

## THE HABITS OF MIND AND THE BRAIN GYM FOR ENHANCEMENT OF TEACHERS' COMMUNICATIVE-TEACHING COMPETENCE

### GLI *HABITS OF MIND* E IL *BRAIN GYM* PER IL POTENZIAMENTO DELLA COMPETENZA COMUNICATIVO-DIDATTICA DEGLI INSEGNANTI

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#### Abstract

The hints offered both by Neuroeducation research and by the theories on the mind, within the national scientific debate, encourage reflection on possible ways of implementing the teaching / learning process.

Communicative teaching approaches such the Brain-based ones, with particular reference to 'Brain-gym' (Mac Lean, 1975, Dennison, 2010) and educational activities aimed at developing the Habits of Mind (Costa & Kallick, 2008) are the keynotes of the present research, carried out with 385 secondary school teachers working in the province of Caltanissetta during the school year 2020/2021. Through the research process we wanted to verify the validity of the Brain-based model in order to enhance didactic communication reinforcing teachers' linguistic-pragmatic skill and communicative-teaching competence.

Gli spunti offerti tanto dalla ricerca neurodidattica quanto dalle correlate teorie sulla mente, all'interno del dibattito scientifico nazionale, incoraggiano la riflessione sui possibili modi di implementazione del processo di insegnamento/apprendimento.

Gli approcci di didattica comunicativa di tipo *brain-based*, con particolare riferimento al *Brain-gym* (Mac Lean, 1975; Dennison, 2010) e le attività didattiche volte a consolidare gli *Habits of Mind* (Costa & Kallick, 2008) sono le cifre definitorie della ricerca qui descritta, condotta con 385 insegnanti di scuola secondaria della provincia di Caltanissetta nell'a.s. 2020/2021. Attraverso il processo di ricerca si è voluto verificare la validità del modello *brain-based* allo scopo di implementare la comunicazione didattica attraverso il potenziamento delle competenze linguistico-pragmatica e comunicativo-didattica degli insegnanti.

#### Keywords

Neuroeducation, Habits of mind, Brain Gym, linguistic and communicative skill, Communicative Didactics.  
Neurodidattica, Disposizioni della mente, Brain Gym, competenza linguistico-comunicativa, Didattica comunicativa

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## Introduction

The Italian school system, crossed by continuous transformative pressures, appears as a complex microcosm in which diversities and differences need to be harmonized within a multi-faceted dialogue. Therefore, we need to rethink the ways of didactic communication through the development of interactional strategies caring of the different profiles of teachers and learners, in the name of a multi-code communicative linguistic competence. Linguistic-communicative mastery lies exactly in the threshold between the acquisition and or learning of the language and the communication skills that involve both the verbal sphere and the non-verbal one. In the changing school, the word alone is no longer enough; it is necessary to enhance a communication competence that involves several sensory channels at the same time. On the neuro-physiological level, then, this threshold finds correspondence both in the Universal Grammar (Chomsky, 1975) which is cerebrally inscribed between the areas of Broca and Wernicke and in the enhancement of linguistic and communicative-didactic skills thanks to the definition of shared attitudes and mental habits.

Studies in Language Teaching pinpoint that the greater or lesser ease in the development of linguistic-communicative competence is subordinated to a series of aspects that cannot be ignored, such as interactions between learner and teacher, attitudes, levels of linguistic mastery, aptitudes, cognitive styles, intellectual typology, and motivation.

The contribution of Neuroeducation is to reveal the neural mechanisms that regulate linguistic-communicative processes by soliciting the qualification of synaptic networks related to communicate-strategic and communicative-pragmatic skills.

In this direction, an interesting technique turns out to be that of the Brain Gym which provides a series of teaching strategies capable of generating significant linguistic learning, thanks to a stimulation of the brain areas concerned through motor exercise, with a prompt relapse on the development of communicative-didactic competence. Motor work on the body acts as an activator of some brain functions underlying the production of language, the lexical-semantic selection, the enhancement of creative fluidity and the consolidation of the critical sense in relation to the contexts of use of communication.

To better regulate communication processes in the specific context of didactic interaction, Habits of Mind are tools that allow teachers to refine their knowledge of the contents underlying the communicative acts and increase the ability to communicate in any situation.

