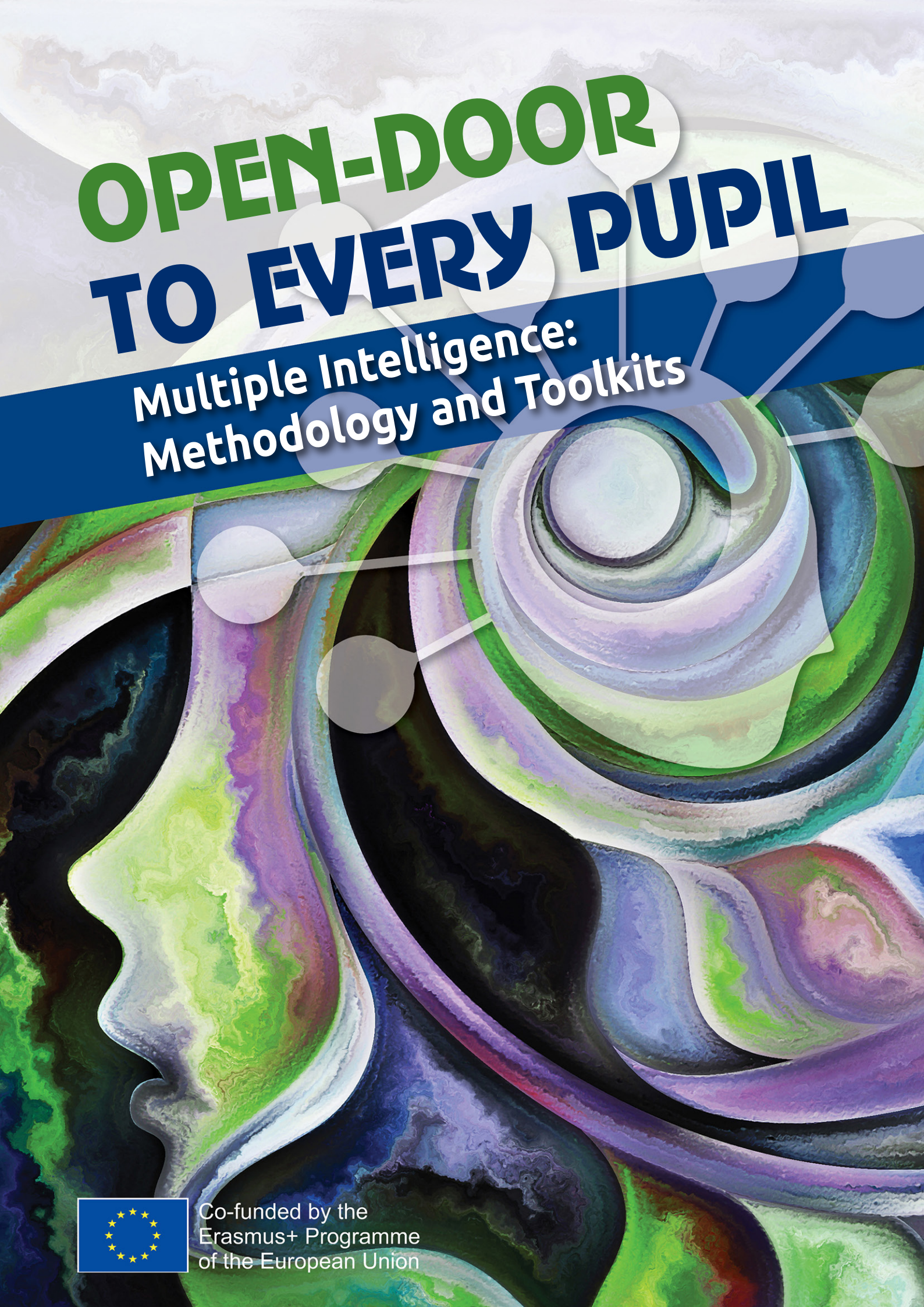
OPEN-DOOR TO EVERY PUPIL

Multiple Intelligence: Methodology and Toolkits



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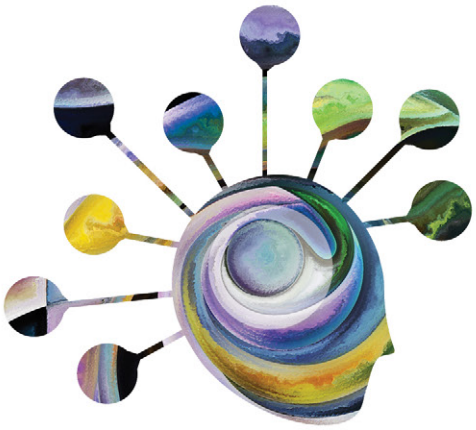

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Multiple Intelligence

Methodology and Toolkits

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Multiple Intelligence: Methodology and Toolkits

(Handbook oriented to teachers at public primary schools to present innovative teaching approaches focusing on individual strengths of pupils in the partner countries - Bulgaria, Greece, Italy and Spain)

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All of them helped us to find the forms how to present the Multiple Intelligence theory and its developed practical tools to teachers and to policy-makers in education. They helped us to understand Multiple Intelligence theory as a system approach opened for development and design of new teaching methods based on the individual types of intelligences of pupils. Further, they showed us how to look at MI theory as one of the alternative options to the longtime dominating traditional educational approach.

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Content

It is of the utmost importance that we recognize and nurture all of the varied human intelligences, and all of the combinations of intelligences. We are all so different largely because we all have different combinations of intelligences. If we recognize this, I think we will have at least a better chance of dealing appropriately with the many problems that we face in the world.

Howard Gardner

Introduction

Today the quality of education and creating functional literacy of children is a priority for every country. It becomes one of the main pillars for building healthy, prosperous, and sustainable societies. Envisioned in this way, societies need to be based on inclusive education; the goal is every child to have access to education that offers equal opportunity to everyone without facing discrimination due to any reason, be it personality traits, learning style, or possessing a unique set of talents and abilities. Despite their differences, today's European educational systems share a common goal of achieving such inclusiveness in the future years, and while some member countries are on the edge of fulfilling this objective, others need to step up their efforts. When we discuss equality of education, it is important to note that usually most people assume that we talk about social and economic equality.

But there is also another understanding of the equality of children at school, related to the learning process, which is determined by the style of teaching. The way of teaching is very important because every individual has different abilities to perceive new information and to acquire new knowledge. In the last decades numerous interdisciplinary studies draw the attention of educators and emphasize that equality of learning environment is the key factor to achieve better quality of education, especially for kids and pupils.

The aim of the Handbook is to present an alternative to the traditional teaching approach – a new one which takes into consideration the specific capabilities of the child and gives knowledge and skills to teachers how to adapt the way of teaching according to them. Multiple Intelligences (MI) theory created by H. Gardner (1983), provides conditions for the creation of a system approach in the implementation of new educational techniques in teachinh. The teacher can use different practical tools and methods by which this theory can be implemented in practice. Gardner states that there are 8 types intelligences and that each individual is intelligent in a different way. Based on this understanding MI theory today is a core for creating a new teaching approach. It is worth to mention that this methodology is developing and upgrading all the time accumulating new knowledge.

The methodology of MI is based on modern scientific results from neurosciences and neuropedagogy which gives a new understanding about mechanisms of learning. Knowledge, emotions and skills are developing in unity and are formed by the innate and inherent specifics of the pupils.

Thus MI provides the keystones for educating kids and children to become creative individuals, much better prepared for their future life and capable of effective professional realization based on their strength abilities. No doubt, it reflects on the increasing of people's capacity for economic and social development on local, national and European levels. It comes possible thanks to a MI – new alternative educational approach that ensures a comfortable, pleasant creative learning environment without stress and aiding children's curiosity to discover the world and their place in it.

A key point is that MI approach is forming step by step the pupil's interdisciplinary way of thinking and understanding about the environment. It forms the first steps to learning based on the comprehensive approach to acquiring knowledge and skills, which later naturally grows into training under the EU program – STE(A)M, focused on training for creative personal and professional realization with complex knowledge and skills.

Having a unique outlook on human intelligences that celebrates diversity, Howard Gardner's theory of multiple intelligences is a valuable tool to facilitate these endeavors. Thus, after almost 40 years from the development of the theory, now is the most appropriate time for it to be applied within the EU educational landscape.

Important advantage of the MI approach is that it creates a class environment for pupils to develop a set of transferable skills in parallel with learning and acquiring new academic knowledge. MI could be a tool for increasing the quality of education and achieving functional literacy of the learners and so to answer the educational priorities of EU policy.

MI approach also creates advantages for the teachers, such as: optimizing their work time, giving areas of creativity to achieve the national educational standards, and motivating professional development. Overall, increased awareness of MI allows the teacher to teach their pupils how to concentrate better in class. Familiar with the appropriate pedagogical tools, he/she can better mobilize the attention of students, whose level of distractibility in general is alarmingly increasing nowadays. Furthermore, the MI approach has the potential to motivate parents to become partners of the teachers in the education of their children together with teachers and in this way to engage parents to be more responsible in children's' bringing up. The advantage is that this could be achieved in a calm motivated self-organized process.

Today almost all key parties in the educational sector sense that the time for teaching reforms is coming.

In recent years a lot of private schools have been established in EU member states. They implement great variation of educational innovative methodologies.[1] These type of schools are also well accepted by the society and attract a lot of pupils as most of these schools are oriented to kids and children and offer elementary curriculum.

Our focus is on public schools and the possibility to implement MI methodology there. The reasons to suggest this are:

(1) Current situation at schools shows the need of reforms of the teaching process and so a majority of teachers are looking to use different alternative techniques for teaching.

(2) Implementation of the MI approach in public primary schools does not need a lot of additional financial resources, but it needs rearranging the available ones and the focus to be on giving proper knowledge and qualification of the professionals.

National educational teaching systems are defined by the educational policies, so each EU member state develops its educational teaching systems by taking into consideration society's

1 Such example is Logiscool describing their way of teaching: Fun-based coding school for the 6-18 years old . The first Logiscool started in Budaörs (Hungary) in January 2014 and today there are more than 110+ locations in 20 countries. The number of schools and students are dynamically growing and more than 100,000 students participate today their courses.(https://www.logiscool.com/bg/about;) Maple Bear chain of Canadian schools becomes recently very popular in Europe as the way of teaching is very close of MI methodology. For a relatively short period of time (about 15 years) there are currently over 560 Maple Bear early childhood, elementary, middle, and high schools in 22 countries around the world. (https://www.maplebear-cee.com/bg/about-us/)

development and overall situation (technological changes, socio-economic context, etc.) in education sector.

This Handbook is addressed to teachers and especially to teachers at primary schools. It aims to highlight and prove the importance of the Multiple Intelligence Theory and to provoke their interest regarding the integration of Multiple Intelligence approach to future educational policies.

Advantages of the Multiple Intelligences Theory

When the Multiple Intelligences Theory was presented in Frames of Mind (1983), Gardner introduced the very innovative approach to the theory of intelligence which is the idea that intelligence is not set in stone and that can never be changed. Gardner defends that intelligence can be improved with training and education[2].

Additionally, the idea that there are different intelligences and that kids can learn through different styles is a breaking point in education. With the Multiple Intelligences theory we can design more inclusive learning environments that take into account that pupils have different needs and that there are different ways to address them to improve their academic achievement.

Using MI methodology, there are advantages for both the teachers and the pupils.

Amongst the main advantages of the use of this theory, we can find the following ones concerning teachers:

- Different entry points to content allow for more adapted teaching to every pupil at class
- Easier integration of child with SEN (special educational needs) to class activities
- Better prepared to e-learning technics and IT skills so, they become skilled for distant education
- Establishing synergy work between teachers and parents; Involving parents to support different school activities as volunteers based on their professionsto achieve better teaching process
- Creating equal educational environment for everybody to ensure motivation to study. This way the engagement of learners is higher
- New ways of evaluating students
- Improved behaviour in class
- Teaching becomes more creative and flexible.

Different entry points allow for more adapted teaching

The use of multiple intelligences allows for including multiple and different entry points on content. These entry points are what Gardner defines as “windows on the same concept”[3].

2 Gardner, H., 2011. Frames of mind (3rd ed.). New York: Basic.

3 ídem

This means that teachers can offer ways of learning inside the classroom that uses different types of intelligences and therefore:

- The engagement and knowledge achievement of all pupils are higher
- More pupils can access the knowledge
- Masters and maintains pupils' attention throughout the class by the invisible control over the learning process through his/her power of autonomy
- Learning is adapted to the learners and is therefore more efficient.

The result of this advantage is that the education provided with using this theory is more inclusive and consider the specific needs of each of the learners in the classroom.

Easier integration of children with SEN to class activities

According to several studies, the inclusion of Multiple Intelligences theory as the basis while designing the curriculum for the classroom, students with Special Education Needs (SEN) can showcase their own abilities, that sometimes are underrepresented in the traditional educational system.

> "Using MI as a backdrop, educators can begin to perceive children with special needs as whole persons possessing strengths in many areas"[4]
>
> T. Armstrong

The implementation of this theory results in creating a natural environment for SEN pupils and therefore allows to use their human resources in a more efficient way.[5]

Better preparation for e-learning technics and IT skills in order to become skilled for distant education

In order to implement e-learning in an effective way, the theory of multiple intelligence is utilized.[6] This is especially relevant when we take into account the fact that e-learning is a very heavily text-based approach to education.

Offering different entry points to pupils in an online environment is of great importance, and even more when speaking of e-learning,[7] since this approach will facilitate the learning of learners that are otherwise alone.

4 Armstrong, T. (2000). Multiple Intelligences in the Classroom. 2Nd Edition (1st ed.). Association for Supervision and Curriculum Development

5 Rile, L., Opulencia, M., Decenorio, N., & Tan, N. (2015). Multiple Intelligences of Students with Learning Disabilities: Its Implication for Business Curriculum Development in United Arab Emirates. Procedia Economics And Finance, 23, 894-898. doi: 10.1016/s2212-5671(15)00517-1

6 Green, C., & Tanner, R. (2005). Multiple intelligences and online teacher education. ELT Journal, 59(4), 312-321. doi: 10.1093/elt/cci060

7 Mankad, K. (2015). The Role of Multiple Intelligence in E-Learning. IJSRD – International Journal For Scientific Research & Development, 3(5), 1076-1081.

