



Rede de Informação Tecnológica Latino-Americana
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Latin American Technological Information Network

ASSESSMENT OF THE CTC PROGRAM

SCIENCE AND TECHNOLOGY WITH CREATIVITY
IN THE CITY OF SALVADOR – BAHIA

OCTOBER 2007

PARCIAL REPORT

Team

COORDINATING RESEARCHERS

Eliane Ribeiro Andrade

(Universidade Federal do Estado do Rio de Janeiro – UNIRIO
e Universidade do Estado do Rio de Janeiro – UERJ)

Luiz Carlos Gil Esteves

(Universidade Federal do Estado do Rio de Janeiro – UNIRIO
e Universidade do Estado do Rio de Janeiro – UERJ)

Miguel Farah Neto

(Universidade Federal do Estado do Rio de Janeiro – UNIRIO)

FIELD RESEARCHERS

Alexandre da Silva Aguiar

(Serviço de Apoio à Pesquisa em Educação – SAPÉ)

Renato Pontes Costa

(NEAd Raízes Comunitárias - Núcleo de Educação de Adultos – PUC-Rio;
Serviço de Apoio à Pesquisa em Educação – SAPÉ)

RESEARCH ASSISTANTS

Lia Dias de Alencar

(Pedagogy undergraduate student at Universidade Federal Fluminense – UFF, Scholarship by RITLA)

Marina de Castro Ripper Cordeiro

(Pedagogy undergraduate student at Universidade do Estado do Rio de Janeiro – UERJ, Scholarship by RITLA)

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Latin American Technological Information Network
SHS Q.06, Conj. A, Bloco C, Salas 1102 a 1108, Ed. Brasil XXI
70316-000, Brasilia, DF, Brazil
Phone: (55) 61 3225-7330 / 3225-8509
Fax: (55) 61 3321-8740
www.ritla.net

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Presentation

*The progress of science and technology is not a task
of demons, it is the expression of human creativity.*

PAULO FREIRE

RITLA – Latin American Technological Information Network, being aware of the challenge represented by the low quality levels verified in the educational area in most Latin American countries and worried about gathering efforts that contribute to operating significant changes in this scenario, has been investing in assessments of educational programs in the area of Science and Technology with the purpose of setting up a panel of experiences that can be applied to new public policies.

Within the basic learning needs and knowledge required for an education for the future, Science and Technology teaching stands out because it represents an important factor for the construction of a more equal, prosperous and sustainable world. Thus, considering that an expressive part of the population is still excluded from the creation processes and the benefits of this kind of knowledge, actions capable of promoting its introduction, understanding, appreciation and qualification, from the earliest years of junior high school, gain a major relevance due to their inherent transformation factor.

We need science education that causes impact and values scientific learning and public schools, linking theory, practice and reality of students, promoting teamwork, providing the conditions necessary for students and teachers to have a quality education. An education that also contributes for scientific literacy of the community where the schools are located.

Therefore, deeper knowledge on the field in which Science and Technology education actions will be implemented is essential, so that, among other aspects, the path of Science education in said field can be unveiled, as well as the profile of teachers in charge of the action, the place it occupies in the plans of studies and curriculum practiced, the conception of Science and Technology developed and the need to contextualize political strategies of the several governments in the educational area. Besides, understanding the context in which the program or project will be applied can certainly allow a wider and more consistent appropriation of its content by the people and institutions responsible for the action, consolidating the process and generating more effective and efficient results for the public sphere.

The purpose of this work is to present results of the first stage of the assessment of the Science and Technology with Creativity (CTC) program, in a pilot project developed in 11 schools of the public education network of the City of Salvador, in the State of Bahia. The assessment was made in two key moments of the process: post-initial moment and final moment of the actions within

one academic year. The idea is to identify, characterize and analyze, by confronting data and information gathered during these two stages, the pertinence and effectiveness of the different strategies, procedures and instruments through which the targets and goals of the Program are pursued.

The assessment was developed based on a comprehensive approach, which aims at responding, if possible, to the different dimensions of the totality in which the Program is inserted, with the purpose of determining its merit, its utility or effectiveness, its relevance and its quality, producing subsidies and recommendations for its extension, correction or improvement.


To carry out a more effective assessment it is essential to consider that in each state or city where CTC is implemented, it has specific features, both in format and in execution. This diversity is desirable and shows that the solution of problems can be found in the places where they occur. Therefore, the pilot project being assessed in public education schools of the city of Salvador already brings significant changes, which are the result of an array of assessments being carried out in other Brazilian cities.

In this perspective, it is essential that experiences are assessed and divulged, so that they can inspire and give subsidies to other initiatives committed to the creation of new paths for education in the country, offering important contributions for the construction of public policies that allow the scientific knowledge democratization process from the childhood, an essential requirement for the exercise of citizenship in the context of contemporary societies.

Finally, the results displayed herein go beyond the *lato sensu* assessment of the CTC Program, reinforcing the potentiality of the school and, most importantly, showing convincingly how a great impact alternative is so little remembered: the incorporation of Science teaching in Junior High School.

JORGE WERTHEIN

CEO OF RITLA



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I think it is a very good thing. It puts together the sense of responsibility – I mean, they know they have something to do – and education, then you learn. You don't memorize, you learn.

TESTIMONY FROM A STUDENT'S MOTHER

Executive Summary

This document is an assessment carried out by RITLA – Latin American Technological Information Network, of the impacts of implementing the CTC Program in institutions of the Municipal Department of Education and Culture (SMEC) of Salvador in the first semester of 2007.