A Habit of Mind is a disposition towards cleverly behaving when confronted with problems, the answers to which are not immediately known. When human experience dichotomies are confused by dilemmas, or come face to face with uncertainties, our most effective actions require drawing forth certain patterns of intellectual behaviour. When we draw upon these intellectual resources, the results that are produced are more powerful, of higher quality and of greater significance than if we failed to employ those patterns of intellectual behaviours.

As teachers learn and practice the Habits of Mind, they become more skilful and develop a large repertoire of strategies they can call upon in problematic situations. So, even students grow more adept employing the habit strategically, selecting and sequencing the most appropriate strategies at the appropriate time. They refine their ability to apply each of these skills and strategies in complex and sophisticated ways. Learners also begin to develop internal, metacognitive strategies when con-fronted with problems, decisions, and different situations. As learners connect success to the effective application of the Habits of Mind, they begin to make predictions about when and why it might be appropriate to use a particular habit. In doing so, they also deepen their valuing of the Habits because they can understand why using a habit would be important in such situations. They can think back upon the use of the habit and see that when the habit is appropriately used, it has led to greater success.

It needs to equip students with lifelong meta-skills and habits of mind. Teachers should help students develop and apply what dimensions of learning calls productive habits of mind.

The research path here presented aims to verify the validity of the Habits of Mind and of the Brain-based model to enhance the communicative-didactic competence of secondary school

teachers in the province of Caltanissetta. The intervention involved, during the academic year 2020/2021, 190 first grade secondary school teachers and 195 second grade secondary school teachers.

## **1 The theoretical framework**

### **1.1 Communicative didactics and the contribution of Neuroscience**

Communicative didactics, inscribed in the epistemic framework of Language Teaching, is configured as a practical science (Balboni, 2002, pp. 22-23) having linguistic, communicative (and underlying cultural) and socio-pragmatic knowledge as its object. Three competences correspond to these areas of knowledge in the teaching practice: 1) linguistic competence, containing the knowledge of the structural levels of the language as well as the mastery of basic skills (Chomsky, 1975); 2) communicative competence, articulated in “knowing how to use the language”, “knowing how to do with language”, “knowing how to integrate language with non-verbal codes”, also with regard to the cultural framework of belonging and pertinence (Hymes, 1972, pp. 35-71); 3) socio-pragmatic competence which translates linguistic structures into concrete and essential actions (Cambi, 2000, pp. 628-632).

If the classroom is intended as a real “communicative scenario” (Teruggi, 2021, p. 133), it is necessary to focus attention on the process of didactic communication not only in terms of Critical Discourse Analysis (Huckin, 1997, pp. 78), but also in terms of mastery of language and communication, thanks to the strategic use of words and gestures able to modify the internal relationship between the denotative and connotative levels of the interaction. Hence the centrality of linguistic-communicative competence, concerning the connections between language and its use in the real world. This competence deals with the speaker’s selection of contexts of language use, that is to say the domains or spheres of action of social life eliciting the speaker’s notions and linguistic functions appropriate to communication. In this framework, we may state that the teacher has got a communicative-didactic competence anytime he/she is able to mobilize the knowledge he/she possesses, the skills and abilities, as well as the inner resources necessary to manage the situation in question, according to the class context he/she is inserted. In this sense, it can be said that this competence constitutes a link between the vision of reality that the teacher carries out and his/her teaching routine, made of a series of sieves, decisions, and operational choices. This competence also exhibits a fair degree of creativity which guarantees the teacher strategies and tools to respond to problematic situations and complex operational areas with a critical sense, autonomy, divergent vision, and terminological expertise.

One of the most controversial topics within the current debate on the effectiveness of teaching communication is the need for a change of register that pushes the teacher to opt for multiple forms of communication. The use of the body and the enhancement of different sensory channels in classroom interaction not only foster the inclusion of all pupils and the respect for their educational needs, but also facilitate the achievement of success by learners. Studies on communication in the classroom, dating back to the 1970s, account for the importance of the social and interactional vector of teacher/class communication as well as for the strictly linguistic-structural aspects (Cazden, 1972; Sinclair, Coultard, 1975, Mehan, 1979). Teaching communication is characterized by different components: the linguistic one, the physical-perceptive one and the social one, that are the aspects of communication related to the body and to action which should be used along with words, subtracting the teacher from a system of traditionally verb-centric communication, as it happens in Italian schools.