Establishing synergy work between teachers and parents; Involving parents to support different school activities as volunteers based on their professions, so achieve better teaching process

Families can be more involved with their children education when an approach based on Multiple Intelligences is implemented. This is due to the fact that they can offer their participation in the different areas that are presented since they offer more flexibility. MI theory also gives knowledge to the parents how to achieve better behaviour with their children out of school. Parents will be motivated to be the active side of the collaboration with teachers.

This also allows for families from different economic, social and cultural backgrounds to be more involved with the education of their children. Schools would therefore not only be inclusive for the individual characteristics of each of the pupils but also of their background.

Creating equal educational environment[8] for everybody and so, to ensure motivation to study and the engagement of learners is higher

When introducing the MI theory into practice, teachers may choose to use three approaches, which allow them to create an educational environment that fully engages and motivates pupils[9]. The approaches are not exclusive and can be implemented complementary at different stages with the same group. The three approaches are:

- The variation approach

In this approach, teachers rotate the activities so that students are in contact with all the intelligences. Teachers can identify in this stage with what intelligences are predominant in each of the students.

- The choice approach

If the predominant type of intelligences of pupils are very varied, the teacher can decide to propose different choices from students to learn the same material using different intelligences.

- The bridge approach

When, on the other hand, students are primarily predominant on one type of intelligence, this approach allows teachers bridge the content that is being taught to this predominant intelligence.

MI methodology provides advantages to pupils as well as to their teachers.

8 Equal educational environment here and in the whole text means to create equality of each pupil based on preferable abilities easier to get new information which is determined by the dominated profile of his/her type intelligences.

9 Adapting Instruction to Multiple Intelligences. Retrieved 13 July 2021, from https://www.scholastic.com/teachers/articles/teaching-content/adapting-instruction-multiple-intelligences/

New ways of evaluating students

The multiple intelligences theory can also be a great tool to offer teachers new ways for evaluating and assessing the learning of pupils, as well as their development in different areas. For example, the MI theory has been used to evaluate text in foreign languages (English) in Algeria[10] or to identify "high-ability students" in Spain[11].

Improved behaviour in class

Research has shown that behaviour of students can be improved by even as much as 77% if using the Multiple Intelligences theory[12]. This is a result of a better teacher-student relationship, a better engagement in the classroom and the lack of long stretches of time in which students can start disruptive activities[13].

MI theory allows to teach in a pleasant and stimulation learning atmosphere in the classroom that results to increasing pupil's motivation and the accomplishing of better results of teaching.

Teaching becomes more creative and flexible

One of the key advantages of using the MI theory is that teaching becomes much more creative and flexible. MI theory encourages teachers to find solutions thinking without constraint, and coming up with learning solutions for the challenges that they face in class. These ideas that they are now thinking are more diverse, and can be tailored to the specific needs of each of the pupils.

MI methodology could reduce the teacher's time for pre-lessons preparation once he/her has mastered the teaching techniques. Moreover, teaching process becomes more creative and stimulating for self-qualification and increasing competences. It also becomes an inspired and imaginative process that will make the profession attractive and so to bring back its high prestige in the society.

MI theory has also advantages for pupils

Some of the key advantages we find out are as follows:

- New knowledge is accepted by pupils in an easy, enjoyable, accessible and even fun way and so new knowledge is easier to be remembered. The learning atmosphere is oriented to collaboration and mutual assistance and self-learning among peers. There is a lack of

10 Boulmaiz, D. (2017). The Place Of The Multiple Intelligences Theory In The Algerian EFL Textbook :, An Evaluation Of 1st Year Secondary School Textbook "At The Crossroads".

11 Hernández-Torrano, D., Ferrándiz, C., Ferrando, M., Prieto, L., & Fernández, M. (2014). La teoría de las inteligencias múltiples en la identificación de alum-nos de altas habilidades (superdotación y talento). Anales De Psicología, 30(1). doi: 10.6018/analesps.30.1.148271

12 Highland, S., McNally, P., & Marci, P. (2019). Improving Student Behavior through the Use of the Multiple Intelligences (Master's Action Research Project). University and IRI/Skylight.

13 Celik, Suleyman. (2015). Managing the Classes by using Multiple Intelligence Instruction. Journal of Education; ISSN 2298-0172; Volume 4, Issue 1, 2015. 4. 25-29.

stress based on permanent competition and rivalry in the learning process.

- Pupil creates a sense of free choice during the learning process and a sense of self-importance

> MI methodology ensures pupils learning without any stress and to feel free and comfortable always to ask questions and to share their opinion.

- MI methodology creates an environment in which each pupil creates a sense of fair and deservedly evaluation by the teacher and classmates
- Forms transferable skills in parallel with the acquisition of new knowledge like: ability to express and affirm personal opinion, critical thinking, team working and communication skills, etc.
- Developing a dialogical personality – forms the ability to evaluate and to understand the different opinion without rejecting it.

Contribution of MI Methodology to training process

The methodology of MI is based on a different understanding of the learning process, based on modern scientific results from neuroscience and neuropadagogy. The learning process is understood as a complex of perception and acquisition of new knowledge by the pupil. Moreover, in parallel with learning pupils develop their transferable skills and socialization behavior under the directions by the teacher. Knowledge, emotions and skills are developing in unity and are formed by the innate and inherent specifies of the pupils.

It is worth that MI approach allows to introduce and form step by step pupil's interdisciplinary way of thinking and understanding about the environment.

Innovation and essence of the methodology of MI in relation with the learning process

The innovativeness of the methodology is on different understanding about equal environment in class, based on the individual abilities of pupils to accept and understand new information. These individual abilities have two components – innate and trained and they form individual preferences and characteristics of the pupils to ways of learning and perception the new information and its memorizing. A core of the methodology is the theory of multiple intelligence (MI) created by H. Gardner. According to the theory each individual has his own dominant profile of capabilities, through which it is easier to perceive and memorize new knowledge. Gardner named these capabilities intelligence.[14] There are 4 main principles ensuring the equal training environment:

Key points in the MI Theory

- Each person possesses all eight intelligences.
- Most people can develop each intelligence to an adequate level of competency
- Intelligences usually work together in complex ways
- There are many ways to be intelligent within each category.

1. Each individual has 8 types of intelligences, developed to varying degrees according to their lifestyle and environment;

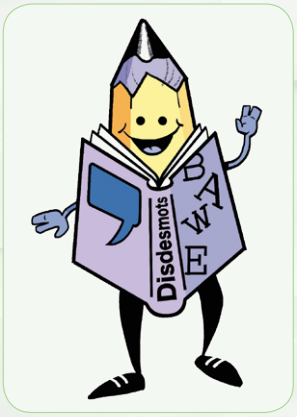
14 Today Gardner's MI theory in general is well known and accepted among professionals. Some of the discussions concern the terminology and some researchers argue that the human capabilities that Gardner named 'intelligences" could be named also "talent", they question is it a reality each individual to be somehow intelligent or it is a beautiful utopia (Steve Bissonette, Clermont Gauthier, Mario Richard, Enseignement explicite et réussite des élèves La gestion des apprentissages) Ongoing discussions don't reject the main principles of Gardner's theory for education but are directed to its clarifying

2. Each type of intelligence can be developed throughout the life of the individual. However, the level of development that is achieved is different;
3. Each individual can be intelligent in a different way with one type of intelligence dominating;
4. All types of intelligences are in constant interaction and determinat preferred interaction with the environment.

Currently the understanding that each child learns in a different way is well known. The alternative that the MI methodology provides to traditional educational methodology is the teacher to include all types of intelligences in the teaching process and by doing this to activate different pupils' channels for perception of new information. This is the main difference of the traditional conventional style of teaching, which was the only one rightly accepted methodology for a long time. But this style of teaching is based mainly only on two types of intelligence in Gardner's understanding. Somehow it creates unequal learning environment for the students because these two types of intelligences are not the preferable to acquire new information for all of them. (linguistic and logical-mathematical.) Thus the learning environment could not be equal for the students, as not for all pupils in class these two types of intelligences are the preferred types of intelligence through which the child acquires new knowledge more easily.

H. Gardner identifies the following eight types of intelligence based on their specific characteristics. They are:

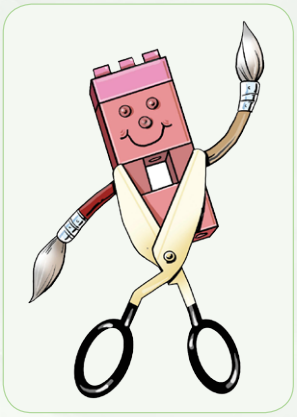
Linguistic intelligence (L)



WORD Smart

The ability to express ideas by words: capability to speak, to read, to listen; to write and express by telling stories, proverbs, poems, using both – written and oral expression.

Visual-Spatial Intelligence (S)



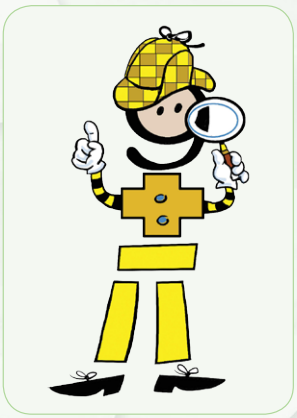
PICTURE Smart

The ability to notice, to recognize and to virtually change parameters (shapes, colors, sounds) of virtual pictures, based on a real images: capability to „see" them in a wide range of the 3-Ddimensional space; to be able to recognize and have fun with different shapes, colors and pictures, to paint, to have a good orientation, to easy navigate in sketches, road maps, diagrams and graphics, but also to be able to dream, to watch movies.

Logical-mathematical Intelligence (LM)

NUMBER Smart

The ability to think logically; to perform mathematical calculations, to arrange, to solve mathematical tasks, also the ability to organize, analyze and manage time, the time as well as the ability to think and reveal causal connections.



Naturalist Intelligence (N)

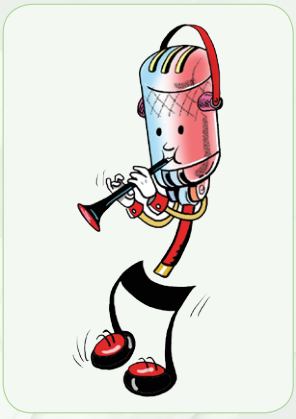
NATURE Smart

The ability to perceive and to feel nature – the animate and the inanimate world; the ability to distinguish different representatives of the environment in detail by assessing them in relation to their positions and survival, the ability to engage in and to feel convenient in natural areas (biophilia). The ability to observe, recognize, identify and classify plants, rocks, to try to understand nature and respect it, to have an ecological approach in actions aimed at protecting the environment. It is also the ability to categorize and classify nature objects or data according to their characteristics. These individuals are gifted in recognizing natural patterns.

Bodily-Kinesthetic Intellgence (BK)

BODY Smart

The ability to express oneself through the body or through their body parts, the ability to express in a clear and precise way like: touch and tig, movement, express forms of their problems and their relevant solutions by combining mind and body; persons with deftness and dexterity, high ability for assembling and disassembling objects.



Musical Intelligence (M)

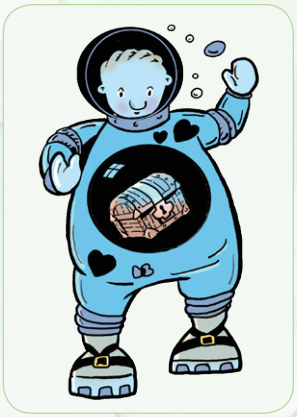
MUSIC Smart

The ability to perceive, to evaluate, and to compose music through rhythms, tones, and modulations. The ability to be sensitive to sounds, rhythm and music: to sing, to play a musical instrument, to beat time, to whistle; the capability to be sensitive to emotional messages of music and to the surrounding natural sounds like birdsong.

Intrapersonal Intelligence (I-)

SELF Smart

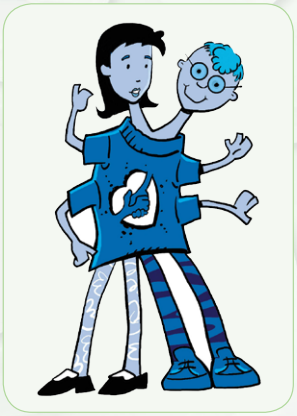
The ability to know and evaluate yourself: to be able to take advantage of the strengths and to take into account the shortcomings, to set personal goals and to achieve them, to be responsible of the actions, to be able to motivate yourselves.



Interpersonal Intelligence (I+)

PEOPLE Smart

The ability to understand others and their intentions, to be able to interact with others in an appropriate way: to integrate and adapt easily, to exchange ideas, to prevent and resolve conflicts, to regulate interpersonal relationships, to organize and lead others.



Using the Theory of Multiple Intelligence in Practice

To determine the strengths of the pupils or their dominant profile of intelligence are designed special tests. They are specially made for the age of the learners. (see the part: Practical Tools)

When working with tests in the class, the teacher should pay attention to the fact that: each individual has their own strengths and everyone is intelligent, but in different ways. There is no type of intelligence that is stronger or better from another.

The teacher has also to keep in mind, that the tests do not in any case reveal a comprehensive picture of the dominant profile of intelligence of the learner. More over, it is important for an educator providing tests not to mistake ***interest*** with ***intelligence***. A child who enjoys music does not necessarily use rhythm and melodies to understand concepts, solve problems, or create musical products. The tests are only indicative and their application is intended to facilitate the teacher in understanding the specific attitude of the pupils and to get general picture about the preferable leading forms of intelligence of the learner. Gardner, like Montessori, relies on observation, which is the core of the behavioral understanding. MI theory considers the person a complete human being, full of feelings, emotions, and whose intelligence is not limited to a test result only. Therefore, the results of individual tests used to determine the dominant profile of intelligence of the learners should be used informatively and should not be treated as an absolute given.

