The impact of skills development through the application of MindLab Project's methodology: a study of Year 5 students

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Abstract

This article presents a study conducted in 2009 (by Mind Lab Brazil in partnership with INADE) of several Year 5 students at 10 public and private Schools in order to evaluate the possible impacts on proficiency levels in Mathematics and Portuguese after three months using Mind Lab's Methodology. The Assessment Tools were based on INADE's Item Response Theory (IRT) and developed from their References for Year 5 and the skills prioritized in the "Resource Management" module from Mind Lab's Methodology. Results showed a 100% increase on average, in levels of proficiency in Mathematics and 20% in Portuguese, more than expected for the period. The SAEB scale was used, but the interpretation of the scale (levels and cut-off points) were proposed by INADE. In Portuguese, there was decrease in the number of students located at "Below Basic" level, and a increase in "Basic", "Adequate" and " Advanced", using the SAEB scale. In Mathematics, there was a decrease in the number of student in levels as "Below Basic" and "Basic" with a brilliant increase in "Adequate" and "Advanced". Finally, we present the outline of the preliminary planning for the continuity of the study in 2010.

Introduction

During the second semester of 2009, Mind Lab Brazil, in partnership with INADE (Institute of Evaluation and Educational Development), developed a study to evaluate the impact in the profiency level of Year 5 students using the Mind Lab methodology within their curriculum.

Mind Lab Brazil is a partner of Mind Lab Group in Israel, which created a program that uses thinking games to develop, within the school environment, cognitive, emotional, social and ethical skills. In Brazil since 2007, this curriculum proposal is implemented in schools with a weekly lesson taught by their own teacher, under the supervision of Mind Lab Brazil's teaching staff.

INADE (www.institutoinade.com.br) develops large scale educational assessment programs to gauge the quality of the education offered by public and private schools. Through the application of Portuguese and Mathematics exams, it is possible to measure learning and whether measurements are comparable with state and national standards of SAEB (Evaluation System of Basic Education).

Justification

In the educational field, we can see an increasing desire to insert, in the school curriculum, a type of work that focus on developing skills and competencies, to go beyond the syllabus of different school subjects.

Education, traditionally, was guided more by transmitting information than through human development. The movements that have followed are educational projects that reflect a strong effort from teachers to realize that the syllabus should be in the service of educational work, ie, they should serve as resources for the promotion of human development. However, in most cases, the conceptual aspects are much more relevant than the skills that children and adolescents need to develop to understand, appropriate and use the concepts and information autonomously and efficiently.

In this sense, the search was for projects or intentional actions that would enable a focus on the development of skills within the school curriculum, but which would also look at individual learning in the context of human beings with needs that schools are required to fulfill. School subjects offer a range of knowledge and information, but often students are unable to establish meanings and connections that empower them to assess the value and importance of this knowledge for their lives and social integration. Today, we live in the reality of a globalized world, marked by the speed of change, and more than ever it is necessary to provide space and time especially designed to develop, in students, internal resources that will enable them to establish the connections that emerge from the content of all curriculum components.

Theoretical Rationale

Throughout the course of Education, research that guided pedagogical work was designed and based upon theoretical principles influenced by several philosophical, methodological, theoretical and epistemological principles (Gamboa, 1997). Every educational action is based upon the concepts of human beings, knowledge, intelligence, education and learning. Historically, the key concepts that have influenced the formation of our schools are: innatist, environmentalist and interactionist (Garcia and Meier, 2007).

In the "innatist" concept, one sees intelligence as being inherited, the result of genetic inheritance, ie, intelligence level as predetermined by chromosomes. When this way of understanding human beings is taken into consideration, the responsibility for the learning process is within the student. As a result, learning difficulties are viewed as structural defects directly related to deficiencies that exist from birth, received as genetic inheritance and therefore immutable. *"From this perspective, the student is born with a pre-established level of intelligence. The teacher only contributes so that knowledge (and not the intelligence) is expanded "*(Garcia and Meier, 2007: 75).

In the "environmentalist" concept (or empiricist), humam beings are seen as the products of environmental stimulations, as if they were a "tabula-rasa" (an expression meaning *blank slate* , used by philolopher John Locke) that the environment will mould. According to this perspective, learning is constrained from the outside to the inside; what really matters is the quality of the stimulus and the content being taught. *"The experience, according to empiricists, is the only source of knowledge (...) In this conception, knowledge is acquired through the action of experiencing the sensations, which are the basis of knowledge"* (Garcia and Meier, 2007: 76). Learning, in this conception, is to incorporate what was presented in order to achieve an exact reproduction of it. The environment's role is to provide the individual with stimuli to be experienced. The student is not considered in their many aspects because what determines learning is the teaching technique : giving good lessons, good explanations of the subjects to be memorized and reproduced. The source of a learning problem is an environment that is unfavorable to the student. The teacher's focus is to develop good techniques to transmit knowledge.

According to those two ways of understanding human beings, the learning focus (and its problems) is either within the individual (innatist) or object (environmentalism). In both concepts, the principle of limitation, whether personal or environmental, is present, setting up educational activities focusing on information transmission rather than the development of intelligence.

The third concept, "interactionist", the emphasis is neither the subject nor the environment, but the interactions between them. When we consider the interactions between the individual and their surroundings, we cover aspects of the aforementioned conceptions, located both within the individual and the environment. However, by including the story of interrelationships, a third factor is added and it modifies both the form of thinking about the individual (no longer genetically determined), and the environment, which also changes when relating to individuals. Thus, interactionism exceeds the *a priori* of previous concepts, bringing a dialectical dimension of both the individual and the environment, mutually constituent and constituted through and within relationships.