A significant contribution to this debate is offered by recent Neuroeducation research which systematizes the aspects of the teaching/learning process, memory, perception, language, attention, emotions, with the underlying brain mechanisms as well as with the use of the body and movement. Since the nineties of the last century, the intersection between language teaching research and Brain-based approaches has given many fruits, especially if one thinks of the application of Gardner’s Theory of Multiple Intelligences (1983) to the class of language (Reid, 1995; Nolen, 2003; Morgan & Fonseca, 2004; McKenzie, 2011) and Skehan’s (1998) studies

on working memory and linguistic performance. Scientific evidence has always substantiated the use of teaching methods based on communication mediated by the body and movement, intended as activators of the processing of linguistic input (Palmer & Palmer, 1959); as a spring for a functional and situated use of communication (Asher, 1969); as a tool to enhance linguistic-pragmatic competence (Lozanov, 1978) or yet to consolidate communicative competence as in linguistic-musical methods (Maule, Cavagnoli & Lucchetti, 2006).

The application of MI theory within the language teaching disciplinary field leads Savas (2012, p. 855) to extend the Gardnerian concept of 'Linguistic Intelligence' towards the idea of a 'Communicative Intelligence' capable of including the various facets of human language, the variety of communicative codes, and of intellectual typologies. In addition, in the communicative interaction, the interlocutor gradually builds a personal communicative-behavioural apparatus that reflects the ways in which the communicative code acts as a mediator between the neural mechanisms for processing linguistic input and the set of contexts, situations and life experiences (Watson-Gegeo, 2004, p. 339). Our brain is, in other words, a brain that synthesizes between insight and oversight, between synaptic networks and the interconnections of meaning returned by the world. It is a 'motor brain', as it is accurately described through the Theory on Mirror Neurons, and this cerebral movement is also valid in the case of linguistic input, which passes from the hearing apparatus for reception, passing through a series of brain areas, up to the phono-articulatory one of linguistic production. (Rizzolatti & Sinigallia, 2006, p. 166).

In terms of the didactic translation of these assumptions, the motor nature of the brain implies that Brain-based methodologies are anchored to processing models favouring movement to guarantee the maintenance of cerebral plasticity. Among these, an interesting role is played by the Brain Gym, literally 'gymnastics of the brain', which is based on a series of movements able to activate various functions, such as understanding, communication and the organization of consciousness.

Dennison, promoter of the Brain Gym techniques, (1984) was responsible for the identification of 26 interhemispheric coordination body movements, 11 of which specifically activate the connection between the two hemispheres and stimulate the lateralization process. Dennison gave these exercises some peculiar names, such as 'Cross Crawl', 'Lazy 8s', 'Double Doodle', 'Alphabet 8s', 'The Elephant'. These exercises work the bilateral crossed movements, in which eyes, arms, hands, legs are involved; these movements aim at facilitating the balance of nervous activity and the neurotrophic production. Moreover, the neurophysiological correlates between learning and movement have been confirmed by numerous studies in which the part of the brain that activates movement is the same that activates learning. Jensen (1995) clarified that physical exercise shapes muscles, heart, lungs, and, at the same time, strengthens all key areas of the brain with a powerful impact on communication.

But there is more. Movement stimulates the brain and predisposes it to a coordination that is not only neurophysiological, but also cognitive, mental. Movement, therefore, acts as a bridge between the brain space and the empirical space of life where the interface is constituted by the complex apparatus of the mind, with its processes, its stratifications, its styles, its inner dispositions (Compagno-Di Gesù, 2013).

## **1.2 The theories of the mind and the 'Habits of mind'**

If teachers are supposed to reach for higher levels of thinking and didactic performing, they must have opportunities to engage in, develop, and demonstrate a richer set of skills and dispositions than are measured in the narrowly defined teaching & didactics tests so prevalent today. The emphasis of most standards-based tests is measuring and reporting on academic knowledge. Although it is important, teachers need to build the habits necessary to embark on projects in which the outcome is not immediately apparent. They need to develop the Habits of Mind that direct their strategic teaching abilities and expand their resourcefulness and capacity for engaging with and solving challenging problems within the classroom.

A habit is something done automatically, without too much self-awareness.