A set of criteria are developed for revealing and monitoring the pupils, aimed at determining their profile, which could help/aide the teacher. (See Practical Tools: Multiple Intelligence Types – Assessment for Determination Dominant Profile of a Child, Evaluation Sheet)

It is important before the teacher begins testing the pupils, they to have at least basic understanding about MI theory and to know that all type of intelligences are good and there is no hierarchy among them. (See Practical Tools : A Way for Presenting MI – MI as a Pizza)

Teaching Strategy for each individual learning in class

Once the dominant intelligence profile of the pupils has been determined, it can help the teacher to develop an individual teaching strategy oriented to each learner in the class as well as to generate the way of giving new information as a whole. It is important that this approach for teaching can be discussed with parents of the learner and so to provide them with valuable information to help them to know how their child prefer to study and acquire knowledge at home.

Each type of teaching strategy and memorizing includes:

- Description of the preferred learning model associated with each type of intelligences;
- Distinctive characteristics of each type of intelligences;
- Competences for any form of intelligences;
- Ways to stimulate learning based on profile of intelligences of each pupil.

The ways for easy memorization and assimilation of knowledge in accordance with the dominant profile of intelligences of pupils are designed[15]. Here are summarized the most popular pedagogical technics:

Linguistic intelligence (L)

He/she learns best by reading aloud; transcribes the texts; retells a text in own words; creates a questionnaire on a given plot; keeps a diary on new words and terms; speak in your mind mind mentally; highlights, take notes about keywords; notes important ideas in a text box; describes own ideas to organize them; studies aloud; negotiates his lessons aloud in front of someone; uses a dictaphone.

Distinctive features:

Ability to use words clearly and in place; reads, writes and expresses itself grammatically correct.

Competencies:

Spelling, language vocabulary and grammar

Ways to stimulate learning:

To speak to the pupil, demand him to express own opinion, always to be heard. Provide him with books, get him to write, read to tell stories, visit libraries and bookstores. Provide completing crossword puzzles with vocabulary words, ask to create poems and stories for a class events.

Logical-mathematical (LM)

The best way to study is: by looking for models and abstract links, by forming concepts and classifying them into groups; by using graphs and statistics; by creating and testing hypoth-

15 Armstrong, T., & Association for Supervision and Curriculum Development. (2009). "Describing Intelligences in Students". Multiple intelligences in the classroom. Alexandria, Va: ASCD

eses; analyzing data; designing diagrams and tables to synthesize; finding relations between different terms; by decomposing the tasks into parts.

Distinctive features:

Operates with numbers easily. Existence of logical and rational thought

Competencies:

Abstract reasoning, calculus, mathematical operations, grouping by categories, presentation of ideas, identify and establish interrelations and logical models.

Ways to stimulate learning:

Provide the pupil with materials for experimentation, give him classification exercises, encourage him to think in his mind, to play logic, deductive and mathematical games, riddles, chess. Provide designing alphabetic and numeric codes. Take him to museums, exhibitions and exhibitions.

Visual-Spatial Intelligence (S)

The best way to study is by visualization, through drawings and paintings; using colors, graphic symbols, diagrams, maps to organize ideas; highlighting the text; uses videos, models and collages; using visual symbols.

Distinctive features:

Think and process information in pictures and images. They have excellent visual receptive skills and excellent fine motor skills Ability to design pictures; has visual and spatial sensation; three-dimensional thinking.

Competencies:

Visualization, orientation, sense of space, technical drawing, fine arts, sketching, drawing, modeling, imagination.

Ways to stimulate learning:

Tell the pupil stories that awaken the imagination. Show and read him diagrams, maps and plans. Let him paint and color. Equip it with a camera, telescope and compass. Buy him a three-dimensional constructor. Play on preview. Explore architectural sites, galleries, planetariums together.

Musical (rhythmic) Intelligence (M)

Think, feel, and process information primarily through sound. The best way to study is through rhythm and melody, just singing or singing what he needs to learn; reading in a rhythmic way; transforming important elements into music or rhythm; finding musical analogues; working on a musical background, creating a music library; making a symphony of words; compose a song to learn a notion; uses intonation to facilitate memorization; uses music to change his mood and create a work environment; uses rhythm to learn rules, definitions and concepts.

Distinctive features:

Has a sense of melody and rhythm; musical memory; artistic sensitivity; auditory sensitivity.

Competencies:

Play more than one musical instrument; sings, composes melodies.

Ways to stimulate learning:

Let the pupil to study on a musical background; get him to write own songs and music about content-area topics, to put poems to music, and then performing them for the class, ask to set a poem to music, and then performing it for the class, use rhythm and clapping to memorize math facts and other content-area information; to take music lessons, to compose music; provide him with musical discs and musical instruments; comment on the lyrics of his favorite songs; take him to opera and concerts.

Bodily-Kinesthetic Intellgence (BK)

The pupil learns best by moving (ex.: counting by jumping rope, clapping hands); gets to know objects by touching; uses gestures and movements to better remember notions and information; imagines himself on stage and plays what he learns; hands movements and gesticulates, winks, smiles to show that he has understood; exercises to relax; lesson revisions while playing ball with a friend. There is a special harmony between their bodies and their minds. They can control their bodies with grace, expertise, and athleticism.

Distinctive features:

Rich physical culture, skillful in handling objects, adroit.

Competencies:

High level body expression and body control, communicates nonverbally; imitates gestures; dexterity and adroitly.

Ways to stimulate learning:

Give opportunity for role-playing, skits, or simulations, chance to improvise theatrically, to dance; any physical activity is useful. Provide him with intensive group activities. It is recommended to enroll in a sports clubs. Make available building objects using blocks, cubes, or Legos to represent concepts from content-area lessons. Provide him with physical work and the opportunity to repair and regulate various mechanisms.

Interpersonal Intelligence (I+)

The best way to learn is by explain to others or together with a friend. in interaction with others; pupil has a natural ability to interact with, relate to, and get along with others effectively; put a lot of questions and like to discuss; studies well in a public place (library).

Distinctive features:

Ability to feel and interact with other people. To feel and understand the emotions of others.

Competencies:

Emotionally sensitive to other, ability to work in a group, easily make friends, easily communicate, innate leader, social type of personality.

Ways to stimulate learning:

Provide the pupil to play team games and team sports. Give him the opportunity to share knowledge with others, to work in pairs to learn math facts, to work in cooperative groups to design and complete projects; provide him with communication activity. Let him to do a task – interviewing people with knowledge about content-area topics and to present it in class; participate in family and social events.

Intrapersonal Intelligence (I-)

Has a deep awareness of his feelings, ideas, and goals. Pupils with this intelligence usually need time alone to process and create; the best way to study is by creating his own rhythm and organizing his time on his own. Study alone. Capable to self-assess. Assess its own strengths and weaknesses. Set goals for the future and planning ways to achieve them. He can recognize the feelings and emotions and overcome them. He has an inner positive attitude. He is rewarded himself for his success. He is responsible for his learning. Keep a diary.

Distinctive features:

He knows himself, ability for abstract thinking, reasoning ability and mental concentration; good emotional control.

Competencies:

Motivated to achieve certain goals. Has clear value system and self-confidence. He thinks before to act, compliance with ethical norms.

Ways to stimulate learning:

Encourage the pupil to reflect on his thoughts and acts and ask to write reflective papers on content-area topics. Stimulate him to keep a personal diary and essay writings. Allow him to play alone, to take long walks in silence, provide him personal space just for him.

Naturalist Intelligence (N)

The best way to study is by interacting with nature like: outdoor activities, making lists and structure information; pleasant places stimulating creativity are: in front of a window, in front of an aquarium, in a place with plants or in front of paintings with landscapes; easy remember information by structuring it; comfort studying is with the pet in his hands; talking to plants if no one is listening him; try to remember what he has learned while going to school or home.

Distinctive features:

Enjoy being in nature, easily recognize and categorize plants, animals, and rocks.

Competencies:

Recognizes natural species. It classifies them and finds connections between different ecosystems. Pays attention to natural phenomena.

Ways to stimulate learning:

Caring for classroom plants, sorting and classifying natural objects, such as leaves and rocks, Researching animal habitats, provide to observe natural surroundings, participation in park/playground clean-ups, recycling drives, and beautification projects. Help him build an aquarium. Stimulate his environmental awareness. Encourage him to have a pet. Take him to a zoo, a science museum and aquariums.

* * *

The success of the approach based on the theory of Multiple Intelligence in the classroom depends on:

- The teacher to ensure a rich and stimulating learning environment, by presenting new information using all forms of intelligence simultaneously without focusing the attention of each pupil to a single one, albeit their dominant, form of intelligence; during teaching to promote development of varied of intellectual potentials supported by multiple symbol systems.
- The teacher to get to know and take into account the individual differences of each pupil and through these differences to organize curriculum around pivotal topics and to try to develop the whole type of intelligences of the pupils aimed to achieve better functional literacy of everyone. (See practical Tools: Questionnaire: To identify the dominant type of intelligence of kids and pupils, Entry point, Bridging between Theory of MI and Practice)

MI Theory teaching children with Attention Deficit and Hyperactivity Disorder (ADHD)

Drawing on Gardner's theory of Multiple Intelligences, we focus on children with Special Educational Needs (SEN) and particularly on those with Attention Deficit Hyperactivity Disorder (ADHD).

After a brief introduction on ADHD, this paragraph provides education practitioners with guidelines for using Multiple Intelligences (MI) technology and methodology to meet the educational needs of children suffering from the condition. Further, it aims to facilitate MI theory integration in mainstream classrooms by helping teachers cultivate a new set of skills and competences.

Special Educational Needs and Attention Deficit Hyperactivity Disorder

Because of the absence of a harmonized classification framework of Special Education Needs (SEN) in Europe, SEN are defined within each country's national legislative framework.[16] Against this backdrop, an operational definition was provided by the European Agency for Special Needs and Inclusive Education (EASIE), which states that children/learners with SEN are those officially recognised as eligible for additional educational support to meet their learning needs.[17]

> Being equipped with a unique configuration of all the intelligences, each student possesses different strengths, weaknesses and learning style. Helping ADHD pupils-learners discover and reinforce their strong points may allow them to rebuild their self-confidence and forge meaningful ties with their peers, sustain attention by engaging in activities they enjoy, better understand the academic material, and improve in any areas they may lack.

The reasons for an official SEN decision may differ considerably both between countries and individuals. According to UNESCO's „International Standard Classification of Education 2011", „reasons may include (but are not limited to) disadvantages in physical, behavioural, intellectual, emotional and social capacities".[18]

16 RAND Europe, Support for children with special educational needs (SEN). 2013.; https://www.rand.org/pubs/research_reports/RR180.html

17 EASIE, Methodology Report. 2018. p.21.; https://www.european-agency.org/sites/default/files/easie_methodology_report_updated_2018.pdf

18 UNESCO, International Standard Classification of Education. UNESCO Institute for Statistics, 2012. p. 83.; http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

Amongst the various reasons for SEN is ADHD, a neurodevelopmental disorder thought to affect around 7% of students worldwide[19]. According to the „Diagnostic and Statistical Manual of Mental Disorders" of the American Psychiatric Association (DSM-5), neurodevelopmental disorders are genetic/hereditable and at least partially caused by abnormalities of the central nervous system.[20] In the case of ADHD, primary diagnostic symptoms include[21]:

- Lack of self-control and inability of the student to self-regulate their behaviour.
- Difficulty concentrating and maintaining attention.

The above symptoms do not necessarily occur together. Some children may experience one type of impairment more intensely; in others, they may all coexist. However, for a child to be diagnosed with ADHD, impairments have to be deviant from their developmental level and significantly disrupt their daily-lives. Specifically, attention and/or self-regulation deficits may culminate in academic underachievement, diminished social relations, and subsequent feelings of exclusion.[22]

Additionally, ADHD co-occurs with at least one psychiatric comorbidity in more than 2/3 of all cases, most prominently with other special learning disabilities, such as dyslexia[23] . Even ADHD children with no comorbid special learning disabilities, however, may exhibit major difficulty in language expression and comprehension – both in oral and written language – , as well as in performing mathematical calculations[24].

All the above skills pertain to that which is measured by traditional IQ tests[25], or in Gardner's terms, to verbal-linguistic and logical-mathematical modalities/intelligences. Despite usually having a normal range of traditionally measured IQ[26] , children with ADHD fail to fulfil their potential in those areas due to their inability to concentrate and stay on task[27].

Although important to personality development and well-being, linguistic and mathematical skills are overvalued within the contemporary school system and in society overall. MI theory stresses this point and advocates for a change of paradigm: everyone possesses a wide range of abilities/intelligences, none of which is inferior in terms of facilitating access to knowledge. Alongside traditional educational pathways which focus on linguistic, logical-mathematical, and

19 Clark, Stephanie. ADHD-Europe Survey, 2nd Edition. ADHD-Europe AISBL. 2011. p. 5.; https://adhdeurope.eu/wp-content/uploads/2020/11/Survey-2011.pdf

20 American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 2013. (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

21 Ibid.

22 Barkley, R. A., (2006). Attention-Deficit Hyperactivity Disorder: A Handbook for Diagnosis and Treatment (3rd Ed.). New York: Guildford Press. ; Normand, S., Schneider, B. H., & Robaey, P. (2007). Attention-Deficit/Hyperactivity Disorder and the challenges of close friendship. Journal of the Canadian Academy of Child and Adolescent Psychiatry = Journal de l'Academie canadienne de psychiatrie de l'enfant et de l'adolescent, 16(2), 67–73.