In Brazil, the best known authors of the social interaction approach are Piaget and Vygotsky (Garcia and Meier, 2007).

Jean Piaget, a Swiss epistemologist, says that humans build cognizant structures through their interaction with objects of knowledge by means of two dialectically complementary and integrated processes: assimilation - use of structures already present in the individual -, and accommodation - transforming these structures and / or creating new ones according to the demands of reality - (Piaget, 2003). This idea of construction gave his theory the name "constructivism."

Piaget was concerned about researching and describing the genesis of logical structures of thought: how is it possible for human beings to develop logical thinking. By studying the characteristics of logic and the development of cognizant structures, he postulated four stages with well defined characteristics: Sensory-Motor, Pre-Operatinal, Concrete Operational and Formal Operational. At each stage, the quality of the interaction is marked by the characteristics of the cognizant structures of the individual. Each stage contains the previous and prepares for the next one. The ages of the individual at each stage vary depending on the quantity and quality of experiences and interactions with the environment, but the sequence of the development of these mental structures are invariable (Piaget, 2003).

Lev Vygotsky, a Russian psychologist, strengthens the role of language as a cultural and historical heritage in the interactions and the development of an individual's intelligence. Social groups develop a language in their own context and assist their members in the appropriation of its rudiments and complexity. To this author, *"The path from the object to the child and vice-versa has to go through another person. This complex human structure is the product of a developmental process deeply rooted in the links between an individual's history and social history* (Vygotsky, 1989: 33).

There are two fundamental concepts of the Vygotskian theory that have influenced the teaching practice in schools: the "zone of proximal development - ZPD" which locates the teacher's region of action in the space between what the student already does independently, what they accomplish with the help of another more experienced being (an adult or a colleague) and the "mediation", understood as the interposition between an individual and the medium, and both semiotic (language, symbols, culture) and personal (the teacher, parents, colleague) elements.

In Brazil, the interactionist author Professor Reuven Feuerstein is currently providing important contributions to education. The author proposes that we learn more efficiently when the learning process is mediated. The mediator is the one who helps the learner to interpret the stimuli and assign meaning to experiences, helping the learner to build knowledge and develop their cognitive functions. *"The development of the human being must go through mediated learning experiences. And it is this set of experiments that allows the individual to develop to the point where they benefit from direct learning experiences "(*Garcia and Meier, 2007: 78).

All of his work has been based on a key statement: "every human being is modifiable". The author has systematized his theory based upon the results of studies on its teaching practice and called it the "Theory of Structural Cognitive Modifiability (Garcia and Meier, 2007). Feuerstein believes that a person can manifest, at any given time, reactions that

indicate weaknesses or problems. However, these can be overcome by modifying themselves, including all the mental structures in general (not only partial or local) and therefore changing the course and direction of development. When talking about transformation and movement, Feuerstein departs from theoretical viewpoints that conceive intelligence as something static and quantifiable, or tied irrevocably to maturational or hereditary conditions. Feuerstein proposes "do not allow chromosomes to have the last word." For the author, cognitive modifiability must be defined as structural and not sporadic or accidental and, therefore, a change in one component affects the whole functional cognition. This is a transformation of the cognitive process itself, in its rhythm, extent and self-regulative nature: "(...) not an isolated event, but a way for the individual to interact". (Feuerstein , 1980, quoted in Garcia and Meier, 2007: 113).

For Feuerstein (Garcia and Meier, 2007), processes of logical thinking, learning and problem solving are supported by a range of cognitive functions. Intelligence is conceived as a set of basic cognitive functions; components that emerge from a child's innate activities, their learnig backround, attitudes towards relationships and motivations. Cognition is the processes by which an individual receives (input), develops and communicates (output) information in order to adapt to his/her environment.

A structural transformation, once set in motion, will determine the future path of individual development. The mental structure, in this approach, is conceived as a total and integrated system, composed of elements or subsystems which are interconnected and interdependent and which influence, combine, restrain and mutually affect each other. Thus, both development and a cognitive dysfunction, (in either the input, the elaboration or the output) may reverberate in changes in the cognitive as a whole. Such processes are the components of mental acts and are part of functional brain systems that explain, in part, an individual's ability to use past experiences when adapting to new and more complex situations. This focus on cognition allows for better flexibility and adaptive plasticity (Garcia and Meier, 2007).

For all the above, we believe that the third concept, the interaction, is the one that offers the most theoretical and methodological means to address the need to improve school performance. Schools today have evolved to incorporate studies and development of pedagogical practices of interactive conception, in which actions and interactions of individuals, teams and the development of projects involving inter and transdisciplinary constructions of knowledge are valued.

In this context, the teacher needs to transform their traditional position and adopt the posture of a mediator. The teacher has to mediate not only the relationship between students and knowledge, but also personal and group relationships between individuals regarding their conflicts, emotions, strengths, preferences and dislikes.

In our view, there were many theoretical advances regarding the understanding of processes involved in human learning. However, these advances often do not include pedagogical practice, which is permeated by references to theory and practice often without any meaning for the teacher, who is the main protagonist of the educational action at school. The teacher ends up repeating what they experienced as a student themselves, based on

concepts that were significant to their historical moment (in most cases rooted in innatist or environmentalist assumptions), but which do not respond to the needs of today.

Today, in the twenty-first century, society has changed and there are different needs. It is essential to transform classroom practices to handle these new demands and deal with new knowledge about learning and teaching.