As Habits of Mind, such as thinking flexibly or communicating through questioning and problem posing, are brought to consciousness, people may confidently navigate the complexity of the situation. The Habits reside in that very important space in which we shift from automaticity to mindfulness.

Studies and research about effective thinking and intelligent behaviour by Feuerstein's group (1980), Perkins (1995), Sternberg's group (1998), Gardner (2006), indicate that there are some identifiable characteristics of effective thinkers. These are not necessarily scientists, artists, mathematicians who demonstrate these behaviours, but these characteristics have been identified in people in all domains of life: secretaries, teachers, entrepreneurs, bakers, and parents.

A *Habit of Mind* is a pattern of intellectual behaviours that leads to productive actions. When people experience dichotomies, are confused by dilemmas, or come face-to-face with uncertainties, our most effective response requires drawing forth certain patterns of intellectual behaviour. When we draw upon these intellectual resources, the results are more powerful, of higher quality, and of greater significance than if we fail to employ such patterns of intellectual behaviour.

A *Habit of Mind* means having a disposition toward behaving intelligently when coping with problems, the answers to which are not immediately known. Employing a *Habit of Mind* requires many skills, attitudes cues, past experiences, and proclivities. It means that we value one pattern of thinking over another and, therefore, it implies choice making about which pattern should be employed at this time. It includes sensitivity to the contextual cues in a situation which signal this as an appropriate time and circumstance in which the employment of this pattern would be useful. It requires a level of skilfulness to employ and carry out the behaviours effectively over time. It suggests that the effects of their use are reflected upon, evaluated, modified, and carried forth to future applications (Costa & Kallick, 2008).

*Habits of mind* are broad, abstract, orienting, habitual ways of thinking, feeling, and acting influenced by assumptions that constitute a set of codes. Exactly like in the communication mechanism, these codes may be cultural, social, educational, economic, political, or psychological. *Habits of mind* become, therefore, the constellation of belief, value judgment, attitude and feeling that shapes a particular interpretation of situation and contexts.

Over the years different writers have presented various lists of their top intelligent behaviours, which are often labelled as 'HoM' or 'thinking dispositions' (King & Kitchener, 1994; Cousins & Earl, 1995; Lee, 1999; Owen, 1999; Patton, 1997; MacBeath, 1998; Costa and Kallick, 1995, 2008; Dottin, Miller & O'Brien, 2013; Kallick & Zmuda, 2017). These lists have been found to be relatively similar, all emphasising curiosity, flexibility, posing problems, decision-making, being reasonable, creativity, risk-taking and other behaviours that support critical and creative thought (Costa and Kallick 2000) as well as multi-code communication.

Costa & Kallick (2008) in *Learning and Leading with Habits of Mind* focus on 16 *Habits of Mind* that teachers and parents can teach, develop, observe and measure to help students get into the habit of behaving intelligently. The 16 *Habits of Mind* were drawn from research on human effectiveness, descriptions of remarkable performers and analyses of the characteristics of efficacious people.

The 16 following attributes - we here describe - refer to what human beings do when they behave intelligently. Costa & Kallick (2008) choose to label them as *Habits of Mind* even if they are characteristics of what intelligent people do when they are confronted with problems, the resolutions to which are not immediately evident. The 16 *Habits of Mind* are: 1. persisting, 2. managing impulsivity, 3. listening with understanding and empathy, 4. thinking flexibly, 5. thinking about thinking (metacognition), 6. striving for accuracy, 7. questioning and posing problems, 8. applying past knowledge to new situations, 9. thinking and communicating with clarity and precision, 10. gathering data through all senses, 11. creating-imagining-innovating, 12. responding with wonderment and awe, 13. taking responsible risks, 14. finding humour, 15. thinking interdependently, 16. remaining open to continuous learning. These 16 attributes

are seldom performed in isolation. Rather, clusters of such behaviours are drawn forth and employed in various situations; when listening intently, for example, one employs flexibility, metacognition, precise language and perhaps questioning.

Therefore, it becomes essential to promote and continuously consolidate the dispositions of the mind in lifelong teacher training, because they are tools that allow teachers to develop, more quickly, the skills required by their training or professional context.