23 Canadian ADHD Resource Alliance (CADDRA): Canadian ADHD Practice Guidelines, Fourth Edition: Chapter 2: Differential Diagnosis and Comorbid Disorder. Toronto ON; CADDRA, 2018.; https://www.caddra.ca/wp-content/uploads/CADDRA-Guidelines-4th-Edition_-Feb2018.pdf

24 ibid.

25 Gardner, Howard. (1999). "Before Multiple Intelligences". Intelligence Reframed: Multiple Intelligences for the 21st Century. Basic Books.

26 Mackenzie, G. B., & Wonders, E. (2016). Rethinking Intelligence Quotient Exclusion Criteria Practices in the Study of Attention Deficit Hyperactivity Disorder. Frontiers in psychology, 7, 794. https://doi.org/10.3389/fpsyg.2016.00794

27 DeShazo Barry, T., Lyman, R. D., & Klinger, L. G. (2002). Academic underachievement and attention-deficit/hyperactivity disorder: The negative impact of symptom severity on school performance. Journal of School Psychology, 40(3), 259–283. https://doi.org/10.1016/S0022-4405(02)00100-0

to a lesser extent spatial abilities (e.g. geometry), MI theory adds emotional skills (intrapersonal, interpersonal), kinaesthetic and musical ones, as well as naturalistic (the ability to learn through connecting to the natural world and observing natural patterns).[28] Moreover, there is an „entry point to knowledge"[29] which roughly corresponds to each of these intelligences, such as a narrational, a numerical, but also a hands-on and an existential entry point. The implications these have for education are enormous. Being equipped with a unique configuration of all the intelligences, each student possesses different strengths, weaknesses and learning style. Educators are thus urged to discover those characteristics and tailor schooling to accommodate each student by presenting the same material through multiple pathways. In doing so, they will be able to think about their students in terms of growth, not deficits.[30]

> MI theory suggests that there are many "windows" to knowledge, or entry points. Each subject maps naturally onto some of the entry points and teachers may employ one, all, or a combination of them. When a student is unwilling or unable to engage in an activity, teachers may encourage them to tackle the same subject from an alternate perspective.

More specifically, helping students discover and reinforce their strong points may allow ADHD children to:

- Rebuild their self-confidence.
- Feel included and forge ties with their peers.
- Sustain attention by engaging in activities they enjoy.[31]
- Better understand the academic material through alternative educational pathways, and
- Gradually gain the necessary competences to improve in what they lack.

That being said, teachers might feel overwhelmed with incorporating alternative strategies to accommodate the needs of their pupils with ADHD. After all, it is not clear how they could adjust the learning environment appropriately or in what novel way they could present the academic material.

Nevertheless, there is a strong consensus that children with SEN would benefit most from receiving education in mainstream schools alongside their neurotypical peers[32], although they may require additional assistance, sometimes in a daily basis. Moreover, according to the prevalence of the condition, chances are at least a child with ADHD is present in every classroom. These facts create an imperative for teachers to devise adaptive pedagogical strategies and cultivate the necessary competences to employ them.

28 Gardner, H. (1999). Intelligence reframed: Multiple intelligences for the 21st century. Basic Books.

29 Ibid. p. 171

30 Armstrong, T., & Association for Supervision and Curriculum Development. (2009). Multiple intelligences in the classroom. Alexandria, Va: ASCD.

31 https://childmind.org/guide/what-parents-should-know-about-adhd/concentrate-on-some-things/

32 RAND Europe, Support for children with special educational needs (SEN). 2013.; https://www.rand.org/pubs/research_reports/RR180.html

Teaching process based on MI methodology and transferable skills such as: critical and creative thinking, analytical skills, teamwork, communication skills

The methodology of MI requires a close connection between the learning environment and the organization of the teaching process with the perception and assimilation of the given knowledge. Most of the MI implementation tools are training like "learning by doing". Thus there are natural conditions for the formation of transferable skills of the pupils in parallel to acquiring the new academic information. It is important to understand that the transferable skills cannot develop separately. As a rule, transferable skills are formed together in a set of different combinations determined by the type of activity. The nature of transferable skills is that they are grouping in a special way and the main element of the group set is the dominant type of intelligence.

Pupil forms his transferable skill step by stem during solving different tasks given by teacher around every topic of the standard educational academic program. Most visible it could be recognized when pupils have to work in groups. Everybody as a member of a team work is involved in a conditions to solve the specific task and to achieve the result. Members of the group have to look for the solution together, so they are placed in a situation ***to work in a team.***

During separate phases of solving the task pupils must use different skills, such as: to reveal in understandable way the conditions of the task and to outline possible ways to reach a solution. They have ***to think analytically and critically, to hear and to listen, to perceive and to comprehend the opinion of all group members***, that means: to hear other people's opinion, to have a dialogue and to reach a common opinion. In the last phase of group work – pupils must present the decision they have reached. For this purpose, they have to select who to present the achieved results, to decide the best way for the results' presentation like: as a text, as text and visualization, as text, visualization and action, etc. So, during deciding the set of presentation's forms of their results pupils learn to communicate effectively, to evaluate the audience of their presentations and according to it to select the most appropriate forms. An important element is training the skills to delegate the rights to present the result of a joint activity with his personal participation to another member of the group and so their joint achievements to be presented in the best way. Effective teaching requires appropriate uses of assessment of the team work. The primary purpose of assessment is to aid development and learning rather than to sort, track or label. It needs a different type of knowledge evaluation.

Each task assigned to a pupil or a group of pupils by the teacher in parallel goes together by a process of forming a different range of skills. It is important the teacher: (1) to select the

tasks in accordance with the individual dominant profiles of pupils' intelligences in each group, (2) gradually to complicate the tasks that require together increasing the new knowledge and also enlarging the variety of skills to be developed.

MI methodology creates environment pupils to acquire academic knowledge and in parallel to form transferable skills.

As a result – a large set of transferable skills is developed in parallel during every single task by practicing MI methodology.

It is especially important to keep the basic principles of the learning process according to the MI methodology through the specific tasks as: each pupil (person) is intelligent in his own way, the atmosphere during training is of cooperation, not of dominance and competition. The skill of the teacher is to manage and control the learning process invisible to the pupils, creating a sense of free choice, his/her affirmation in the community in the classroom, according to individual innate abilities.

Organization of the learning environment for effective implementing of MI methodology; how to create a flexible class

Learning environment is a key element of effective implementation of the MI methodology. The interior of the classroom is important as much as the difference of the traditional organization curriculum around pivotal topics it is. Open learning space means possibility for flexible seating and writing locations and spots, integration of technological learning tools and multimedia, creative dynamic overall learning environment. Open learning space intents process of learning to be delivered in various ways such as: lecture, presentation, team working, experimentation, challenge, discussion and exploration. Establishing open learning space has two main aspects – forming movable and dynamic interior and creating innovative ways of teaching directed to holistic teaching-learning approaches for teachers and learners.

In general, these changes could be recognized in the modern today concept about a flexible class.

The flexible class means (see pictures as examples):

- Possibility for controlled (regulated by the teacher) movements of pupils during class, according to the performance of specific tasks.
- Readiness of the teacher to change power position and to takes the role of facilitating the process as a mentor.
- Possibility to rearrange the school desks (writing tables) depending on the organization of teaching and work individually and / or in group. The rearrangement to b e possible to be carried out by pupils themselves under the control by the teachers.
- Establishing an environment stimulating learning through objects, made by pupils, texts, drawings, etc. that support the learning process; the designed walls of the classroom with different materials are mobile and could be a part the assessment pupils' process.
- The teacher at the beginning of school year to determine the dominant profiles of intelligence of each pupils in the

class and so to organize each lesson , respectively the design in the classroom in accordance with them and create conditions for the overall personal development of the pupil.

- Parents are allowed (motivated, even required) to participate in helping the teacher when it is possible for stimulating the creative process during class or in extracurricular activities.

Last but not least is that establishing a flexible class could become a reality with a limited extra financial resources. In school financial flexibility could cover the costs for equipment for the flexible class.

All of these possible enhancements illustrate how classroom changes can positively support teaching practices by enhancing pupils' engagement in the learning process. Today MI methodology could be the leading system educational approach for innovation changing in education. But it is not the only effective pedagogical methodology that aims to get around currently existing bottleneck of education. MI could be an effective tool on a par with other pedagogical methodologies that mobilize and motivate pupils to develop a desire for education and to have good self-esteem both in school and in life.

It is worth to say if the MI theory can be effectively implemented it has to be in a system way not as a single occurrence – detached, partially and on the individual initiative of individual educators. MI approach is an open space for inventing various training techniques that makes it appropriate for great variations and gives freedom to teachers to use different tools but also following the national educational standards.

Why should the MI be considered and brought to attention to teachers and experts in education sector?

MI methodology is important to be introduced to educational system because it could help to overcome the following key social issues:

- To increase functional literacy of learners on national level;
- To create friendly environment learners with SEN to be integrated in universal class;
- To form transferable skills of learners in parallel with getting new academic knowledge;
- To reduce stress and to prevent possible long-term traumas of child during learning by creating comfortable and pleasant teaching environment that motivate learners for self-education;
- To give freedom to teachers to use different pedagogical tools depending on the types of intelligences of pupils in class and at the same time to follow the national curriculum;
- To distribute schools budget more effective and related toteaching needs;
- To motivate active and responsible collaboration of parents about the education and upbringing of their own children.

Good practices of implementing MI methodology on regional and national level of education – experiences of Canada, Belgium and France

"Teachers bring enthusiasm and varied teaching and assessment approaches to the classroom, addressing individual learners' needs and ensuring sound learning opportunities for every learner".[33]

The declaration clarifies the approach that the Canadian school system focuses on MI.

This section of the Handbook develops an approach to the strategies related to MI in schools in the French and Canadian schools. The contribution is related to countries that, also for their specific and cultural connections and partially for their common language, have experienced many projects and indications on how and why the specific needs of the students have to be considered and faced.

Just for presenting a case, the Ontario mathematics curriculum recognizes that pupils do not learn mathematics in the same way and require the use of variety in instruction and assessment.[34] Additionally, the health and physical education curriculum for Grades 1-8 states that elementary schools in Ontario strive to give every pupil opportunity to learn in ways that are suitable to their unique needs and strengths.

From the national Canadian practice, we can learn how not only in Ontario, but everywhere in Canada, the school system shows awareness of the diversity that exists among the learners, as well as the need for differentiation in the ways in which they instruct and assess their performances and learning achievements. What is defined as "differentiated instruction (DI)" recalls flexibility in the teaching methods and approaches and, in particular, different and personalized assessment strategies with the (expected) results to meet all (or the maximum potentially possible) learners' individual needs. Educators in Canada are expected to use MI in their teaching to address all learners' needs, which not only include a range of learning styles in their classrooms, but also a range of intelligences or multiple intelligences (MI). While learners must be recognized for their learning preferences (surrounding environments, timing, etc.), teachers must also understand individual learners' learning capacities in a variety of categories, meaning their MIs[35].

33 Gov. of Ontario, Ministry of Education, The Ontario Curriculum Grades 1-8: Mathematics, 2005. This curriculum policy is replaced by the The Ontario Curriculum, Grades 1–8: Mathematics, 2020 that is inspired by the same principle, p. 5

34 Ontario Ministry of Education, 2005

35 Prashnig, B., 2005. The power of diversity : new ways of learning and teaching through learning styles. Moorabbin, Vic : Hawker Brownlow Education

In Canada the teachers have been trained for developing specific activities and to be made aware of the MI implications. In order to supplement classroom work, the Canadian educational system suggested using simulation activities as "role playing, debating, and simulation software", indicating that they have all the potential to integrate multiple intelligences in the classroom.[36]

MI theory has become a new methodological approach used in many school settings and in Belgium[37]. The aim is to awaken the pupils' capacity to memorize school material in their own way. It also serves to restore and develop the pupils' self-confidence, to teach him how to learn and how to reason.

Analysis of the approach to the strategies related to Multiple Intelligence in the French, Belgium and Canadian schools, that have experienced many projects and indications on how and why the specific need of the pupils have to be considered and faced. The three countries identified a general introduction of ideas directly or indirectly related to Multiple Intelligence introducing learning outcomes approaches and they have a common trend addressed to enhance flexibility, which is intended to open up more personalized learning paths, contributing to a more learner-centred system with the aim to consider the role of MI in the learners carriers.

Françoise Roemers-Poumy, an elementary school teacher with more than 25 years of practice created the „Octofun" pedagogy in 2013[38]. Components of this pedagogy are MI theory and positive psychology. She presents the eight forms of intelligence, calling them „energy balls". The aim is child to understand that he/ she possess all of these „powers". Some are dominant, others are less developed, and the teacher's efforts should be directed toward all of their development.

In Belgian schools that apply this methodology, decide to implement it in a parallel way with traditional lessons Several lessons per week pupils are grouped according to their dominant intelligence profiles and teachers adapt their teaching according to these pupils. Teachers rearrange the way of presenting lessons differently and explaining material considered complex in a more interactive way.[39]

In France the MI has been investigated more at academic level and the inclusion of practices like Problem and Project based learning are not uniform in all the schools.

An experience has been carried out in the University of Grenoble investigating how the learner's level of achievement is not solely influenced by the way he/she is taught, but by a nest of correlations, resulting in each individual being influenced by an immediate and a proximal environment. The human capability to act effectively in a nest of correlations constitutes the modern definition of intelligence and precisely Gardner's Multiple Intelligences Theory (MI)[40] . This article reflects on the results of a pilot study carried out to investigate whether there is a relationship between MI theory and language sustainability among learners taking an English course. 220 second-year science learners were randomly chosen for two experimental groups

36 Educational Broadcasting Corporation, 2004b, pp. 4-5

37 www.octofun.org

38 La pédagogie des OCTOFUN – Guide méthodologique pour les enseignants – Edité par "Octofun – 2018.

39 Cahour, F., 2016. Le VIF, 16/06/ (https://www.levif.be/actualite/la-theorie-des-intelligences-multiples-le-futur-de-la-pedagogie/article-normal-513205.html).