It is necessary to consider proposals in which teachers build experiences and meanings first for themselves, as an individual that is part of the proceedings, so that when they notice changes in themselves, they will also change their own practice. By experiences of being mediated within the learning process, teachers notice the difference and importance of a learning experience that is developed with meaning, and also the intentionality of the intervention of another person who wants them to learn.

The Mind Lab Project's Methododology

What is the Mind Lab Project? It is a curriculum-pedagogical proposal for the development of cognitive, social, emotional and ethical skills through thinking games, with emphasis on meaningful learning and the role of the teacher-mediator.

The Project's methodology (theoretically grounded in the interactionist approach) , proposes the insertion of a subject in the school curriculum, which includes the use of pleasant teaching resources (thinking games), and focuses on the development of skills and the role of the Teacher-Mediator in the teaching-learning process. The learner, the teacher and teaching resources are designed with the same degree of importance and with the same careful eye, which enables the "learning event " to be more meaningful.

We believe that the attribution of meaning leads to attention, interest, motivation and participation of students in the learning process. They feel part of this process; accomplices or co-authors: the process is experienced as a joint construction between teacher and students. Teachers enable the building of new concepts, the processing of information and encourage research. They are true masters who consider the knowledge of the others and enter the relationship as someone who will collaborate in the development of autonomy. Finally, a teacher-mediator.

We know that schools develop, within their daily work, a whole range of skills for their students, without reducing its role as a "tool builder" (numeracy, literacy, etc) and "transgenerational communicator" of formalized and systematized scientific knowledge (the contents of the various subjects). However, developing such skills takes place, in most cases, in a dispersed way, integrating other focuses of educational work in school.

The Mind Lab Project is configured as a space-time within the school curriculum, with specific focus on the development of human skills that are mainstays of diverse learning, whether formal or informal. That is, its contents are "cognitive, social, emotional and ethical skills."

It is essential to make this clear: they are not "game" lessons, they are lessons "with a game." The intention is not to form "players", but to collaborate in training people with greater and better internal resources to be part of the world in an ethically, socially and emotionally balanced manner; able to reason about reality and about themselves and to solve everyday problems more maturely and efficiently.

The use of thinking games as a teaching tool creates contextualized problems that simulate real situations. It is a pleasant and provocative teaching resource, in which the student is involved and is open to learning strategies and reasoning methods which are the "contents" of the "new subject".

Through the experience of playing, we provide the construction of metacognitive methods, which are resources that organize thought and action when facing many different everyday situations, simulated by the game. Children learn to think about their own thinking and appropriate strategies not only to play better, but as internal resources to use in daily life situations and with other curriculum components, such as Mathematics, Portuguese, Science and History.

The methods are named after metaphors that, for their ambiguous and relational character, facilitate the translation of meanings between the applicability within a game and aspects of human experience.

For example, the "Detective Method" is an investigative action before any situation: to elaborate good questions, carefully observe the details of a situation to see it better, capture meaningful data that can anchor chains of logical and consistent hypothesis, "break" larger problems into smaller ones and find solutions. This method is taught through the experience of playing and it is used by students to play better. It enables awareness (through metacognitive processes), of the paths taken and their advantages. Finally, possible transcendences are explored with the students, ie, learning extensions beyond immediate experiences. Exercises and records, held in the Student's Book also systematize the contents explored.
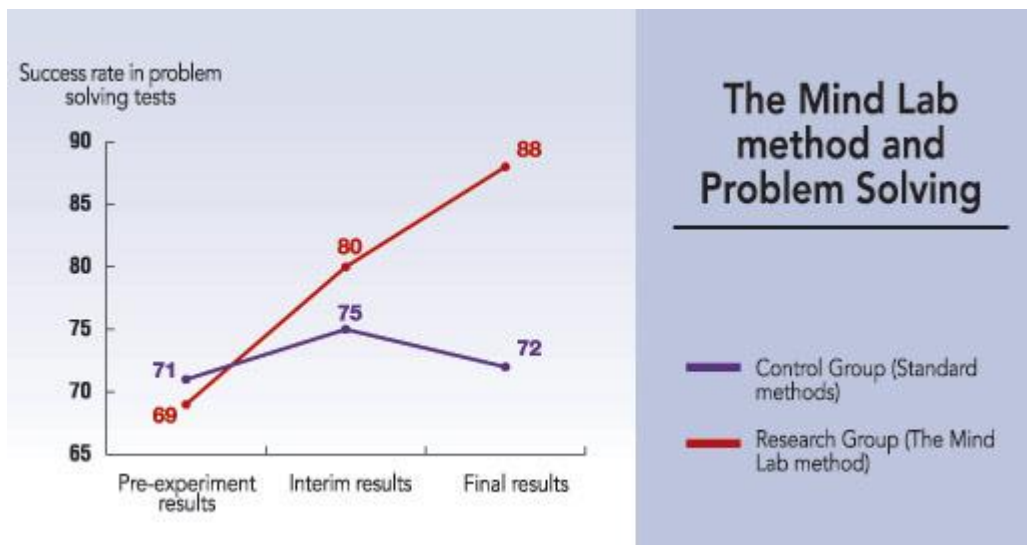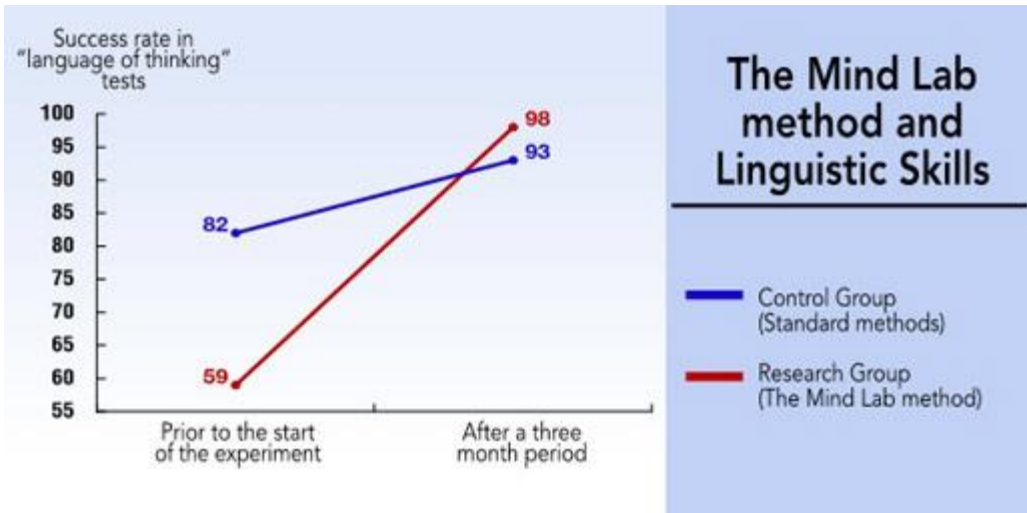
Previous research