## **2. The research**

Starting from the theoretical reflection, from the research conducted in recent years, both nationally and internationally, and from the results of a survey carried out within the Degree Course in Primary Education at the University of Palermo, the research path on the development of teachers' didactic communication (divided into linguistic-pragmatic competence and communicative-didactic competence) has foreseen, for its realization, three actions: the first aimed at planning and elaborating a series of activities using the Brain gym methodology; the second action experimented and implemented the training methodology; and the third action saw the experimentation of the path with 190 first grade secondary school teachers and 195 second grade secondary school teachers from the province of Caltanissetta.

To ensure the fundamental characteristics of reliability and validity, the research adopted mixed methods. As Guba (1981) points out, the combination of the two methods allowed to highlight 4 aspects to give rigor to the investigation: 1) the value of truth, 2) applicability, 3) consistency, and 4) neutrality. The experiment plan used was the single-group quasi-experimental one.

### **2.1. The questions and the formulation of the research hypotheses**

We asked ourselves if the Habits of Mind and the Brain-based approach can modify the communicative-didactic competence of in-service teachers working in secondary school.

As part of the research, we predicted that at the end of the experimental action (Brain-gym activities and activities based on Habits of Mind), the performance indicative of the development of the didactic communication (divided into the sub-domains of linguistic-pragmatic and communicative-didactic competence) would significantly increase.

It was hypothesized that the Dispositions of the mind and the Brain-based methodology, used in the experimental path with the teachers, would have considerably improved their ability to:

- reflect on their own communication process
- critically evaluate their work and the degree of their communicative interactions in the classroom
- perform analysis and synthesis of verbal and non-verbal texts of medium and high complexity
- describe and use different communication codes, verbal and non-verbal
- acquire greater dexterity in the use of the body as a mediator of didactic communication.

After the formulation of the particular hypotheses, we proceeded to the choice of the initial, ongoing and final survey tools, to the definition of the research plan and to the design and construction of the training methodology that would be tested for the verification of the hypotheses.

### **2.2 The evaluation tools**

How to evaluate and what tools to use to promote the assessment of communicative-didactic competence and provide useful information to support its development? The training effectiveness of the experimental action for the development of competence was measured through a series of tools specially prepared to verify the hypotheses.

To measure communicative-didactic competence, a checklist was used (Anello, 2012) which investigates the following areas: ideational and exhibition order; pragmatic efficacy, non-verbal



expressive capacity, logical structuring of thoughts, flexibility, ideational and expressive-verbal fluidity, critical sense. Each area of the check list contains 10 descriptors that are detected in dichotomous form (YES/NO).

For the evaluation of the dispositions of the mind, the evaluation rubric was chosen because a rubric, rather than leading to the attribution of a single score, becomes a guide for evaluating teachers' performance based on a set of criteria ranging from a minimum to maximum level. The clear and explicit definition of the evaluation criteria is fundamental for the evaluation of competences, since it makes the evaluation process transparent in relation to the manifestation of certain competences by teachers (Castoldi & Martini, 2011; Castoldi, 2016). The rubric provides non-subjective parameters for evaluating the learning process, but - at the same time - moves in the direction of skills evaluation since it allows to combine the uniqueness of the references and the variety of possible paths (Pedone, 2012, p. 80).

Six rubrics have been constructed, one for each disposition of the mind. Each heading consists of 2 criteria and 5 indicators placed on a 5-level scale (not sufficient, sufficient, fair, good, excellent). The rubrics created were used to evaluate the 6 dispositions of the mind at the beginning and at the end of the intervention.

### **2.3. The experimental intervention**

The intervention was aimed at 385 first and second grade secondary school Sicilian teachers in the academic year 2020/2021.

The experimental factor (the Brain-gym and Habits of Mind activities) was introduced in the period between February and June 2021.

The experimental action has foreseen and achieved three phases.

In the first phase (1<sup>st</sup> – 19<sup>th</sup> February), the initial evaluation session was carried out and the Brain-based activities were chosen for the development of linguistic-pragmatic skills and of the communicative-didactic skills and the activities for the consolidation of 6 Habits of Mind (HoM) were built.

The two methodologies used were: Brain Gym and Habits of Mind.

The Brain Gym allows you to work on the brain through the body, generating new balances and better emotional management. Lived as an integral part of the training course, it allows the integration of cerebral hemispheric activities through a reprogramming of movement patterns. These allow the training subject to have access to previously inaccessible areas of the brain. The Brain Gym uses the combined use of different sensory, perceptual, and expressive channels, invests the whole person in the communication process and guarantees a better understanding of oneself and one's own ability to interact with the world outside (Dennison, 1984; 2010). Movement implements not only the ability to memorize (Kandel, 2010), but also the ability to 'mental movement', that is to visualize (even in the absence of vision) (Rivoltella, 2012), on which the structuring of the act is based communicative.