40 Cahour,F., 2016. Le VIF, 16/06/ (https://www.levif.be/actualite/la-theorie-des-intelligences-multiples-le-futur-de-la-pedagogie/article-normal-513205.html).

(MI theory-based teaching) and a control group (teaching based on their textbook). The main results showed a statistically significant difference between learners' continuous assessment marks. Also, the results of learners' final exam showed a statistically significant difference between the experimental and control groups.

The research group[41] intended to answer the question "Does using a Multiple Intelligence approach in teaching have a significant effect on English sustainability among second-year undergraduate (L2) science learners?". They discovered and proved that using an MI-based approach to teaching has a positive effect on the learners' activity and in-class participation. The results of the study show that the learners in the experimental group had higher performance in their final exams than those in the control group. As the final exam sheets are randomly corrected by a team of teachers and the papers are anonymous, there is not a high possibility of a Pygmalion effect. However, the limitation to a fill-in-the-blanks style of testing is that the testing is not coherent with the teaching, i.e. in a course where the teaching is based on MI theory, the testing should as well be MI theory-based.

The study concluded that integrating Multiple Intelligences into curricula aims at explaining the diverse manifestations of intelligence within learners. Creating environments that foster individual as well as group potential might help individuals make a lasting change in the way they perceive and deal with their environment. Consequently, using an MI approach to language teaching might be able to boost sustainability in an individual learner's knowledge of language and language competence.

Canada and France have been engaged in curriculum reforms including learning outcomes and a competence-based approach in VET curricula. The scope of these reforms is to introduce learning outcomes and competences in the curricula. Both countries identified a general introduction of ideas directly or indirectly related to MI introducing learning outcomes approaches. And they have a common trend addressed to enhance flexibility, which is intended to open up more personalized learning paths, contributing to a more learner-centered system with the aim to consider the role of MI in the learners' careers.

MI Learning outcomes increase flexibility through personalization of curricula and the autonomy granted to teachers to develop and implement learning programs.

In general a better awareness about MI introduces learner-centered teaching methods conceptual issues behind outcome-oriented policies and practices in the nine examined countries. It highlights the key role played by learning outcomes in curriculum reforms and brings evidence of important changes in national curricula. However, the analysis of the curricula in VET institutions provide only hints about the implications of outcome-oriented curricula on learning processes. To analyze the extent to which learning-outcome approaches may contribute to more learner-centered VET systems in France and Canada is necessary to see how the countries have adopted the learner's perspective and analyze at micro-level how outcome-oriented curricula may influence teaching and learning practices, learner achievement and the progression of learners within the education and training system.

Concerning the Kindergarten and the introduction of MI perspectives in Canada and France (4 and 5 years old) the experiences are addressed to mix the pupils in each class, remaining with the same teaching team for their full two years before moving on to first grade.

41 Salena Molaie, 2015., Les stratégies, l'engagement et l'ergonomie cognitive comme leviers pour l'enseignement / apprentissage des langues, Vol. 35 N° 1

The Ontario Ministry of Education (2017) projects intends to develop for all children a personalized support to their social, emotional, and cognitive development; improving their reading, writing, and math skills; smoothing their transition to first grade; helping them achieve long-term academic success; and ultimately building a stronger future economy. This is shown also by the large-scale monetary investment – over $1.4 billion and growing and the pioneering nature of this early childhood initiative make it significant not only in Canadian education but even in the global early childhood sphere.

In general, it is obvious that early childhood education is very important for the personal development of everybody. MI theory is one of the existing pedagogical methodologies that manage to engage kids and children to learn, to keep their curiosity to understand the world around, so to grow and realized themselves based on their strengths.

Analyzing the process of implementation of MI methodology in Canada, France and Belgium there is a similar factor that direct this process. In all countries there is a permanent collaboration between academic community investigating different areas of individual's mechanisms of learning and memorizing and professionals in education that transfer these results into practical tools. Based on these collaboration is directing education policy priorities.

The pointed above examples about implementation of MI methodology show also that to achieve effective results of its implementation there has to be common understanding on political and government level. It is very important the opinion of teachers to be taken into account during making policies in education.

Multiple Intelligence Methodology and STEAM approach in education

In the last couple of years the abbreviation – STEM has much traction in the field of education. Many schools, teachers, even politicians have been using the term in relation to innovation in the educational process.

STEM comes from the first letters of **S**cience – **T**echnology – **E**ngineering – **M**ath.

It was introduced back in the 90's in the educational system in the US. Without having one specific name used as the "father" of STEM term, the name of Charles Vela, founder and director of Center for the Advancement of Hispanics in Science and Engineering Education (CAHSEE), comes ahead as one of the first educators, who used and apply this term, as we know it today. Afterwards, back in 2001, Rita Colwell from National Science Foundation (NSF, USA) has adopted the term officially.

Today there are many different variations of this abbreviation with added letters and disciplines. STREM (adding Robotics), STEAM (adding Arts), STREAM (adding both – Robotics and Arts), STEEM (adding Economics), to name a few.

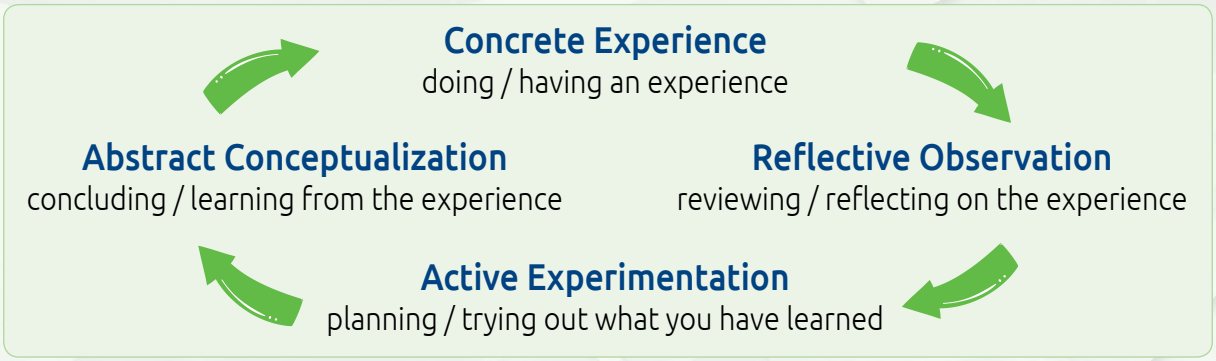
The general concept is to bundle together different disciplines in science, technology, engineering and math in order to make it easier for students to understand the link between all these various topics. In the conventional educational system, as an example, students have class in mathematics, then in biology and then in informational technologies. Students should "switch" not only between topics but also classrooms, way of thinking, understanding and of course teacher. So STE(A)M appears in response to modern perceived needs for effective learning and personal development.

When Gardner introduced the Multiple Intelligence theory back in 1983, he identified 8 types of intelligences, which all people have and can develop in various ways. Learning, as an integral part of our development is also affected depending on how we learn best.

The implementation of STE(A)M methodology helps teachers in their day to day work and preparation of materials and programs for the students. Teachers from various disciplines could prepare projects together in an interdisciplinary approach.

STE(A)M approach unlocks creativity not only among pupils, but also among teachers. Through this approach students not only learn new information in various ways such as – practical experiments, challenges, hands on approach, but also have the chance to present and apply what was discussed with the teacher. There are many examples for collaboration between math and science classes, engineering and robotics, programming and arts.

About the same time as Gardner, another great scientist and educator – David Kolb introduces his Experiential Learning Cycle (1984)[42].



Kolb argues that each individual's effective learning experience covers four major steps:

- Concrete experience (doing / having an experience)
- Reflective Observation (reviewing / reflecting)
- Abstract Conceptualization (concluding / learning from experience)
- Active Experimentation (planning / trying out)

Both MI theory and Kolb's theory could be used as a fundament for creating engaging classes at school for the students. Taking under consideration the 8 different types of intelligences and these four stages through which effective learning could be obtained and putting them together in STE(A)M approach could unlock a very practical, holistic and active educational classroom.

STE(A)M is not only a methodology through which a teacher or a school can create curriculum for these main disciplines, but is also a mindset, which cultivates critical thinking, practical application of knowledge and collaboration between students, teachers and law makers.

In the last years there were some critics, who argued that math and science professionals and jobs are widely available and we do not need special focus on these disciplines but as stated above STE(A)M – not only tries to address these main areas of studies, but also to create a new general approach to education, teaching and participating at the classroom.

MI and STE(A)M as complementary methodologies have the potential to improve the learning process and to unlock practical and applicable knowledge for all students in various age groups at school.

42 McLeod, S. A. 2017. Kolb -Learning styles. Simply Psychology, October, 24

Conclusion

The fact that there is a lot of talk about alternative educational approaches is not accidental. The appearance of many various alternatives today to conventional approaches indicates that there is a need for a change in the methodology of teaching. It is bottom-up initiated processes provoked by the perceived needs of changing the teaching process by educators.

The dissemination of the principles of the MI theory recently is also not accidental. MI theory has the potential to be the core of innovative educational methodology that comprises and implies different teaching techniques, including newly created ones.

The important aspect is that the development of MI methodology goes in an evolutionary way. Thus it continuously accumulates the new academic and practical knowledge which results in unceasing improving of the MI methodology.

Another valuable innovative point of MI methodology is that there are great variations of correct ways to implement it. Teachers design curriculum as appropriate for their pupils in class. How they structure the curriculum reveals their beliefs about how to enhance pupils learning. MI theory could be used as framework for lesson planning and pre-lesson preparation.

MI approach is open space for inventing various training techniques and a way to bring back the high prestige of the teacher's profession in the society, to make it attractive and interesting for pursuing such professional career.

Although major changes require time to be implemented, it is never too late to start working towards them. The topics analyzed in this Handbook can be the starting point for a comprehensive reform in education policy discussions in Europe, regarding the acceleration of achieving an inclusive and effective education overall.

PRACTICAL TOOLS

List

1. Determination dominated intelligences profile – adults
2. Determination of dominated intelligences profile – child
3. Assessment for Determination Dominant Profile of a Child
4. Student Evaluation Sheet Helping to Identify Preferred Way of Learning
5. Practical techniques helping teacher to present a subject in a different way
6. Practical ways teacher to explain MI theory to children at class
7. Transformation of a study concept according to the principles of the theory of multiple intelligence (practical example – symmetry)
8. MI Pizza: How to talk to pupils (students) about the Multiple Intelligences Framework?
9. Guidelines to help the teacher to use Multiple Intelligences Theory for teaching process in class (primary school)
10. General ADHD Guidelines helping teachers to work with such children in class

Determining the dominant intelligence profile[43]

INSTRUCTION: Read each phrase and when it matches your personality, interests and skills, circle the corresponding phrase number. Respond spontaneously.

To determine your profile, complete the attached table.

1. I ask a lot of questions about the functioning of objects.
2. I spontaneously offer my help to friends when they need it.
3. I like to tell stories and jokes.
4. I am sensitive to noises and sounds.
5. I regularly indulge in physical activity.
6. I spend a lot of free time drawing.
7. When I think about something, I see images.
8. I am independent and stick to my ideas.
9. I consider myself a famous person.
10. I am interested in gardening and floriculture.
11. I like to read in my spare time.
12. I quickly find the errors in people's reasoning.
13. Taking notes helps me remember and understand better.
14. I am quick to do mental arithmetic.
15. I easily remember tunes I have heard.
16. I like playing cards and social games.
17. I keep my house and office in order – "every thing in its place, a place for every thing".
18. I am motivated to work on certain projects by myself.
19. I move easily and dance to a beat.
20. Contact with nature calms and relaxes me.
21. I love to identify birds, plants and trees.
22. I am attentive when listening to someone's speech or at a conference.
23. I need to know why I am going to do something before I accept to do it.
24. I have a pretty good memory regarding what I read or hear.
25. Orderly thought contributes to the success of my endeavors.
26. I need to touch people when I speak to them.
27. I decide what to think, what to choose, and what to do.
28. I can follow the scale in a piece of music.

43 Pascal Toscani, 2013. Neurosciences at the Heart of the Class: School Studies All levels.

29. As a child or adolescent, I liked to do science experiments.
30. I can read maps, tables and diagrams easily.
31. I take care of the environment daily with appropriate gestures.
32. I am handy, I like to work with appliances and tools.
33. I am good at strategy games and win often.
34. I have a wide vocabulary when expressing myself.
35. I draw objects and people correctly.
36. I weigh the pros and cons before deciding on something.
37. I recognise false notes when performing a piece of music.
38. I am a sports person. I like to practice different kinds of sports.
39. I am the one to turn to when there is conflict in a group.
40. I like to chatter about "everything" and "nothing".
41. I like to be in contact with animals or observe them in their natural environment.
42. I can spend hours trying to solve a problem.
43. I am interested in all types of music: I listen to them regularly on the radio or on CD.
44. When a book is illustrated with pictures, I am first and foremost interested in the juxtapositions.
45. I like to classify and categorize.
46. When walking or moving around the house, I like to touch objects.
47. I like to go out to meet friends.
48. I consider and consider the feelings of others.
49. I react strongly when people contradict me.
50. I find it difficult to concentrate on my work when listening to the radio or television.
51. I study by practicing.
52. I love to solve logical problems.
53. I am often the organizer of events among my friends.
54. I like to collect objects and grade them.
55. I like concerts, recitals, musical comedies or opera.
56. I have confidence in myself.
57. I am enterprising.
58. Plants thrive well with me.
59. I find it easy to find my way around a new city.
60. I like watching movies, DVDs and pictures.
61. I write with ease.
62. I think it's important to preserve our national parks and love to visit them.
63. I like to speak up during family discussions.
64. I like to think about my life, my desires, and my beliefs.