Research from renowned universities show that students' abilities are developed through their participation in Mind Lab's lessons. In 1999, Danny Gendelman held a survey at Northumbria University (England), which noted that meta-cognitive methods developed by Mind Lab and taught through thinking games improve understanding and the application of reasoning in other contexts.

Research by Donald Green, Yale University / USA (available in full at www.mindlab-brasil.com.br) in 2004, compared the use of thinking games with and without the methodology used in Mind Lab's Project to develop skills. The results showed that within three months, the Methodology promoted an impact on students' performance on standardized tests of Maths and language skills. Observe that the control group

showed a better performance than before the intervention. Then the experimental group obtained significantly higher scores compared to the control group, and the results were evident in the verbal tests than in math, indicating that the introduction of reasoning strategies improves academic performance.

" Additional research is needed to understand why the Mind Lab curriculum improved verbal and math scores. One possibility is that the curriculum helped students in the treatment group negotiate standardized tests – they might have become more sensitive to the strategy of picking the best option from a field of choices. Another possibility is that games made ordinary schoolwork more fun for the children in the treatment group, enhancing their attentiveness to their lessons. A small post-intervention interview of the children lends some support to both of these hypotheses, as children expressed widespread enthusiasm for the Mind Lab curriculum, claimed that it gave them confidence, and often said that it helped them in their all around academic performance. It remains to be seen whether the promising results in this pilot study can be replicated in other grades and school environments."

(Green, D. & Gendelman, E. Can a Curriculum that Teaches Abstract Reasoning Skills Improve Standardized Test Scores? EUA, Yale, 2004)

Success rate in "language of thinking" tests — The Mind Lab method and Linguistic Skills

Success rate in problem solving tests — The Mind Lab method and Problem Solving

Research in Brazil

In 2009, with the aim of expanding the research from Yale, Mind Lab Brazil, in partnership with INADE, conducted a study to assess the impact of the implementation of Mind Lab methodology on proficiency levels in Mathematics and Language of Year 5 students. Around 1000 students from 13 schools (public and private) were part of the research. Between
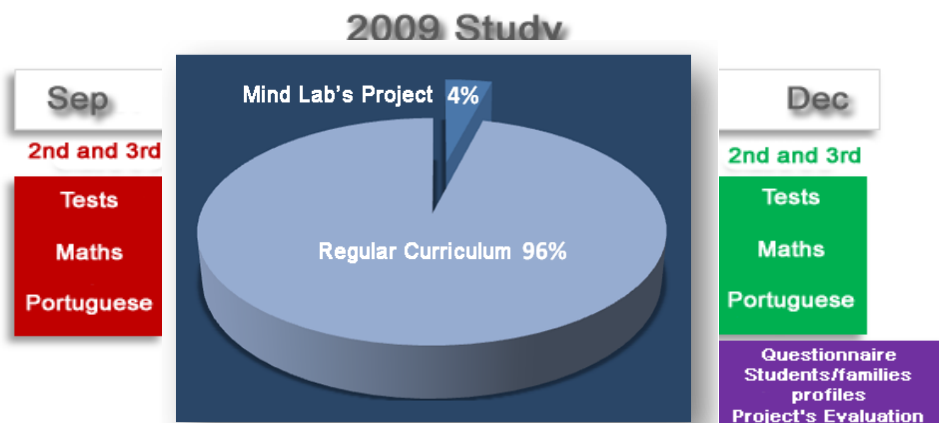
August and December, they studied the module "Resource Management" (incorporated to the school's curriculum) in weekly lessons of 50 minutes taught by their own teacher. These teachers participated in an Initial Training of 20 hours prior to the commencement of work and monthly meetings of supervision throughout the implementation of the project..

