Mind Lab Method and its Skills Development Impact on Grade 5

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(Translated from Portuguese)

Abstract

This article presents a study conducted in 2009 (by Mind Lab Brazil in partnership with INADE) of 1000 fifth grade students at 13 public and private schools. The purpose of the study was to explore the potential impact on proficiency levels in Mathematics and Reading Comprehension after three months of using Mind Lab's Methodology. The Assessment Tools were based on INADE's Item Response Theory (IRT) and developed from their References for Grade 5, as well as 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% increase in Reading Comprehension, 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 Reading Comprehension, there was a decrease in the number of students located at "Below Basic" level, and an increase in "Basic", "Adequate" and " Advanced" levels, using the SAEB scale. In Mathematics, there was a decrease in the number of student in levels as "Below Basic" and "Basic" with an increase in "Adequate" and "Advanced." Given these initial results, an outline is appended of further research plans for 2010.

Introduction

During the second semester of 2009, Mind Lab Brazil, in partnership with INADE (Institute of Evaluation and Educational Development), developed a pilot research study to evaluate the impact in the Mathematics and Reading Comprehension proficiency levels of fifth Grade 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 cognitive, emotional, social and ethical skills within the school environment. Since 2007, this curriculum program has been implemented in schools in Brazil through 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 and analysis of standardized Reading and Mathematics exams, it is possible to measure learning. These measurements can offer insight into whether the Mind Lab program and curricula are aligned to Brazilian state and national standards of SAEB (Evaluation System of Basic Education) and, in that context, raise Mathematics and Reading Comprehension proficiencies to a greater extent than do the in place, non-Mind Lab supplemented curricula.

Justification

In the educational field, we can see an increasing desire to insert innovative multi-disciplinary critical thinking pilot programs in the school curriculum, a type of work that focuses 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 translate into real world and real life transformative achievement for the student learners. Using real life problem solving as the standard, the Mind Lab framework is much more relevant than abstract, in-place Mathematics and Reading Comprehension curricula.

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 society. School subjects offer a range of knowledge and information, but often students are unable to establish meanings and make connections that empower them to assess the relevance of subject content knowledge for their own lives. Today, we live in the reality of a globalized world. In this context, it is necessary to provide space and time to develop, in students, internal resources that will enable them to establish the connections which mirror interdisciplinary studies.

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 hereditary, the result of genetic inheritance, for example, intelligence level as predetermined by chromosomes. When this way of understanding human beings is taken into consideration, the responsibility and the opportunity for the learning process lies within the student's power. 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" (or empiricist) concept, human beings are seen as the products of environmental stimulations, as if they were a "tabula-rasa" (an expression meaning *blank slate*, used by philosopher 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 to achieve an exact reproduction of it. The environment's role is to provide the individual with stimuli to be experienced. The individual student learner is not considered because the determinant for learning is the teaching technique: giving good lessons and 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.

These two very divergent ways of understanding human beings situate the learning focus either within the individual student (innatist) or as a part of teacher-created setting for learning (environmentalism). In both concepts, the principle of limitation, whether personal or environmental, is present. This principle results in educational activities focusing on information transmission rather than the development of intelligence.

The third learning perspective, "interactionist", places its emphasis on neither the subject nor the environment. The emphasis is, as the name suggests, on interactions between them. When we consider the interactions between the individual and their surroundings, we cover aspects of the aforementioned conceptions, located within the individual and the environment. However, by including the story of interrelationships, a third factor is added. This factor 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 renders a dialectical dimension

of both the individual and the environment, mutually constituent. It is 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. He explored how it is 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-Operational, 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. However, the sequence of the development of these mental structures is 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 to assist their members in the appropriation of its rudiments and complexity. Vygotsky noted: *"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 the student can 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. Authentic mediation involves both semiotic (language, symbols, culture) and personal (the teacher, parents, colleague) elements.

In Brazil, the interactionist researcher and theorist Professor Reuven Feuerstein is currently providing important contributions to education. Feuerstein proposes that students 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. It is through this mediator

support that the student learner builds knowledge and develops individual 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 Feuerstein's work has been based on a key statement: "every human being is modifiable". He posits this ongoing body of research as "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 the individual's modifying that individual's personality, including all the mental structures in general (not only partial or local). Hence to Feuerstein, the individual can change the course and direction of his/her 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 boldly 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. 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 conceptualized as a set of basic cognitive functions; components that emerge from a child's innate activities, his/her learning background, 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. These elements or subsystems influence, combine, restrain and mutually affect each other. Both development and a cognitive dysfunction, (in 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. They 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. Multidisciplinary projects, teacher and student collaborations are valued.