65. I like visualization exercises. When I envision redecorating a room, I can easily visualize it.
66. I can easily imagine the rotation of a geometric figure in space.
67. I work well alone.
68. I like to solve crossword puzzles.
69. I sing faithfully or play a musical instrument.
70. I like movies that evoke strong feelings.
71. I like hiking, hunting and fishing.
72. I like to assemble and disassemble objects.
73. I like to do what I find interesting myself.
74. I participate in sports or social clubs.
75. I have a good memory for names of people, places, dates and details.
76. I like word play.
77. I can imitate other people's gestures, manners and behaviour.
78. I am sensitive to the musical sound of poems, lyrics and words.
79. I own a telescope, binoculars, or microscope.
80. I find it difficult to stay seated for long periods of time; I need to move.

In the table below, circle the numbers corresponding to the numbers of your circled phrases from 1 to 80 in the test.

Linguistic intelligence	Logical-mathematical Intelligence	Visual-Spatial Intelligence	Bodily-Kinesthetic Intellgence	Musical Intelligence	Naturalist Intelligence	Interpersonal Intelligence	Intrapersonal Intelligence
76	52	66	80	78	79	74	73
75	45	65	77	69	71	63	67
68	42	60	72	55	62	53	64
61	36	59	70	50	58	48	57
34	33	44	51	43	54	47	56
24	29	35	46	37	41	40	49
22	25	30	38	28	31	39	27
13	14	17	32	19	21	16	23
11	12	7	26	15	20	9	18
3	1	6	5	4	10	2	8

Fill in as many cells in each column as the answer you circled in the table above.

This will give you a visual idea of your multiple intelligence.

	Linguistic intelligence	Logical-mathematical Intelligence	Visual-Spatial Intelligence	Bodily-Kinesthetic Intellgence	Musical Intelligence	Naturalist Intelligence	Interpersonal Intelligence	Intrapersonal Intelligence
10								
9								
8								
7								
6								
5								
4								
3								
2								
1								

Interpretation:

Your profile reflects the present status of your qualities. The greater result you have demonstrated in a certain form of intelligence indicates that it can be considered as a strong side of yours.

Do not worry if one or more forms of intelligence are not of great value in your case.

Do not forget that these qualities can be developed if you have the will to work on them.

The highest results (9/10 or 10/10) indicate your dominant (best developed) intelligences.

Here is what a sample result should look like

Linguistic intelligence	Logical-mathematical Intelligence	Visual-Spatial Intelligence	Bodily-Kinesthetic Intellgence	Musical Intelligence	Naturalist Intelligence	Interpersonal Intelligence	Intrapersonal Intelligence
(76)	52	66	(80)	(78)	79	74	(73)
75	45	(65)	77	69	71	(63)	(67)
68	(42)	(60)	72	(55)	(62)	53	(64)
(61)	36	59	70	50	(58)	(48)	(57)
(34)	33	44	51	43	54	(47)	(56)
24	29	35	(46)	37	(41)	(40)	(49)
(22)	(25)	30	38	28	31	(39)	27
(13)	(14)	17	32	(19)	21	16	(23)
(11)	(12)	7	26	15	(20)	(9)	18
3	1	6	5	(4)	10	(2)	(8)

	Linguistic intelligence	Logical-mathematical Intelligence	Visual-Spatial Intelligence	Bodily-Kinesthetic Intellgence	Musical Intelligence	Naturalist Intelligence	Interpersonal Intelligence	Intrapersonal Intelligence
10								
9								
8								
7								
6								
5								
4								
3								
2								
1								

Test adapted for children

Determination of dominated intelligences profile

Step 1. Questionnaire

MY INTELEGENCE PROFILE

INSTRUCTIONS: *Read each phrase first. Encircle the number in front of all phrases that you think describe your character best. Afterwards count the marked answers and register the result.*

A. Intelligence: Body-kinesthetic

1. I like to create (to construct and to carry out different things).
2. I enjoy physical education classes.
3. I prefer motion to sitting.
4. I like to repair or disassemble things.
5. I can perform moves that require flexibility and skill.

B. Intelligence: Spatial

1. I can draw different things that provoke my mind.
2. I have affinity to art classes.
3. I have the ability of noticing details (shapes, colors, figures)
4. I need pictures to understand things better.
5. I orientate myself easily.

C. Intelligence: Logical-Mathematical

1. I like to play and solve puzzles and logic games.
2. I like to know how things are functioning.
3. I am good at math.
4. I like to use my computer (PC) to play and to do different things.
5. I am good at finding solutions of problems.

D. Intelligence: Musical

1. I like listening to music
2. I can play a musical instrument.
3. I can recall music or different melodies.
4. I can tell apart the sounds of different musical instruments.
5. I like to sing

E. Intelligence: Natural – Scientific

1. I love animals
2. I like to walk in the woods
3. I protect the environment (recycle)
4. I like watching scientific movies.
5. I like to play in open air.

F. Intelligence: Interpersonal

1. I have many friends (four or more)
2. My friends share their problems with me.
3. I like team sports and team games.
4. I like doing favours for other people.
5. I can easily guess the mood of other people.

G. Intelligence: Intrapersonal (personal)

1. I have one, two or three true friends.
2. I like to spend my time all alone in order to do different things
3. I prefer to do sports alone.
4. Occasionally I think about my future and set aims for myself.
5. I know my strong sides and weaknesses well.

H. Intelligence: Verbal-Linguistic

1. I like to play with words, to joke and to imitate.
2. I am good at Bulgarian language (reading, writing essays, dictations).
3. I like to read books or magazines on various topics.
4. I do not feel uneasy talking in front of other people.
5. I like going to the library or to the book shop.

TEST RESULTS:

Transfer the total number of points formulated for each intelligence to the attached table.

Paint in different colours the squares corresponding to the number of answers that you have marked in each form of intelligence.

Table:

Body-kinesthetic					
Spatial-Visual					
Logical-Mathematical					
Musical					
Natural – Scientific					
Interpersonal					
Intrapersonal (personal)					
Verbal-Linguistic					

INTERPRETATION:

Your profile reflects the present status of your qualities. The greater result you have demonstrated in a certain form of intelligence indicates that it can be considered as a strong side of yours.

Do not worry if one or more forms of intelligence are not of great value in your case.

Do not forget that these qualities can be developed if you have the will to work on them.

The highest results (4/5 or 5/5) indicate your dominant (best developed) intelligences.

My dominant intelligences are:

.....

.....

I explain to myself why:

.....

.....

Source : APO, Les intelligences multiples, Commission scolaire de la Beauce-Etchemin, 2011.

Step 2. Teacher's (and parents') watching observation

Multiple Intelligence Types – Main Features and Behavioral Indicators

Form/Type of multiple intelligence	Characteristic of the multiple Intelligence Watching criteria	
LINGUISTIC (L)	Comfortable with words	They have the capacity to speak, to tell, to invent and to listen to stories. They write clearly and understandably. They feel well when speaking in front of a group; they realize the function of the words and their impact on the listener. They learn and recall new words easily. Sensitivity to words and sentence structure.
SPATIAL (S)	Comfortable with images and paintings	They have the capacity to cover/view the visual space with great accuracy and to react accordingly to this perception. They have the ability to recreate color pictures and shapes innate in their imagination. Ability to accurately reproduce various aspects of the world around them.
MUSICAL (M)	Comfortable with music	They like to listen to music and to be surrounded by sounds. They like to perform music, to play musical instruments. They often like to hum and sing. Sensitivity to the sounds that surround them, they can reproduce harmonious sounds. They like dancing.
LOGICAL MATHEMATICAL (LM)	Comfortable with numbers	They have the ability to use numbers efficiently and to think logically. They like to think abstractly and to solve complex problems. They create schemes and imaginary models for understanding and memorizing concepts, they use mathematics as a tool to study the reality. They like order, their room is tidy, and they make experiments, they cook according to recipes, they are resourceful and they are able to find a quick solution to a problem
BODILY-KINESTHETIC (BK)	Comfortable with their own body	They move a lot, do sports, and take physical risks. They have the ability to express themselves through their body. They possess the ability to express thoughts and feelings through gestures. They have developed a sense of body coordination and dexterity. They dance, play, imitate gestures. They like touching objects while looking at them. They are patient in handling small items.
NATURALIST (N)	Comfortable with nature.	They spend a lot of time outside, and have the capacity to distinguish different living organisms. They observe the environment and are sensitive to changes in it. They are able to recognize and classify numerous animal and plant species.

INTERPERSONAL (I+)	Comfortable amongst others	Ability to notice and distinguish nuances in the mood, the motivation, the intentions, the desires and the feelings of others. Often this is manifested in the behavior of cooperation, support and striving to work in a team. These, by nature, are people born for leaders who facilitate the tasks of others. They love public gatherings and are often part of an organizing committee. They often invite their friends at home and are able to share their favorite activities or toys with others..
INTRAPERSONAL (I-)	Comfortable by themselves	Ability to understand their own feelings in order to get to know themselves and others better, in order to adapt their behavior. Ability to structure emotions, which will serve as a guide in behavior towards themselves and others. They like to be left alone. They know what gives them pleasure, they know their strengths and know which weaknesses they need to correct. They have the skills to set goals and achieve them.

Assessment the Dominating Profile of Pupil

Questionnaire (Example)

Guidelines teacher to watch and assess the strengths of the pupil

Standardized tests/questionnaires have some value by themselves when it comes to assessing Multiple Intelligences dominant profile of pupils. Nonetheless, they may be used in conjunction with real life observation and documentation of the children's performance in experiences associated with the different intelligences (e.g. playing a board game, manage interpersonal conflicts, having a conversation with their peers, singing, dancing, etc.)

Moreover, it is important for an educator providing tests/questionnaires to not mistake interest with intelligence . A child who enjoys music does not necessarily use rhythm and melodies to understand concepts, solve problems, or create musical products.

Lastly, having devised a pupils' profile, an educator must remember to revisit it often in order to reassess it and make any appropriate changes. After all, unlike traditional intelligence, multiple intelligences are not stable across the lifespan, but change together with the student who progresses.

The table below illustrates some sample questions, provided by Thomas Armstrong[44]:

MI Assessment Checklist

Name of Pupil: .....

Check items that apply.

Linguistic Intelligence

___ Writes better than average for age

___ Spins tall tales or tells jokes and stories

___ Has a good vocabulary for age

___ Communicates to others in a highly verbal way

Logical-Mathematical Intelligence

___ Asks a lot of questions about how things work

___ Enjoys working or playing with numbers

___ Enjoys playing chess, checkers, or other strategy games

___ Enjoys putting things in categories, hierarchies, or other logical patterns

44 Armstrong, T., & Association for Supervision and Curriculum Development. (2009). "Describing Intelligences in Students". Multiple intelligences in the classroom. Alexandria, Va: ASCD.

Spatial Intelligence

___ Reads maps, charts, and diagrams easily
___ Enjoys art activities
___ Is good at drawings
___ Enjoys doing puzzles, mazes, or similar visual activities

Bodily-Kinesthetic Intelligence

___ Excels in one or more sports
___ Cleverly mimics other people's gestures or mannerisms
___ Loves to take things apart and put them back together again
___ Shows skill in a craft or good fine-motor coordination in other ways

Musical Intelligence

___ Tells you when music sounds off-key or disturbing in some other way
___ Remembers melodies of songs
___ Has a good sense of rhythm

Interpersonal Intelligence

___ Enjoys socializing with peers
___ Seems to be a natural leader
___ Has a good sense of empathy or concern for others

Intrapersonal Intelligence

___ Accurately expresses how he/she is feeling
___ Has a realistic sense of his/her abilities and weaknesses
___ Does well when left alone to play or study

Naturalist Intelligence

___ Enjoys doing nature projects, such as bird watching, collecting butterflies or insects, studying trees, or raising animals
___ Likes field trips in nature, to the zoo, or to a natural history museum

Student Evaluation Sheet
Helping to Identify Preferred Way of Learning

Name : ..... Date : .....

I choose my own evaluation method

To show my knowledge about.....*(theme, subject)*....., I would like to:

- ☐ Write a text
- ☐ Make a collage
- ☐ Make an album
- ☐ Build a model
- ☐ Create a group project
- ☐ Make a statistical table
- ☐ Make a diaporama
- ☐ Publish a newspaper
- ☐ Do an interview
- ☐ Draw a poster
- ☐ Create a discography on a topic
- ☐ Other:
- ☐ Make an oral presentation
- ☐ Create a simulation
- ☐ Make a series of sketches or diagrams
- ☐ Make an experiment
- ☐ Participate in a debate or discussion
- ☐ Create a diagram for organizing ideas
- ☐ Create a video
- ☐ Compose a musical play
- ☐ Write a song or "rap" on a topic
- ☐ Teach another student
- ☐ Make a choreography

Brief description of what I intend to do:

Student's signature: ..... Teacher's signature: .....

Source : Apprendre à sa façon – Martine Daudelin, Chenelière Education, 2006, p. 125

Practical techniques helping teacher to present a subject in a different way

Entry points

An "entry point" refers to a way through which a disciplinary topic can be approached. Gardner has identified at least seven entry points:[45]

The table illustrates that there can be many different ways to teach the same subject. This does not mean that everything should be approached through all the entry points. Quite the opposite, each subject will naturally map onto some entry points, and will not be suited to others. What is important is not to utilise every entry point/intelligence in all instances, but that the MI framework allows for a great number of ways to engage the students. This can prove invaluable in catching the initial attention and introducing children with ADHD to the topic at hand.

Entry Point	Learning through:	Gardner's example: Darwin's theory of evolution
Narrative	Stories – narratives about a topic	Darwin's Voyages as it contrasts with the Bible's story of origins.
Quantitative/ Numerical	Numbers, patterns, and insights into size, ratio and change.	Species rate of change during different ecological periods.
Foundational/ Existential	Fundamental, philosophical questions raised by a topic.	Evolution addresses questions such as who we are, where we come from and what, if any, is our purpose.
Aesthetic	Art	Darwin's branched tree of evolution (compared with mistaken, linear depictions of it)
Hands-on	Active engagement, building things, manipulating materials, carry out experiments.	Observe gene mutations first hand by breeding generations of fruit flies (or, as Mendel did, pea plants)
Social	Group learning	Role-playing the different species, or solving problems in peer-to-peer settings and/ or teaching others.
*Logical**	Deduction, syllogisms.	Evolution can be conceptualized in terms of syllogisms.**

* Gardner, H. (1999). Intelligence reframed: Multiple intelligences for the 21st century. Basic Books.