The study used the Item Response Theory (TRI). Were used as the SAEB scale (National Assessment of Basic Education) and educacional interpretation of the scale was proposed by INADE

The assessment tools used in this research were composed of objective Portuguese and Mathematics exams, both with around 30 questions. They were developed specifically for this study from the intertwining of the skills which are prioritized in the Module "Resource Management", part of Mind Lab's curriculum (Annex 1), with a cut made from INADE's Matrix of Reference for Year 5 (Annex 2). These matrices are in line with the official documents that regulate Basic Education in Brazil, translating skills that can be measured through multiple-choice questions. The social, emotional and ethical skills that, by their nature are beyond the scope of this instrument, were evaluated using a specific instrument (questionnaire).

There were two objective Portuguese and Mathematics exams, on 2nd and 3rd of September and 2nd and 3rd of December, 2009. The assessment tools were sent by INADE in a sealed envelope, identified with the name of each participant student. The exams were conducted simultaneously in different schools by members of staff (respecting the condition that the teacher was not the one who taught the Method). They were accompanied by a Mind Lab Brazil official trained by INADE in order to ensure that all the methodological procedures necessary for the exemption and reliability of the results were put in place. Along with the assessments in December, students also answered a questionnaire to assess their perceptions on the development of social, emotional and ethical skills. The results were tabulated by school, Year and class (not per student).

The results indicate that the development of the average proficiency in the SAEB scale (in three months of implementation of the project) were higher than expected for the period by 100% in Mathematics and 20% in Portuguese (to know more, visit www.mindlab-brasil.com.br).

Development of the average proficiency in the SAEB scale

Mathematics
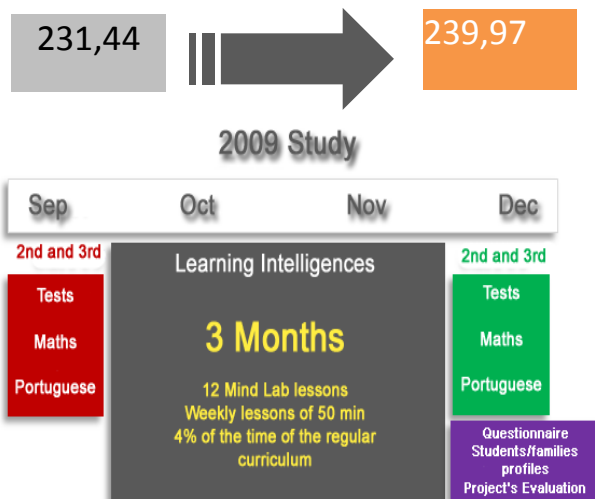
Increase with the project = 8.53

Increase expected without the project = 4.25

Evolution attributable to the project = 100%

Portuguese

Increase with the project = 4.49

Increase expected without the project = 3.75

Evolution attributable to the project = 20%

The SAEB scale consists of four proficiency levels: Below Basic, Basic, and Adequate and Advanced. The graphs below show the percentage of students in each of these performance levels before and after three months of Mind Lab lessons:

Impact on performance - Mathematics
Development of student's average proficiency
Before ■ After

	Before	After
Advanced	1	7
Adequate	30	43
Basic	27	22
Below Basic	41	28
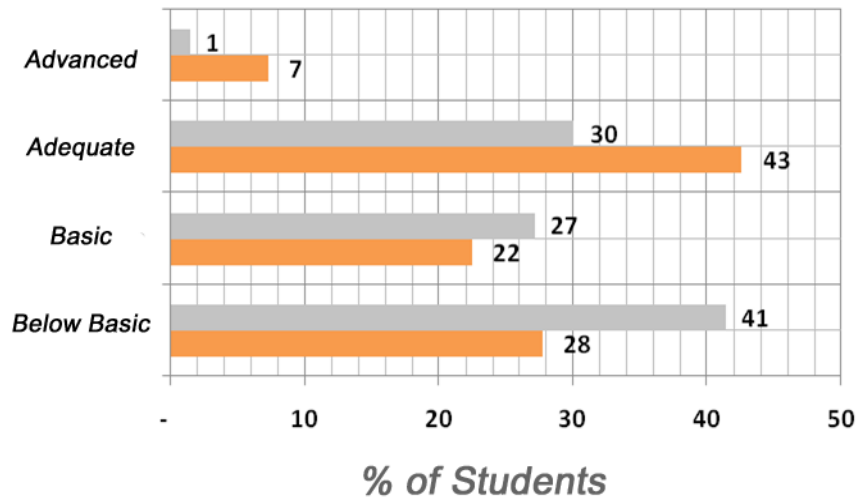
% of Students

Impact on performance - Portuguese
Development of student's average proficiency
Before ■ After

	Before	After
Advanced	3	6
Adequate	25	30
Basic	38	40
Below Basic	35	24
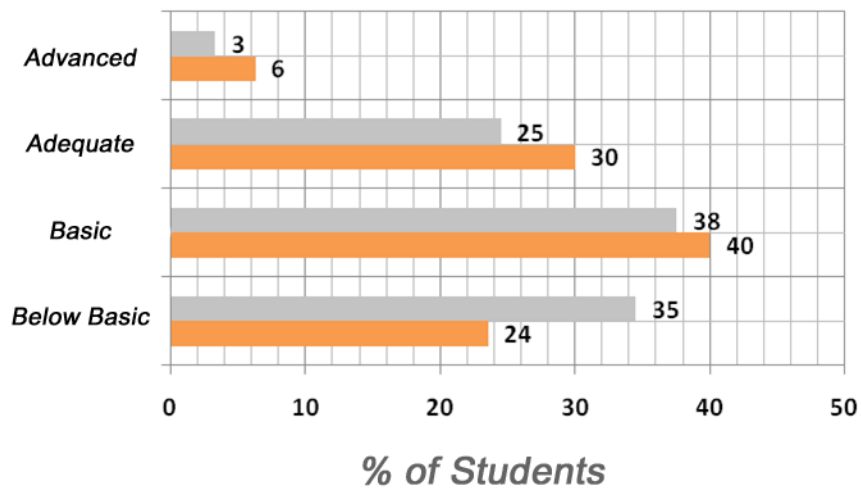
% of Students