In this context, the teacher needs to transform his/her traditional position to adopt the posture of a mediator. The teacher has to mediate not only the relationship between students and knowledge, but also facilitate personal and group relationships between individuals. Inherent in this facilitation would be helping individual students with their conflicts, emotions, strengths, preferences and dislikes.

Today, in the twenty-first century, society has changed. 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 teaching programs in which teachers build experiences and meanings first for themselves, as individuals that are part of the program development. 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. They will also experience the intentionality of the intervention of another person who wants them to learn.

The Mind Lab Project's Methods

What is the Mind Lab Project? It is a curriculum-pedagogical transformative method 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 its insertion within a major subject to enhance subject mastery. The Mind Lab program includes the use of pleasant teaching resources (thinking games). It 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.

Mind Lab method is grounded in the belief 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 learning 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.

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 content skills/knowledge base that are key constructs 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. Mind Lab lessons are not "game play" 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. The goal is for students to be able to reason about reality and about themselves. They need 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. Thinking games function as a learning portal 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, Language Arts, Science and History.

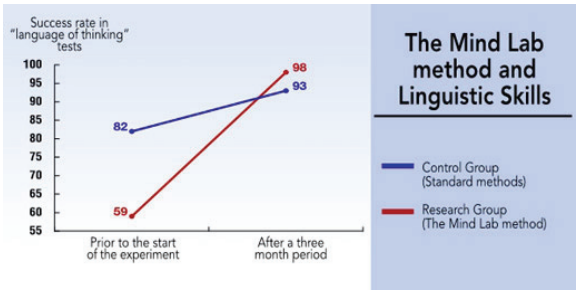
The methods are named after metaphors that, for their ambiguous and relational character, facilitate the translation of meanings between the applicability within a game and aspects of human experience.

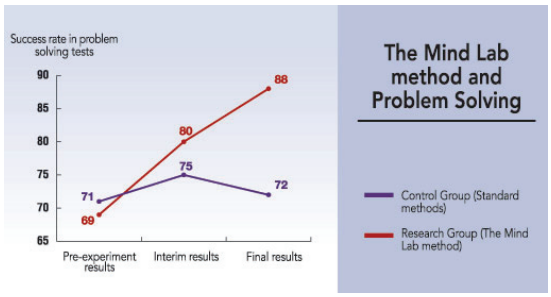
For example, the "Detective Method" is an investigative action before any situation: to elaborate good questions, carefully observe the details of a situation to see it better, capture meaningful data that can anchor chains of logical and consistent hypothesis, "break" larger problems into smaller ones and find solutions. This method is taught through the experience of playing games. It is used by students to play better. It enables awareness (through metacognitive processes), of the paths taken and their advantages. Finally transference to their lives and community/world situations is explored with the students. 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.mindlabny.com) 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. In that seminal study, the control group showed a better performance than before the intervention. Then the experimental group obtained significantly higher scores compared to the control group. The results were evident in the verbal tests than in math, indicating that the introduction of reasoning strategies improves academic performance.



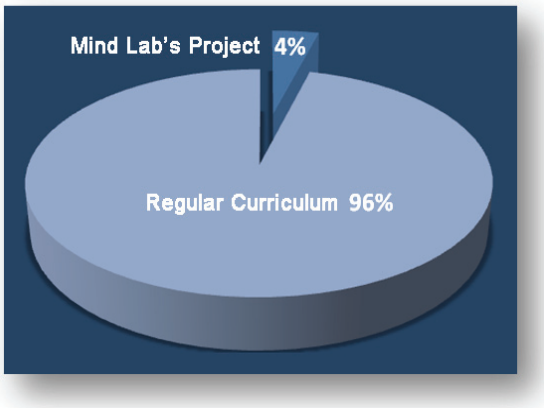


Additional research is needed to understand why the Mind Lab curriculum improved verbal and math scores. One possibility is that the curriculum helped students in the treatment group negotiate standardized tests – they might have become more sensitive to the strategy of picking the best option from a 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 credence to both of these hypotheses. 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/ USA, Yale, 2004)

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 Grade 5 students. Over 1,000 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), which were used as the SAEB scale (National Assessment of Basic Education). Educational interpretation of the scale was proposed by INADE.

The assessment tools used in this research were composed of objective Reading Comprehension and Mathematics exams, both with approximately 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 Grade 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. Therefore they were evaluated using a specific instrument (questionnaire).