Costa and Kallick (2007, 45-46) outline 16 dispositions that can be taught, cultivated, observed, and evaluated. Such dispositions of the mind represent a pattern of intellectual behaviours that lead to productive actions. Considering the components and dispositions of the mind, indicated by Costa and Kallick, we have identified the 6 dispositions of the mind that are coherent for the development of the communicative-didactic competence which are shown in the following table

Dimensions of Habits of Mind		Habits of Mind
<i>Value</i>	Choosing to employ a pattern of intellectual behaviors rather than other, less productive patterns.	1. Remaining Open to Continuous Learning 2. Thinking Flexibly 3. Persisting 4. Managing Impulsivity 5. Thinking and Communicating with Clarity and Precision 6. Finding Humor
<i>Inclination</i>	Feeling the tendency to employ a pattern of intellectual behaviors.	
<i>Sensitivity</i>	Perceiving opportunities for, and appropriateness of, employing the pattern of behaviors.	
<i>Capability</i>	Possessing the basic skills and capacities to carry through with the behaviors.	
<i>Commitment</i>	Constantly striving to reflect on and improve performance of the pattern of intellectual behaviors.	
<i>Policy</i>	Making it a policy to promote and incorporate the patterns of intellectual behaviors into actions, decisions, and resolutions of problematic situations.	

Table 1: Dimensions and Habits of Mind

The second phase (February 22<sup>nd</sup> - May 20<sup>th</sup>) of the intervention was characterized by the introduction of the experimental factor: the Brain-based methodology and the activities on Habits of Mind, according to a well-defined calendar. The intervention covered 60 hours. The course consisted of 2 weekly meetings, lasting 4 hours each, for a total of 15 meetings. During this phase, the evaluation rubrics related to the two chosen skills and the 6 dispositions of the mind were used to monitor the process.

In the third phase (23<sup>rd</sup> – 30<sup>th</sup> May) the evaluation tools were administered again, the data were analysed and processed. The results were communicated and discussed with the teachers in 5 meetings held in June 2021.

The path was structured as follows (table 2):

Timing	Activities	Affected brain areas and functions Habits of mind involved
5 hours (Preparatory dynamics) + 5 hours HoM (Habits of Mind)	Motor heating PEACE I & II part  HoM 1 Opening up to the world HoM 2 Let's try to change	<b>Cerebral-motor tuning:</b> muscle activation; preparation for work and deconstruction of prevailing psycho-motor patterns.  <b>Habits of Mind:</b> Remaining Open to Continuous Learning, Thinking Flexibly, Managing Impulsivity, Finding Humor



<p>8 hours + 5 hours HoM activities</p>	<p>Exercises on the dimension of LATERALITY (right/left): * Water drinking - Lazy 8's - Alphabet 8's - Arm activation - Elephant - Thinking cap - The Owl</p> <p>HoM 3 We resist listening HoM 4 Let's look beyond</p>	<p><b>Activation of linguistic-pragmatic competence:</b> integration of the right and left areas of the brain; integration of bilateral skills of vision and hearing and eye-manual visual cooperation; auditory cooperation, right ear and left ear; passage of logic and analogic information.</p> <p><b>Habits of Mind:</b> Remaining Open to Continuous Learning, Persisting, Managing Impulsivity, Thinking and Communicating with Clarity and Precision.</p>
<p>2 hours + 1 hour HoM</p>	<p>Repetition in combinatorial blocks of all the exercises previously performed on lateralization in micro-sequences. Reflection on Habits of Mind</p>	
<p>8 hours + 6 hours HoM activities</p>	<p>Exercises on the dimension of the CENTERING (top/bottom): * Water drinking - Positive points - Balance buttons - Space buttons - Energy Yawn - Earth buttons - Gravity glider - The Grounder HoM 5 I look at you and I don't listen to you HoM 6 We think positive</p>	<p><b>Activation of communicative-didactic competence:</b> stimulation of the limbic zone and the prefrontal cortex; perceptual consolidation of the balance of the centre of gravity; consequent enhancement of brain circulation and oxygenation.</p> <p><b>Habits of Mind:</b> Thinking Flexibly, Persisting, Finding Humour</p>
<p>2 hours + 1 hour HoM</p>	<p>Repetition in combinatorial blocks of all the exercises previously performed on lateralization in micro-sequences. Reflection on Habits of Mind</p>	