The table below shows the percentage of students at each learning level in the first and second application of Mathematics and Portuguese exams. It is noticed that the percentage of students "Below Basic" decreased in both areas of knowledge (10.98% in Portuguese and 13.64% in Mathematics). In Portuguese, the percentage increased for students in levels "Basic" (2.47%), "Adequate" (5.52%) and "Advanced" (2.99%). In Mathematics, the percentage of the proficiency level "Basic" was reduced by 4.72% increasing to the higher levels "Adequate" (12.52%) and "Advanced" (5.83%).

Learning levels between the two exams

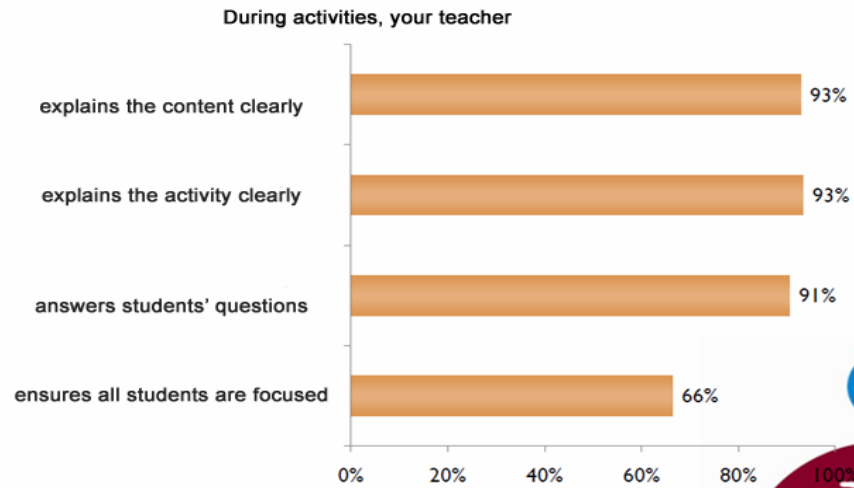| Subject - Exam	Below Basic	Basic	Adequate	Advanced
Portuguese - 1st exam	34,58%	37,55%	24,52%	3,35%
Portuguese - 2nd exam	23,60%	40,02%	30,04%	6,34%
Mathematics - 1st exam	41,35%	27,16%	30,05%	1,44%
Mathematics - 2nd exam	27,71%	22,44%	42,57%	7,27%

Regarding the data obtained through the questionnaire about the benefits of the project, it was found that the methodology, from the students perspective, contributed significantly to improve skills that help them to deal with situations of defeat and victory, on academic performance, teamwork, relationships with friends and family and the pedagogical relationship with the teacher. The results showed high levels of student satisfaction when improving their relationship with the teacher, a fact that encourages us to think about the possible impacts of applying this methodology in the teacher's pedagogic practice and also in other curriculum components.

Project's evaluation according to the students

Students who have given grades 8, 9 or 10 in the item evaluated (on a scale 0-10)

**Evaluation of Activities
Student's Perspective**

Contribution of Mind Lab's Activities

Item	Percentage
Deal with victory and defeat	87%
Performance at school	83%
Hability to work in group	87%
Relationship with Teachers	76%
Relationship with Friends	71%
Relationship with Family	63%
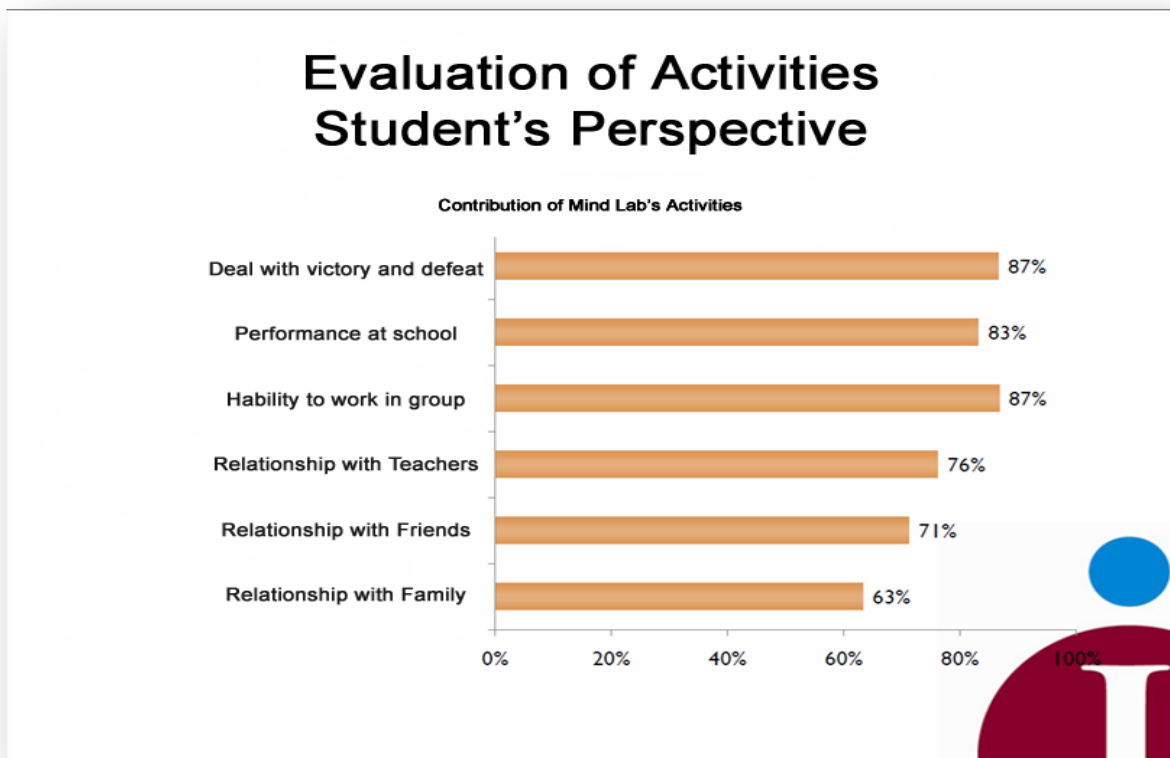
Evaluation of teachers
Students Perspective