There were two objective Reading Comprehension 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, Grade 5 staff, 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 Reading Comprehension.

Development of the average proficiency in the SAEB scale

Mathematics

Increase with the project = 8.53

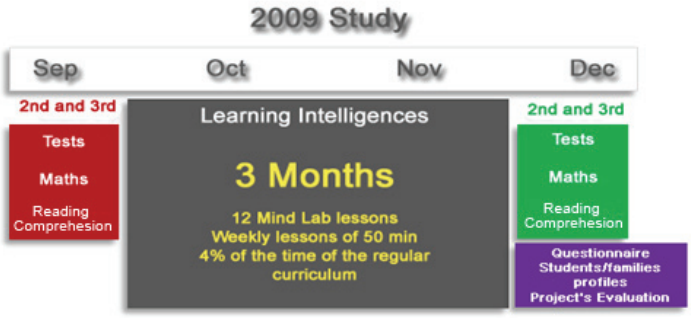
Increase expected without the project = 4.25

Evolution attributable to the project = 100%

Reading Comprehension

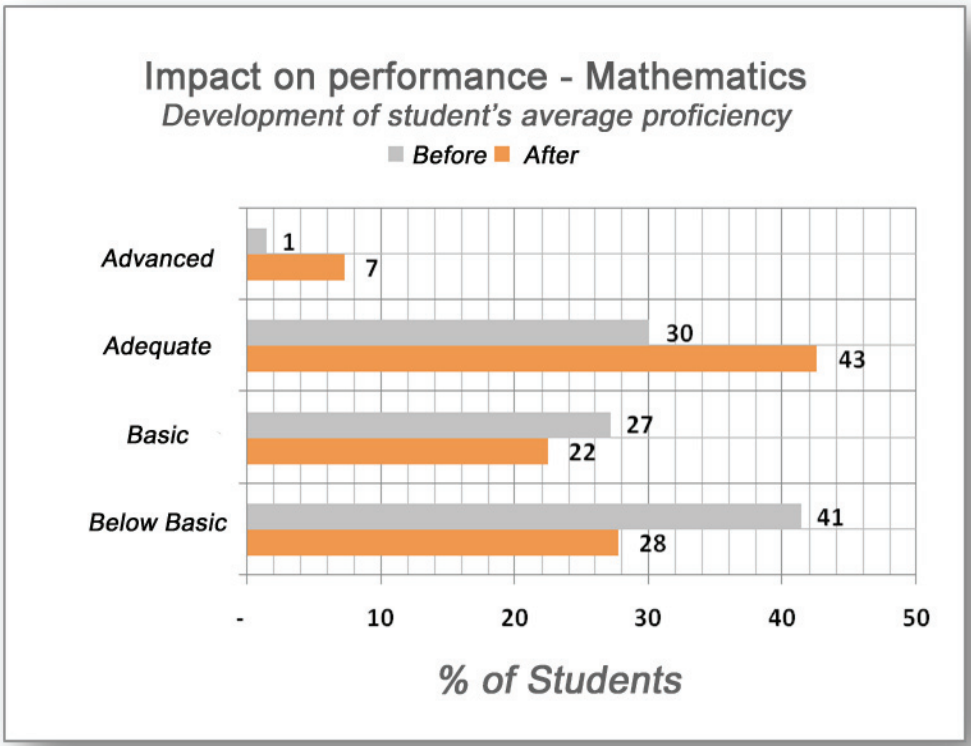
Increase with the project = 4.49

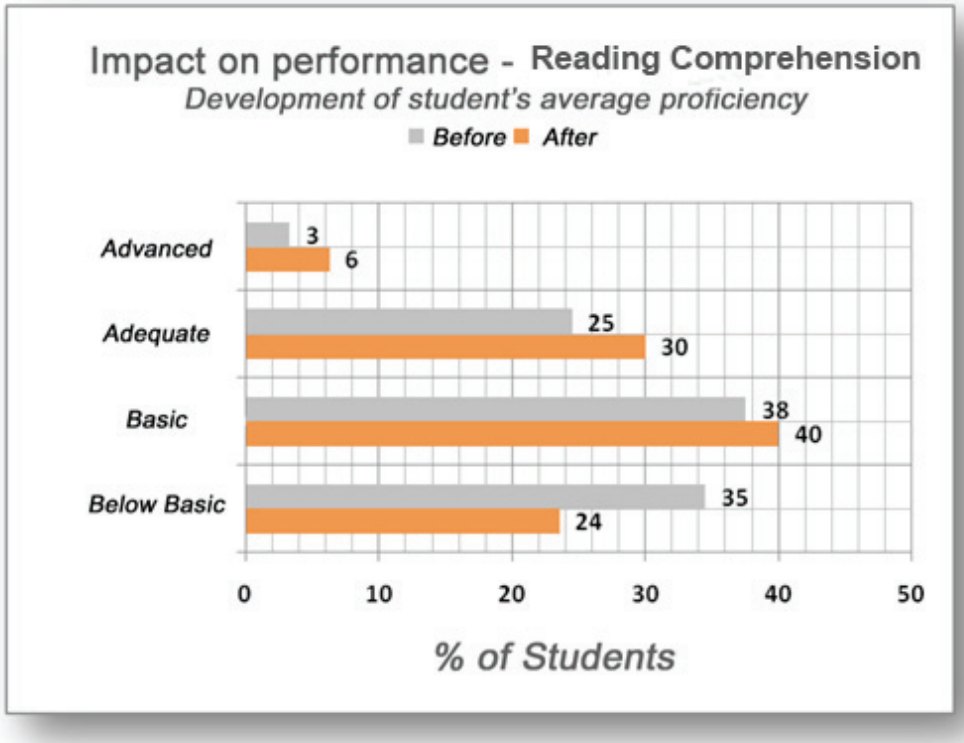
Increase expected without the project = 3.75



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:





The table below shows the percentage of students at each learning level in the first and second application of Mathematics and Reading Comprehension exams. It is noticed that the percentage of students "Below Basic" decreased in both areas of knowledge (10.98% in Reading Comprehension and 13.64% in Mathematics). In Reading Comprehension, 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%).