<p>8 hours + 6 hours HoM activities</p>	<p>Exercises on the dimension of FOCUSING (forward/backward): * Water drinking</p> <ul style="list-style-type: none"> <li>- Neck rolls</li> <li>- Belly breathing</li> <li>- Gravity gilder</li> <li>- Think o fan 'X'</li> <li>- Cross crawl</li> <li>- Energizer</li> <li>- Rocker</li> <li>- Double doodle</li> <li>- Belly breathing</li> <li>- All lengthening activities</li> </ul> <p>HoM 5 help I begin to communicate well HoM 6 Hold on... here we come</p>	<p><b>Activation of linguistic-pragmatic and communicative-didactic competence:</b> stimulation of the interconnection between the posterior part of the brain and the anterior one; shift from the registration of disciplinary knowledge to their elaboration, analysis, and didactic transcoding.</p> <p><b>Habits of Mind:</b> Remaining Open to Continuous Learning, Thinking Flexibly, Persisting, Thinking and Communicating with Clarity and Precision., Finding Humour</p>
<p>2 hours + 1 hour HoM</p>	<p>Repetition in combinatorial blocks of all the exercises previously performed on lateralization in micro-sequences. Reflection on Habits of Mind</p>	

Table 2: Description of the Brain Gym and Habits of Mind intervention

### 3. Results discussion

385 secondary school teachers took part in the intervention. 87.7% of those interviewed are permanent teachers, only 10.3% are on contract. 70% of permanent teachers have been in service for at least 20 years. Most of the teachers are between 42 and 58 years old.

With the application of the T-test for repeated measurements, we ascertained the significance of the differences between the averages between the data collected, with the check list (Ring, 2012), at the beginning and at the end of the experimental intervention. The probability we chose to accept the values of T as significant was that of  $<.05$  (95% confidence interval for the difference). The results of the statistical processing made it possible to state that the average value of the group, in each dimension investigated (ideational and expository order; pragmatic efficacy, non-verbal expressive capacity, logical structuring of thoughts, flexibility, ideational and expressive-verbal fluidity, critical sense), has significantly raised after carrying out the intervention, as shown below:

Dimensioni check list	Media	Dev. Std.	T	Si. (2-code)
Pre-test conceptual and exhibition order	4.29	1.39	-22.58	$\leq 0.01$
Post-test ideational and exhibition order	6.81	0.89		

Pre-test pragmatic effectiveness	4.41	1.85	-21.8	≤ 0.01
Post-test pragmatic effectiveness	6.95	0.91		
Pre-test non-verbal expressive ability	4.42	1.81	-21.65	≤ 0.01
Post-test non-verbal expressive ability	7,1	1.1		
Pre-test logical structuring of thoughts	4.44	1.96	-20.86	≤ 0.01
Post-test Logical structuring of thoughts	7.05	1.20		
Pre-test flexibility	4.53	1.93	-20.46	≤ 0.01
Post-test flexibility	7.08	1.3		
Pre-test fluency in ideation and expressive-verbal	4.51	2.1	-19.6	≤ 0.01
Post-test fluency in ideation and expressive-verbal	7.04	1.45		
Pre-test critical sense	4.56	1.87	-19.83	≤ 0.01
Post-test critical sense	7.05	1.39		