During activities, your teacher

explains the content clearly	93%
explains the activity clearly	93%
answers students' questions	91%
ensures all students are focused	66%

0%　20%　40%　60%　80%　100%

Evaluation of classmates
Students Perspective

Your classmates

know how to deal with your mistakes, treating them as a form of learning	63%
are willing to find contructive solutions during group activities	54%
show cooperation during group activities	70%
consider and value people in daily situations	65%
show commitment in daily situations	64%

0%　20%　40%　60%　80%　100%
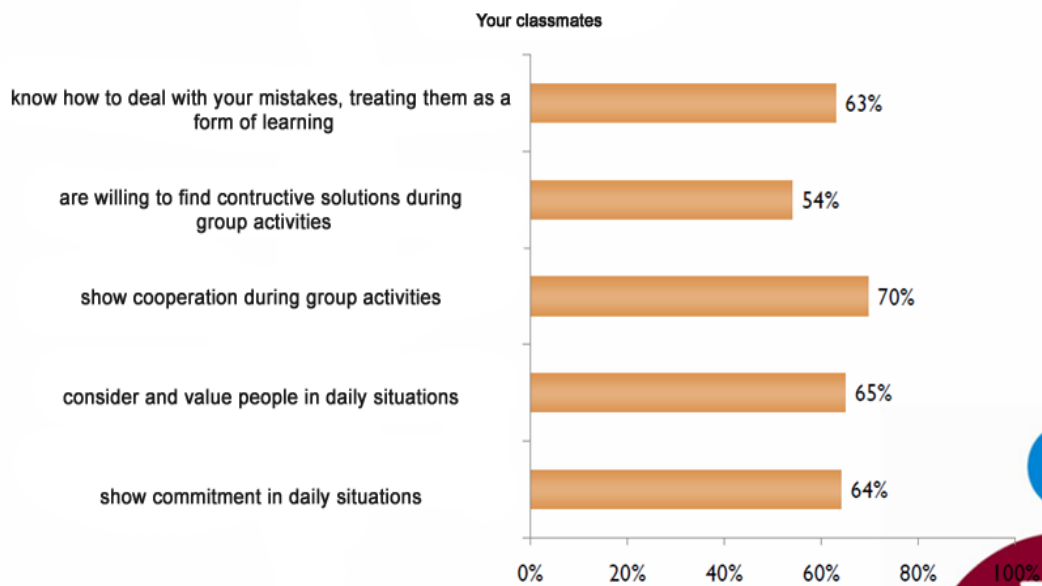
The students' questionnaire responces were used to create a profile of the students and their families. It revealed the following data, regarding the gender of the students, education of parents and resources available at home:

Profile of Students and Families
Students Perspective

Gender

Gender	School
Male	50%
Female	50%

Parents Education

Education	School	
	Mother	Father
None	2%	2%
Year 1 - 5	7%	8%
Year 6 - 9	10%	11%
High School	22%	21%
University	60%	58%

Profile of Students and Families
Students Perspective

Resources available at home

Resources	School		
	No	Yes, one	Yes, more than one
Newspaper subscription	74%	19%	7%
Magazine subscription	59%	24%	17%
Online magazine/ news-paper subscription	81%	13%	6%
Cabo TV	32%	52%	16%
LCD/Plasma TV	38%	40%	22%
Computer	10%	52%	38%
Internet	16%	63%	21%
VHS / DVD	5%	51%	45%
Car	8%	45%	47%
Housekeeper	48%	44%	8%
Vacuum cleaner	26%	66%	8%

Extended research in Brazil

In 2010, this study will be continued and deepened, expanding it in some directions:

- Increase the number of individuals: approximately 50 participating schools (public and private), including new schools and schools from the 2009 Study and approximately 2000 students in Year 5, using the module "Resource Management";

- Involvement of other individuals in the educational process: questionnaires to be completed by students' parents (about 2000) and teachers from participating schools (from Year 1 to 5, applying the methodology in their classrooms - 500);

- Expansion of a curricular component: Assessment in Mathematics, Portuguese and Natural Sciences.

Final Thoughts

This study, in 2009, provided quantitative results about the benefits of using Mind Lab's methodology. This could already be seen from the qualitative data obtained from teaching staff who monitored its implementation in schools since 2007. Teachers, co-ordinators, students and families of schools that are part of the project continually express their satisfaction in seeing how much students actually expand their cognitive, social, emotional and ethical skills. This can be seen in school and also in their actions and attitudes in different life situations.