** Ibid. p.170: „If there are more individuals/species in a territory than can be supported, and If there are variations among individuals/species, Then those variants that survive best in a particular ecology will be able to reproduce and flourish there."

45 Gardner, H. (1991). The Unschooled Mind, New York: Basic Books.

Practical ways teacher to explain MI theory to children at class

An advantage of thinking in terms of entry points is that they allow for "bridging activities". When a student is unwilling or unable to engage in an activity, or in any kind of inquiry/school subject, teachers may help them tackle it from an alternate perspective. An example of "bridging" is provided by Gardner:

"In cases where children avoided certain materials, we devised "bridging" activities. So, for example, if a child didn't want to tell stories about a picture, we gave her props and encouraged her to build a diorama. Using the diorama as a bridge, we then asked her to tell us what had happened to the people or animals in the diorama".[46]

What is very interesting about bridging activities is that they seem to engender a viewpoint diametrically opposed to that of traditional schooling. Instead of attempting to facilitate the students' adaptation to a stable school environment, bridging alters the environment itself to accommodate each of them. Having acquired new competences within this more welcoming context, students gradually learn to tackle what they used to avoid.

Student Choice & MI Corners

Gardner and his colleagues devised "bridging" in 1980's, while running "Spectrum", an experimental classroom rich in material pertaining to different intelligences and their activation, including board games, natural specimens, artistic materials and sport equipment as well as materials with which to build and create things.

Inspired by this initial innovation, the MI theory advocates for alterations in the class environment, in order to facilitate the students' cultivation of the different intelligences. MI corners consist an example of doing just that. They are "activity centres", located in specific areas of the classroom, with which students can engage during predetermined periods/class hours. Each activity centre is dedicated to specific intelligences and can take a variety of forms. According to Armstrong, they may be:[47]

	Open-Ended	Example	Topic Specific	Example
Permanent Centres	Long-term stations where students choose activities/topics on their own.	A linguistic centre comprising a library, writing material, word processing software, audio books, etc.	A permanent theme may be chosen and tackled through different intelligences during the year.	The theme may be a question, such as „Does everything change?"

46 Gardner, H. (1999). Intelligence reframed: Multiple intelligences for the 21st century. Basic Books., p. 137

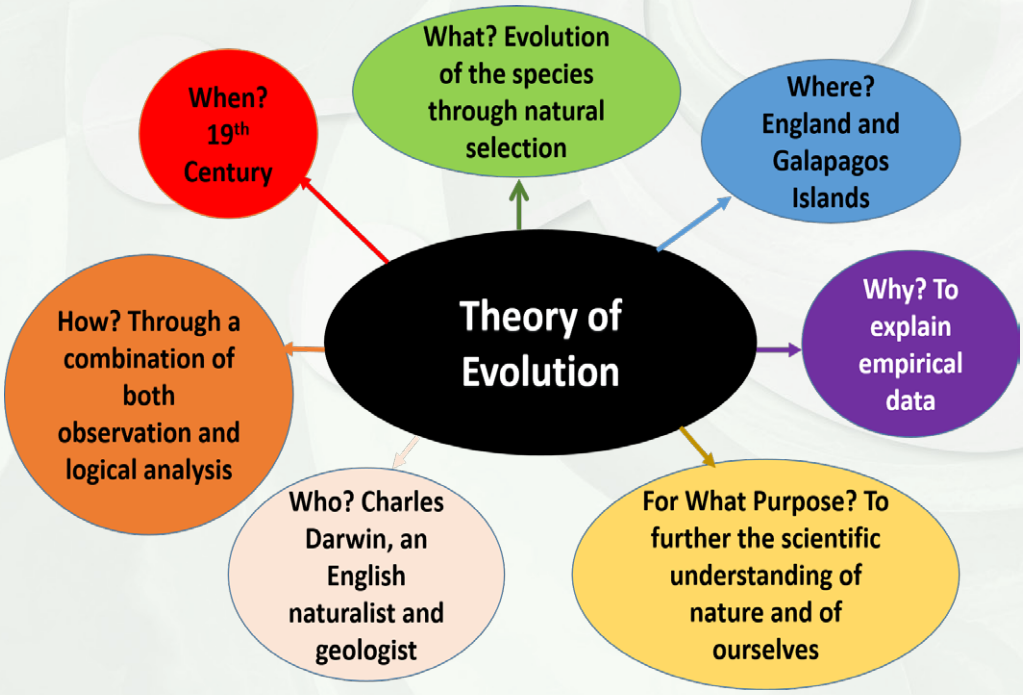
47 Armstrong, T., & Association for Supervision and Curriculum Development. (2009). „MI Theory and the Classroom Environment". Multiple intelligences in the classroom. Alexandria, Va: ASCD.

	Open-Ended	Example	Topic Specific	Example
Temporary Centres	Short-term open-ended stations.	A board-game* corner where games change frequently.	Better suited to tackle less general inquiries for a limited amount of time.	A building centre where students create models of Ships, such as the Darwin's Beagle.

* Board Games can pertain to one, or a combination of intelligences.

By using both open-ended and topic-specific centres, the teacher may help their students in both, exploring and cultivating their personal interests/strong points, but also learning to work on their weaknesses. Moreover, permanent centres are suited to complex themes that map onto many intelligences, while temporary centres may provide students with new stimuli and novel experiences, which is especially valuable in the case of ADHD.

Cognitive map



Transformation of a study concept according to the principles of the theory of multiple intelligence

(A practical example presenting the meaning of symmetry – suitable for primary school)

As a result of a lesson on butterflies, the teachers noticed that the children's interest was attracted by, among other things, the symmetry of the butterfly's wings. They decided to explain the concept of symmetry by offering the pupils different corners to work on butterfly wings. The following work corners were suggested:

1. Observation of the butterfly

The teacher suggests to observe the butterfly closely with a magnifying glass. Ideally, the children should have captured butterflies beforehand using a device they have made out of a plastic bag attached to a stick.

2. Colouring competition (relay)

Two teams of several children are formed. Each team has a cardboard on which a butterfly is drawn whose only one wing is coloured. The children of each team pass the baton (cardboard) to each other as soon as they can symmetrically apply one colour on the uncoloured wing. The first team to declare that they have finished colouring wings wins.

3. Musical butterfly

Children trace large butterfly wings on the floor with ropes. Musical instruments are placed symmetrically on the two wings. One of the children, stepping on one of the wings, uses one of the musical instruments to play a piece of melody of his choice. His teammate has to play the same melody on the other wing.

4. Color the butterfly in a team

The children are divided into two groups. The teams agree beforehand what paintings they will reproduce on the wings. Each team has a silhouette of a butterfly and small coloured cards with different shapes.

5. Imaginary butterfly

Each child invents his own butterfly and draws it on a sheet, trying to keep the symmetry.

The examples given above serve to show that there are a variety of ways of approaching a topic. This is not to say that the teacher has to convey his lesson in eight different ways, as many as are the forms of intelligence. It is enough for him to select three or four forms to make his teaching multi-intelligent and thus reach the different types of intelligence of the students.

In preparing to present the lesson in this way, the teacher has used the following toolkit:

- Teacher's Daily Hourly Chart – See Appendix 1
- Bi-weekly planning chart – See Appendix 2
- Thematic planning table – See Annex 3

SOURCE: GELINAS Francine, ROUSSEL Manon, 2007,
Les intelligences multiples dès la maternelle, Chenelière Education, p. 88-92

THEMATIC PLANNING GRID

Theme: .....

Musical intelligence

Visual-Spatial Intelligence

Bodily-Kinesthetic intelligence

Logical-mathematical Intelligence

Linguistic intelligence

Naturalist Intelligence

Intrapersonal intelligence

Interpersonal Intelligence

Appendix 2

PLANNING GRID FOR A FORTNIGHT

Weeks of ..... and ..... Theme: .....

Timetable

Schedule	Monday	Tuesday	Wednesday	Thursday	Friday

Observations/inventories/special activities

	1st week	2nd week
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		

TWO-WEEK PLANNING GRID *(continued)*

The workshops

Nature corner	Science corner
Reading corner	Construction corner blocks blocks
Writing corner	Construction games corner
Maths corner	Puppet corner
Listening corner	Home and theatre corner
Drawing corner	Musical instruments corner instruments
Modelling clay corner	Carpentry corner
Puzzle corner	Group games corner
Painting corner	Craft corner
Sewing corner	Figure corner
Logic games corner	Motor skills corner
Computer corner	

Large group activities

Art techniques
Children's literature
Computer activities
Group activities
Cooperation
Songs and dances
Project work
Motor activities

MI Pizza: How to talk to pupils (students) about the Multiple Intelligences Framework

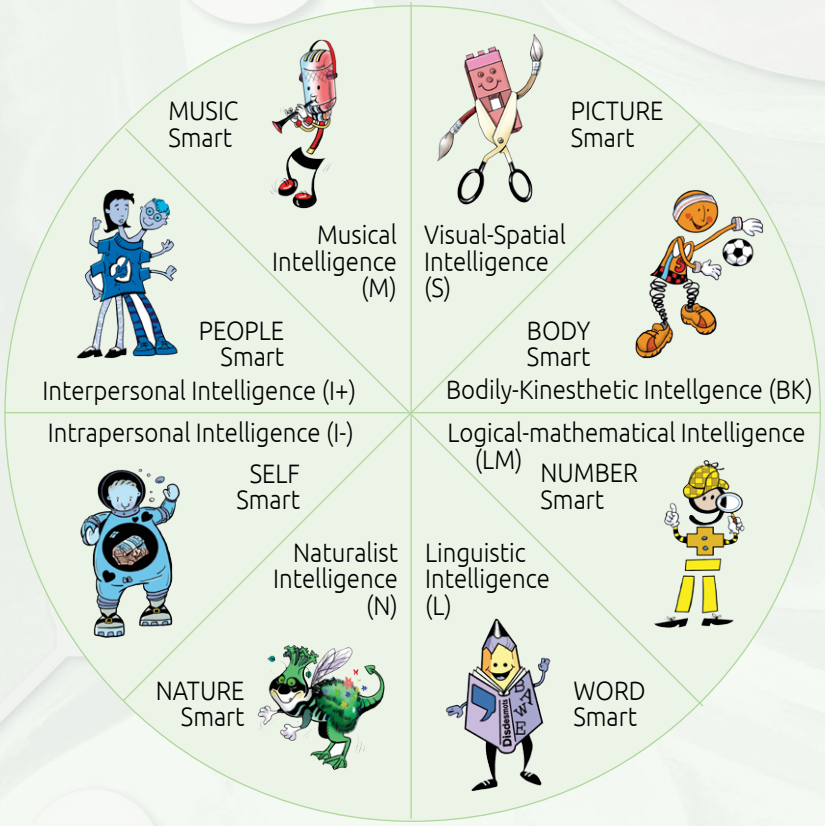
Ensuring that students have at least a basic understanding of MI theory is a necessary step towards employing its methodology during class. After all, students should approach MI activities while having a mind to learn and not just as leisure time activities. Not only that, talking about MI provides the teacher with an excellent opportunity to help students gain in confidence and self-esteem, especially SEN students that might struggle with regular school activities.

Introducing students to MI may initially take as little as a few minutes. Teachers can start by asking a question along the lines of "how many of you think they are intelligent?" After some hands are raised, the teacher may proceed to declare that "everyone is intelligent and in at least eight different ways!"

Then, an MI PIZZA may be drawn, presenting the intelligences in a less verbose way for the students to grasp.

Very Important:

It is essential teacher to present the intelligences in a positive manner, emphasizing that everyone possesses all of them in a sufficient degree. MI activities and learning should never make a student feel inadequate or "stupid" in any of the eight domains of intelligence. After all, teaching about the MI theory is meant to empower students, especially those that find it hard to cope with regular classes, by providing them with alternative roads to knowledge and new ways to interact with the world around them.



Guidelines to help the teacher to use Multiple Intelligences Theory for teaching process in class (primary school)

Form/ Type of MI	Characteristic of the multiple intelligence		Pedagogical techniques	Specific activities for development of the dominant intelligence
LINGUISTIC (L)	Comfortable with words	Have the capacity to speak, to tell, to invent and to listen to stories. They write clearly and understandably. They feel well when speaking in front of a group; they realize the function of words and their impact on the listener. They learn and recall new words easily. Sensitivity to words and sentence structure.	Stories and narratives using a more complex vocabulary; Records; Humor; Exchange in a group, using words to recreate a picture;	Listening; Writing; Reading; Puppets; Encouraging the use of extravagant words and expressions, engaging in debates and oral presentations. Showing how poetry can be a conduit of feelings.
SPATIAL (S)	Comfortable with images and paintings	Have the capacity to cover/ view the visual space with great accuracy and to react according to this perception. They have the ability to recreate color pictures and shapes innate in their imagination. Ability to accurately reproduce various aspects of the world around them.	Visualizations; Use of colors, creation of diagrams, maps – reading routes, schematic organization of ideas; Modeling/ Models; Metaphors;	Fine art techniques; Computer; Project work in three-dimension form; Teaching techniques for creating maps for organizing ideas and drawing mazes, techniques for expressing knowledge through drawing, constructions with different materials, plastic materials, creating models, sketches of clothes, scenes describing a certain period studied.
MUSICAL (M)	Comfortable with music	They like to listen to music and be surrounded by sounds. Like to perform music, play an instrument. They often like to hum and sing. Sensitivity to the sounds that surround them, they can reproduce harmonious sounds. They like to dance.	Music on the background; Rhythm, songs, rap, voice variations, imitation of, different sounds; Motivation to compose or play skillfully known musical works;	Listening to music; Lectures on music; Songs and dances, rewriting the words of a song to describe a concept, encouraging the application of music during games, creating sound effects, teaching social sciences to countries around the world associated with their national music or training in different eras.