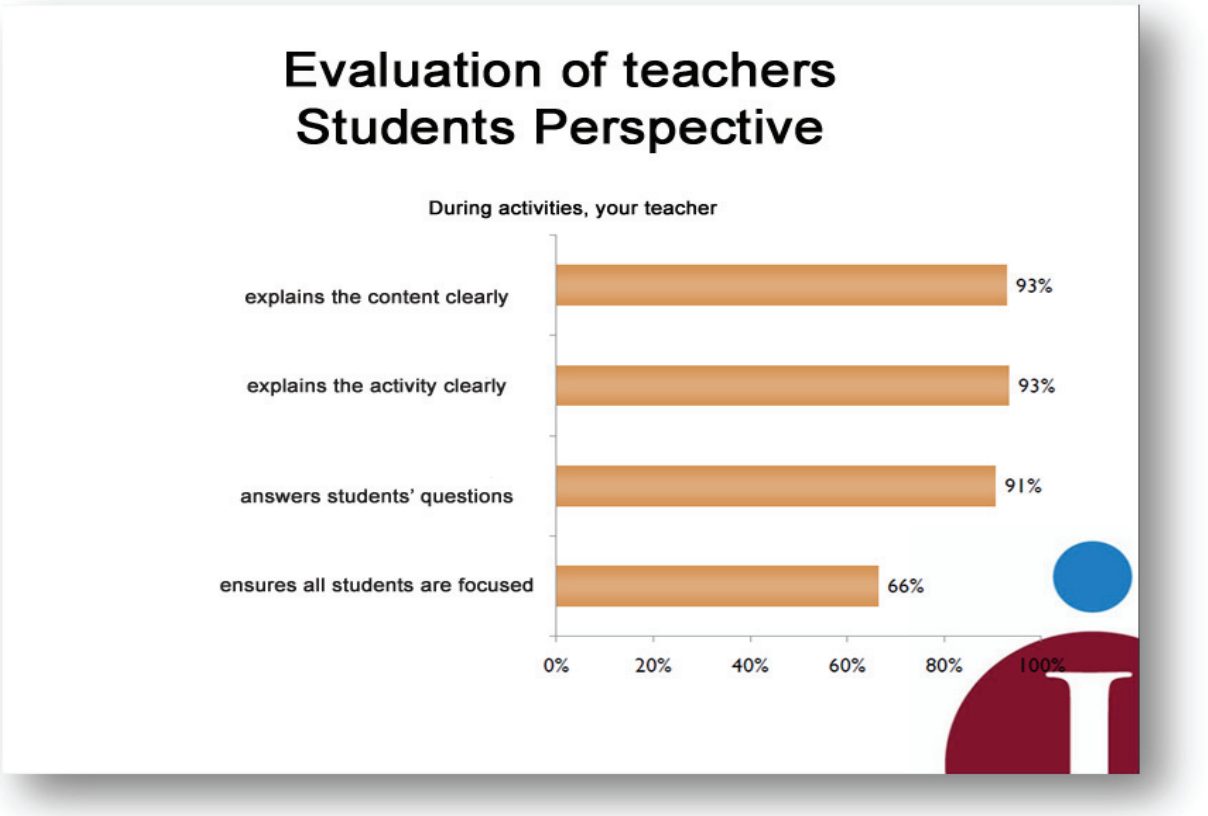
Learning levels between the two exams

Subject - Exam	Below Basic	Basic	Adequate	Advanced
Reading Comp. - 1st exam	34,58%	37,55%	24,52%	3,35%
Reading Comp. - 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. The skills improved helped them deal with: situations of defeat and victory, academic performance, teamwork, relationships with friends, family and teachers. The results showed high levels of student satisfaction when improving individual relationships with the teacher. This is an indicator that further research might be done on the impact of applying this methodology in the teacher's pedagogic practice and weaving it through more than one subject content area.

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)



Profile of Students and Families
Students Perspective

Gender

Gender	School
Male	50%
Female	50%

Parents Education

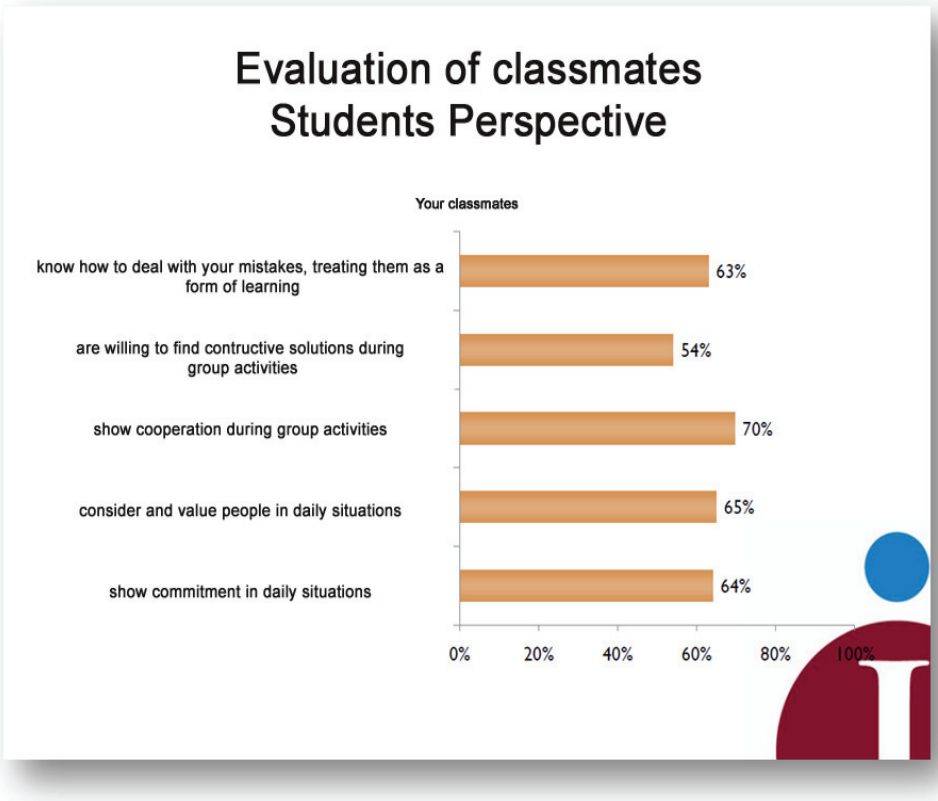
Education	School	
	Mother	Father
None	2%	2%
Year 1 - 5	7%	8%
Year 6 - 9	10%	11%
High School	22%	21%
University	60%	58%

The students' questionnaire responses 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

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%



Final Thoughts

This study, in 2009, provided quantitative results about the benefits of using Mind Lab's methodology. These results could already be anticipated from the qualitative data obtained from teaching staff that monitored its implementation in schools since 2007. Teachers, co-coordinators, 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 Grade 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.

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Anex 1

Extract from Mind Lab's Curriculum
Module: Resource Management – Grade 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 organizing 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 . Highlight 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 them 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

Appendix 2

Extract from INADE's references for Grade 5 for Mind Lab's Project

Reading Comprehension
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 narrator 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 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- Recognize 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 integer to 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 multiple operations application) 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 polyhedral 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