The population considered for the Study of Mind Lab's Methodology in 2009 consisted of all students in Year 5 of the 13 schools that are part of the project. According to INADE, in order for the study planned for 2010 to broaden and deepen that of 2009, it is necessary to keep some parameters of the previous survey but also enter new data. Therefore, when planning the 2010 study some characteristics of that from 2009 were maintained and other details that were not collected in the previous study were added.

Humanity has developed, especially in the late twentieth and early twenty-first centuries, significant technological and theoretical advances in several areas of knowledge, including Education. However, it is not always possible for the school to follow the speed of change, given the complexity of their role in contemporary society.

We believe that the Mind Lab Project provides an opportunity for educators to fulfill their desire to develop the School of the XXI century, with its pillars as portrayed in the Delors Report: Learning to be, to do, to live together, to know (Morin, 2000).

In a globalized era of inevitable contact between different cultures (Morin, 2000) undoubtedly the school is a place to train future generations, responsible for the construction of XXI century Earth, which we hope will be marked by peace and populated by people involved with improving the quality of life for all and the preservation of nature. For intact, accomplished and happier human beings.

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Anex 1:

Extract from Mind Lab's Curriculum

Module: Resource Management – Year 5 – 2nd semester

Game	Objectives of the session	Skills involved
Rush Hour	.Define the notion of "problem" . Highlight the importance of the Detective and the Trial-and-error Methods to solve problems	. Understand and clearly define the problem . Elaborate relevant questions . Use logical reasoning strategies. . Act based on planning
Blokus	. Develop the concept of "resource " . Discuss resource management . Promote creativity when using resources . Develop space organising skills . Present game strategies and reflect upon their use in real life.	. Understand the importance of planning and management when resources are limited. . Is consciously oriented in space and occupies favorable positions . Understand a problem . Make decisions showing flexibility and versatility . Show critical and conscious reasoning

Pylos	. Reflect upon different kinds of resources . Hightlight the importance of saving the available resources . Explore game strategies . Enable the understanding of internal and external resource management	. Use several sources of information simultaneously when planning actions. . Show space-time orientation. . Use logical-hypothetical reasoning . Use resources in a planned way
Cartagena	. Reflect upon collection, accumulation and conservation of resources . Explore game strategies	. Identify different sources of information in order to use resources in a planned manner . Maintain a controlled and non-impulsive attitude . Establish secondary objectives as the way to achieving the primary objective. . Show exploratory attitudes, looking for data in a systematic and orderly manner to develop long-term planning. . Develop strategies and verify hypothesis, going beyond the immediate impressions . Anticipate possible difficulties of the process considering varieties of information
Octi	. Develop concepts of versatility and flexibility of resources . Develop concepts of resource and quantity of resources available . Highlight the need to allocate resources efficiently	. Use vocabulary and concepts adequately . Orientate themselves efficiently in space in order to dominate board dimensions and different possibilities of moves . Manage long-term resources . Develop strategies to draw-up and verify hypotheses . Examine a situation in a systematic and detailed manner . Execute planned actions and develop flexibility to change decisions when facing new circumstances

Extract from INADE's references for Year 5

for Mind Lab's Project

Portuguese

Block 1: Reading Procedures

D1- Find explicit information in a text

D2- Infer an implicit information from a text

D3- Identify the text's main idea

D4- Establish, within the text, the logical relationship between the facts and opinions shown

D5- Infer the meaning of words and expressions, considering a specific context

D6- Identify the communicative intention of opinion texts

Block 2: Implications of the support, gender and or the enunciator when comprehending a text

D7- Establish relationships between written information and information extracted from graphs, illustrations and the interlocutory situation

D10- Identify the descriptive discourse used in the characterization of characters

Block 3: Relationship between texts

D12- Compare information of two different articles about the same subject

D13- Compare different versions of the same story

D14- Compare the graphic representation of dialogues in narrative texts and comics

Block 4: Coherence and Cohesion in Texts

D15- Establish the the cause / consequence relationship between elements of a text

D16- Notice the temporal sequence in narrative texts, indentifying its linguistic characteristics

D17- Identify mechanisms for the articulation of words in a sentence
Block 5: Relationship between Expressive Resources and Effects of Meaning D19- Establish relationships between visual and phonic resources, images and the meaning of texts

Mathematics

Block 1: Numbers and operations D1- Recognise the meaning of natural, cardinal, ordinal or code numbers D3- Organize numbers in ascending or descending order D4- Identify the location of natural numbers in a number line D5- Solve problems with natural numbers, involving different meanings of addition or subtraction: add, change an initial state (positive or negative), compare and make changes (positive or negative) D7-Solve problems with natural numbers, involving different meanings of multiplication (repeated addition, the idea of proportionality, rectangular and combinatorial configuration) or division (sharing and measuring) D16-Identify the defining characteristics of a group and the attributes of its elements
Block 2: Space and Shape D17- Identify the location / movement of objects in maps, sketches and other graphic representations D18- Identify common properties and differences between polyhedra and round figures, relating three-dimensional figures with their planning D19- Identify common properties and differences between two-dimensional figures by the number of sides
Block 3: Quantities and Measures D25 – Establish relationships between starting and finishing times and / or duration of an event
Block 4: Data Processing D30- Read information and data from tables

D31- Read information and data from graphs (particularly bar graphs)

D32- Solve problems in which data is presented through tables and graphs

D33- Solve problems involving probabilities

D34- Solve problems involving estimations