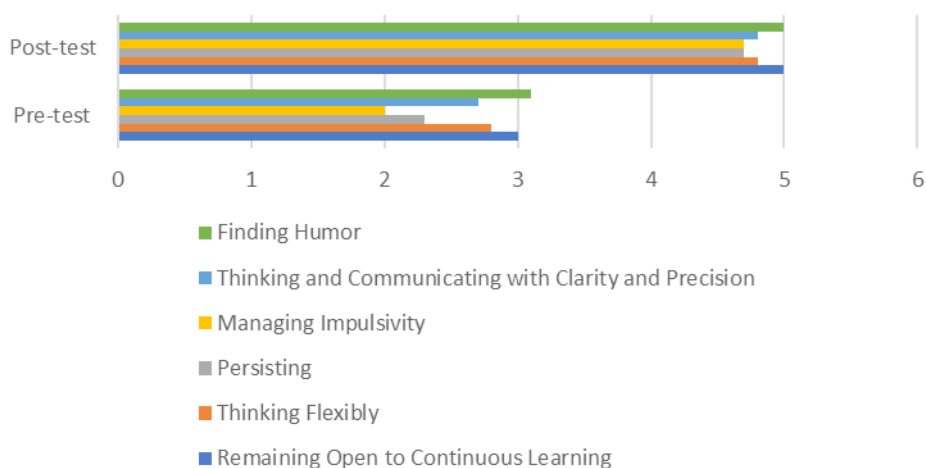
Tab 3: Differences between pre-test and post-test in the experimental group (n = 385)

From the data processed, we may observe that the intervention for the enhancement of linguistic-pragmatic and communicative-didactic skills has gradually achieved a development both in the general ability of teachers and in their individual skills. In particular, the teachers have consolidated the linguistic-pragmatic competence and, therefore, at the end of the intervention, the abilities of clearly exposing, connecting the different segments of the contents of the discipline establishing comparisons and relationships, selecting information and language, considering the knowledge of the interlocutors, modify their production based on the feedback of their interlocutors. About communicative-didactic competence, there emerged a noteworthy increase of their abilities to regulate the direction of the gaze and the position of the body with respect to the listener, to control the tone of the voice, to pronounce terms and support them with non-verbal gestures, to treat and expose a content from multiple points of view and using different verbal & non-verbal tools. Finally, a significant increase in positive performances was noted in the group, referring to the ability to express judgments by adopting an adequate criterion, to criticize oneself.

The intervention based on Habits of Mind did not affect the content result of the acquired learning, but the cognitive path that each teacher has explored to reach a conclusion. This is because what was most intended to be strengthened was the maturation of the metacognitive reflection that traces, designs, stimulates, elasticises, plasticises, and builds new information processing maps.

The data from the evaluation section, at the end of the course, helped us better define the significant improvements of the two competences we meant to enhance. Reading the averages before and after the intervention confirms that the teachers, through the activities of Brain Gym and Habits of Mind, have consolidated their mind dispositions as shown in the following graph:

## Pre/Post test Habits of Mind



Graph 1: Pre/post-test Habits of Mind (n. 385)

At the end of the intervention, the data show:

- Remaining Open to Continuous Learning: 79% of teachers are more comfortable with respect to the knowledge of the discipline, they feel more confident, they are more creative and eager to learn, they are committed to making progress, growing, learn, modify, and improve themselves; yet doubts do not cause them anxiety.
- Thinking Flexibly: 83% of teachers consider the theories and topics covered from multiple points of view, have developed the propensity to adapt to situations according to the events and the inputs of information that their brain receives; create and search for new approaches and elaborate cumulative and/or alternative reflections.
- Persisting: 82% of teachers remain focused for much longer on a designed activity if considered complex and difficult and do not entrust the possible answer to chance, but look for a system, a structure or strategy to face it and bring it to term.
- Thinking and Communicating with Clarity and Precision: 79% of teachers describe the situations and contexts using a precise and appropriate language; communicate accurately, taking care to use relevant language and terms that clarify by motivating their statements with comparisons, quantifications, and evidence.
- Managing Impulsivity: 91% of teachers solve problems effectively and think before acting, reflect before approaching a problem and express judgments only after having fully understood it; moreover, they consider the possible alternatives, evaluate them, and listen to the opinions of others, in order to implement the most appropriate one.
- Finding Humour: 78% of teachers appreciate and understand other people's humour and are verbal-pleasant when interacting, they can discover inconsistencies, similarities, absurdities and laugh at themselves.

The intervention of Brain Gym and Habits of Mind allowed the 385 teachers involved to enhance their communicative-teaching skills. The results obtained with the experimented path do not make us forget that, while it is relatively easy to obtain changes when designing and implementing valid activities, it is much more complex to transform these changes into stable acquisitions over time if periodical reinforcement activities are not proposed.

We are aware that the conclusions reached, being based on a non-probable sample, do not allow generalizations.; in addition to treatment, other uncontrolled variables may have influenced the improvements observed in the group.

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