Form/ Type of MI	Characteristic of the multiple intelligence		Pedagogical techniques	Specific activities for development of the dominant intelligence
LOGICAL MATHEMATICAL (LM)	Comfortable with numbers	Have the ability to use numbers efficiently and to think logically. They like to think abstractly and to solve complex problems. They create schemes and imaginary models for understanding and memorizing concepts, use mathematics as a tool to study the reality. They like order, their room is tidy, they make experiments, cook according to recipes, are resourceful and find a quick solution to a problem.	Using John Venn's logic diagrams to compare and discover the common and the different. Use of graphic materials, posters and timeline techniques. Explanations related to the practical use of certain objects. Requiring the student to find the logical parts and arrange them in sequence. Learning to structure through techniques for: ranking, categorization, segmentation, synthetic tables, analogues.	Working with numbers and solving problems, analyzing situations, showing how things work, getting them used to accuracy and consistent thinking when solving a problem. Finding short and clear answers to a given problem.
BODILY-KINESTHETIC (BK)	With their own body	They move a lot, do sports, take physical risks. They have the ability to express themselves through their body. Possess the ability to express thoughts and feelings through gestures. Have developed sense of body coordination and dexterity. They dance, play, imitate gestures. Like to touch objects while looking at them. Patient in handling small items.	Application of tactile games and activities that require movement. Theater, mime, role, dance, explanation of a concept through gestures. Application of Brain Gym, for the development of physical and artistic abilities.	Mechanical toy games, acrobatic performances, sports competitions; Outdoor games; Creation of the so-called „saynetes", i.e. short comic sands with a small number of characters, training in carpentry or wooden constructions, sewing, making various objects;
NATURALIST (N)	Comfortable with the nature	They spend a lot of time outside, and have the capacity to distinguish different living organisms. They observe the environment and are sensitive to changes in it. They are able to recognize and classify numerous animal and plant species.	The use of the nature as a classroom, growing plants and animals in a classroom under the guidance of the teacher, making practical experiments, creating an area for nature observation in the school yard in the breaks. Making pedagogical nature excursions.	Assigning a project to collect plants, animals, minerals, to listen to natural sounds and to explain and systematize them according to certain criteria, to observe and keep notes on natural phenomena, to classify elements of flora and fauna.

Form/ Type of MI	Characteristic of the multiple intelligence		Pedagogical techniques	Specific activities for development of the dominant intelligence
INTERPERSONAL (I+)	Comfortable amongst others	Ability to notice and distinguish nuances in the mood, motivation, intentions, desires and feelings of others. Often this is manifested in the behavior of cooperation, support and striving to work in a team. These, by nature, are people born for leaders who facilitate the tasks of others. They love public gatherings and are often part of an organizing committee. They often invite their friends home and are able to share their favorite activities or toys with others.	Applying the cooperative pedagogy of Freinet, a cooperative approach to learning in a group, offering opportunities for learning in pairs between students, organizing sessions of „brainstorms" to solve a problem, creating situations in which students can observe each other and exchange and share their impressions.	Prerequisites are created for building many personal contacts; Conditions are created for the manifestation of skills for reaching consensus, Jim Howden's 1,2,3 techniques are applied, conflict resolution, etc. puppets are used to play out problematic interpersonal situations.
INTRAPERSONAL (I-)	Comfortable by themselves	Ability to understand their own feelings in order to get to know themselves and others better, in order to adapt their behavior. Ability to structure emotions, which will serve as a guide in behavior towards themselves and others. They like to be left alone. They know what gives them pleasure, they know their strengths and know which weaknesses they need to correct. They have the skills to set goals and achieve them.	They allow the student to work at their own pace, create a space for solitude or allow students to work outside the classroom in another room, help students formulate and guide the achievement of their personal goals, encourage them to keep a diary.	Creating a space for reflection, for getting to know and naming one's own emotions, showing techniques for this purpose. Encouraging students to use their metacognitive skills in learning. Giving knowledge about their way of thinking and building cognitive strategies. Creating workshops, which develop the ability of students to reflect on their own cognitive experiences and to regulate them, in a way "thinking about thinking".

General ADHD Guidelines helping teachers to work with such children in class

The General Guidelines below are to be employed in conjunction with the MI methodology:

Everybody in class

- Provide information on ADHD to the student and their parents.
- Establish a teacher-student code of communication, building trust.
- (For example, teacher-student communication could take place through gestures: an open fist informs the teacher that the student is sure about an answer; a closed one that they are not – ensuring they do not make too many mistakes and feel disempowered).
- Reward-Based Teaching (not punishment!)

Children with inattentiveness behavior in class

- Simple and Clear Instructions
- Short/Specific Questions with a Definite Answer
- Frequent changes in the classroom to provide new stimuli, while minimizing distractions.
- Task Modifications: extra time; easier exercises which get harder gradually.
- Clock on Desk

Impulsivity/Hyperactivity children behavior in class

- Desk close to the teacher to facilitate teacher-student communication/tutoring (alternatively, desk-sharing with an attentive student)
- Assign the student with tasks/responsibilities, such as writing on the whiteboard, attendance tracking, etc.
- Allow for Movement: resistance bands can be placed in the feet of the student's chair so the student can engage their legs. This helps them stay calm and seated. (Alternatively, a chair with wheels may be used; or kinesthetic stimuli to palpate with hands.)

Glossary

Attention Deficit Hyperactivity Disorder: ADHD is a disorder marked by an ongoing pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development (source: https://www.nimh.nih.gov/health/topics/attention-deficit-hyperactivity-disorder-adhd/)

Flexible class – a classroom with opportunities for quick, easy and frequent changes of interiors related to the nature of the specific activity based on the organization of the curriculum of the topics; allowing conducting a class outside the school building – in the yard, in the garden near the school, etc., which is a regular rather than an episodic event. In recent years it has gained great popularity due to its impact on the learning process and at the initiative of teachers – funds have been raised to provide the necessary interior and teaching aids.

Inclusive education (definition by UNESCO): The inclusive education means that all children – no matter who they are – can learn together in the same school. This entails reaching out to all learners and removing all barriers that could limit participation and achievement. Disability is one of the main causes of exclusion; however, there are also other social, institutional, physical, and attitudinal barriers to inclusive education.Inclusive education systems, which is a core part of the fourth Sustainable Development Goal (SDG4) and the 2030 Education Agenda, respect the diverse needs, abilities, and characteristics of all children and youth, and is free of all forms of discrimination. Inclusive education systems can in turn foster societies that are more inclusive. (source: http://www.iiep.unesco.org/en/inclusive-education)

Intelligence is defined as general cognitive problem-solving skills. A mental ability involved in reasoning, perceiving relationships and analogies, calculating, learning quickly… etc. Earlier it was believed that there was one underlying general factor at the intelligence base (the g-factor), but later psychologists maintained that it is more complicated and could not be determined by such a simplistic method. Some psychologists have divided intelligence into subcategories.

Intelligence given as a term by Gardner is: Intelligence is a "biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in the culture' (H. Gardner, Gardner,H.,1999. Intelligence Reframing: Multiple Intelligence for the 21 Century, Basic Books, N.Y. ,33)

This formulation has distinctive features:

- Intelligence is not a singular capacity;
- An intelligence is rooted both – in human biology (brain, genes) and in human psychology (mental process);
- While concepts of intelligence typically valorized problem-solving, the definition incorporates the creation of products, ranging from works of art to technological inventions;
- All intelligence may only be expressed or valorized in certain loci at certain time. (p.208)

Types of Intelligences (H. Gardner):

Number Smart (logical/mathematical intelligent): Having the ability to recognize patterns, work with abstract symbols, such as numbers and geometric shapes, and see relationships

or connections between separate pieces of information. (Armstrong, 2009. Multiple intelligences in the classroom)

Word Smart (verbally/linguistically intelligent): Having the ability to use language effectively, whether orally or in writing. (the same source as above)

Picture Smart (visually/spatially intelligent): Having the ability to perceive and depict the visual-spatial world accurately. Being sensitive to shape, line, color, form, and space and the relationships that exist between them. (the same source as above)

Music Smart (musically intelligent): Having the ability to perceive, discriminate, transform, and express musical forms. Being sensitive to rhythm, pitch, melody, and timbre of music. (the same source as above)

Body Smart (bodily/kinesthetically intelligent): Having the ability to use one's hands and body to express ideas and feelings or to produce and transform objects. Possessing remarkable physical skills, such as coordination, balance, and dexterity. (the same source as above)

People Smart (interpersonally intelligent): Having the ability to perceive and respond to the moods, intentions, and feelings of other people. Being sensitive to facial expressions, voice, and gestures; being able to respond effectively to those cues. (the same source as above)

Self Smart (intrapersonally intelligent): Having the ability to self-reflect effectively. Knowing oneself well and acting on the basis of this self-knowledge. This includes having an awareness of one's inner moods, intentions, motivations, temperaments, and desires. (the same source as above)

Nature Smart (naturalistically intelligent): Having the ability to know about and relate well to one's natural surroundings. Being sensitive to nature and one's place within it, being able to nurture and grow things, and easily caring for and interacting with animals. (the same source as above)

IQ test: An IQ test is an assessment that measures a range of cognitive abilities and provides a score that is intended to serve as a measure of an individual's intellectual abilities and potential. IQ tests are among the most commonly administered psychological tests.(source: https://www.verywellmind.com/how-are-scores-on-iq-tests-calculated-2795584#:~:text=An%20IQ%20test%20is%20an,most%20commonly%20administered%20psychological%20tests.)

ISCED: The International Standard Classification of Education (ISCED) belongs to the United Nations International Family of Economic and Social Classifications, which are applied in statistics worldwide with the purpose of assembling, compiling and analysing cross-nationally comparable data. ISCED is the reference classification for organizing education programmes and related qualifications by education levels and fields. ISCED is a product of international agreement and adopted formally by the General Conference of UNESCO Member States. (source:http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf)

Neurotypical or NT, an abbreviation of neurologically typical, is a neologism widely used in the autistic community as a label for non-autistic people. It refers to anyone who does not have

any developmental disorders such as autism, developmental coordination disorder, attention deficit hyperactivity disorder or obsessive compulsive disorder. (source: https://en.wikipedia.org/wiki/Neurotypical#:~:text=Neurotypical%20or%20NT%2C%20an%20abbreviation,label%20for%20non%2Dautistic%20people.)

SEN: Special Educational Needs is a legal definition and refers to children with learning problems or disabilities that make it harder for them to learn than most children the same age (source: https://www.nidirect.gov.uk/articles/children-special-educational-needs)

STEAM (Science, Technology, Engineering and Math) – STEM education, is the learning school subjects through an integrated approach. It's learning science, technology, engineering, and math as one, and in parallel also forming skills of critical thinking, problem-solving, exploratory learning, working in a group, that go hand-in-hand with those subjects that make STEM education valuable. STEM educational approach means academic knowledge to be related hands-on and relevant learning experiences. EC established EU STEM Coalition, the EU's network of national STEM platforms (https://www.stemcoalition.eu/)

Transferable skills (soft skills) – transferable skills are those skills that are formed at different periods of development of the individual and become abilities that accompany him (transferable and manifested in different life situations) throughout life. These skills generally correspond to the types of intelligence given by H. Gardner of the individual, but are constantly growing and improving. Such transferable skills are: ability to think critically and critically perceive new information, ability to work in a team, ability to express oneself clearly, ability to argue and defend one's own opinion, ability to hear and perceive different (person, opinion, behavior), ability to lead and be a leader, etc.

Project consortium

GIS-TC Foundation is a non-profit independent public non-governmental organization based in Sofia (Bulgaria) with mission to stimulate transfer knowledge form academic institutes to SMEs and vice versa since 2000 year. Today GIS-TC is a network of 29 Centers for knowledge transfer that is initiating and stimulating the innovation in different areas: natural, social and engineering research and development. As an Erasmus+ project coordinator GIS-TC works for innovation in educational sector like presenting innovative alternative educational methodologies to public schools and gives new knowledge and skills to teachers to ensure the achieving of better functional literacy of pupils and increasing the quality of education.

Athens Network of Collaborating Experts (ANCE) is a non-governmental, non-profit organization based in Athens, Greece. It was established in 1996 by a group of Greek experts in international development cooperation and technical assistance and today has succeeded to create an extensive network of collaborators and volunteers for the promotion of sustainable development and the support of vulnerable social groups in the European Union and the developing countries.

DEFOIN – Desarrollo para la formación e inserción SL (Training for Develop and Integration) was born in 2009 with the idea of promoting the Training for Employment and Insertion of employed and unemployed workers. Today DEFOIN is a training center with a large experience in the design, implementation, development and evaluation of training programs at national, regional and local level.

Fondazione Hallgarten Franchetti Centro Studi Villa Montesca, Città di Castello, Italy. Experimental workshop for pilot projects on new didactic methods and pedagogic perspectives addressed to various educational levels and to support students with special needs. Among its objective the Foundation promotes a democratic space of education and supports the educational inclusion of students with special, personal and social needs. The Foundation enhances the European cooperation in the fields of education, audio-visuals and culture, building on the valorisation of diversity.

J&MSynergie is a profit company. Its main mission is related to development innovative alternative pedagogical methods, training and communication with adolescents, as well as implementation of specific methodologies related to multiple intelligence theory.

Technokrati – is an educational centre useing the natural state of children's mind – creativity, curiosity, imagination and transforms that into real practical knowledge. Working with children and youth aged 7 to 16 by focusing on practical workshops in science (renewable (green) energy) and technology (robotics, programming, 3D and etc.). The programs also cover non-technical topics such as: teamwork, self awareness, taking responsibility and critical thinking. Overcoming the chasm between children and technology happens in a friendly atmosphere where wrong questions do not exist.

Authors

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