CTC – Science and Technology with Creativity is a Program intended for scientific education at Junior High School level which puts together teacher training, support material for the teacher and student and different inquiry materials. CTC is composed of 36 theme Units covering the nine years of Junior High School.

In Salvador, the Project covered the implementation of 8 theme Units of CTC in 11 schools of the Network, involving 100 teachers and 10,000 students of the eight grades of Junior High School.

The assessment methodology used focal groups and individual interviews with 108 actors of the Program: pedagogical coordinators and school principals, SMEC technicians, trainers, teachers, students and their families.

The greatest impact of CTC in Salvador was the quality of students' learning verified in a local formal assessment carried out by teachers, which surprised everyone. Another important aspect was the way the Program was received by SMEC. It was enthusiastically incorporated and its pedagogical proposal nurtured a feeling of appreciation and self-esteem in teachers, parents and students.

According to the people involved, the program not only brought an important infrastructure, it brought real learning and working conditions, training and recognition – to parents, teachers and the students themselves – that learning is taking place and, above all, disposition for the development of the pedagogical work – which motivates the commitment of those who participated in the experience.

One of the challenges listed by the educators is the need for more investments in actions that link Science teaching to the reading and writing processes, as well as the integration of interdisciplinary strategies with the area of Sciences.

The most significant claim from students, parents and teachers was for the continuity of the Program. The impact that most reflects the great acceptance and relevance of this pilot project for Science education in the Municipal Network of Salvador was the way the Program disseminated interest not only in participants, but in other segments and schools.

1. Introduction

TEACHING SHOULD BE SUCH THAT WHAT IS OFFERED IS PERCEIVED AS A VALUABLE
GIFT AND NOT AS A HARD DUTY.

ALBERT EINSTEIN

1.1 The importance of establishing scientific knowledge

Although in the past few years Brazil has been trying to enhance its scientific and technological capital, the initiatives of approximation with the scientific knowledge are still inaccessible to the majority of the Brazilian population, specially the new generations. The speech of the Ministry of Science and Technology, Sérgio Machado, translates this perception:

We do know that scientific development is increasingly fast. In the past 50 years, having this agency as witness, the scientific discoveries surpassed all knowledge accumulated by Humanity in its History. Our Country took part with a certain delay. (REZENDE, 2006)

Indeed, in the 21st century, it is still necessary to draw the attention of the general public, especially governors, in order to understand the real importance of Science education to improve life conditions, social, political and economic development of a country and the construction of a better world.

Undoubtly, public domain of science and technology concepts can significantly contribute to increase the possibilities of the exercise of citizenship and solidify democratic processes, as states Tedesco (2006):

The main argument to justify the priority of Junior High School Education has a social-political nature. Mastering basic scientific knowledge is an indispensable component in the formation of a citizen of the information society. This is the reason why scientific formation must be incorporated to the content of universal and obligatory education. (TEDESCO, 2006)

The precarious access to scientific knowledge and even smaller access to the possibility of producing science and technology is the reflex of the huge “naturalized” social inequalities, which are reified in an incisive manner by the Brazilian educational system. Although Brazil has achieved the universalization of Junior High School Education in this decade, what Charlot (2004) said should be noticed – the care for an allegedly equality in the beginning and a deep inequality in the end: “today, the safe of the possible was opened but in fact, the opportunities

are very narrow, they require more than the mere increase in the offer of places in a classroom or school – many times without any quality in the public network.” So, for many, overcoming inequalities has, today, in public schools, “the last republican space left for us” (HENRIQUES, 2004), the institution being a cozy place to democratize the access to knowledge and scientific and technological production, stimulating the interest for Science and the relations between scientific concepts and life.

The quest for expanding a quality education in Brazilian public schools goes through a real and symbolic investment in the socialization of Science teaching. In the words of the Ministry of Education, Fernando Haddad, to young scientists, the appreciation of scientific production appears with strength: “You can help MEC with the same creativity and dedication you used in your projects and studies. We want to find out more appropriate ways to reach young people and discover talents.” (HADDAD, 2007).

To Pavão (2005), clear determinants for the scientific and technological development of the country are: a quality scientific education in schools, training of qualified teachers, the existence of consolidated universities and research institutions, the integration of scientific and technological production with industrial production in an attempt to solve serious social problems and to overcome the inequalities that affect the country.

The acknowledgement of the importance of Science education is not yet defined in the Brazilian educational field, as Chaves points out (2005):

In addition to carrying out a strong Science education program, it is necessary to review the way Science is taught in Brazil. We have a rooted tradition of an education based on books, excessively formal, in which people end up believing that knowing the name of things is the same as knowing them. Scientific education must begin with the contact of the children with natural phenomena, in simple situations in which they can change the environment or the initial conditions of a natural system and observe how it behaves. (CHAVES, 2005, p. 58)

Some authors raise the issue that, due to the precarious situation related to literacy in the first grades of Junior High School, the educational system focused on this segment, investing heavily in the lato sensu literacy and in instrumental mathematics, which ended up putting scientific literacy in second place and, in a general way, result in the training of generations of teachers who do not feel secure enough to work on this educational field, strengthening a systematic vicious circle.

Starting to do sciences is, in fact, teaching students to question themselves. However, this task is not as simple as it seems:

For students, there is a high degree of detachment between the scientific activity and everyday life. In general, they are not aware of how much the scientific-technological activity participates and affects our daily reality. The school science is uneventful, dull, not very useful and very difficult. We know that students’ interests are focused on action, dialogue, idea confrontation, teamwork, experimentation, group reflection, in the search for new questionings. However,

Science classes are not able to transmit the idea of being vital, human, fascinating, inquirer, opened, tolerant, useful and creative, which are features of the scientific activity. (Pavão, 2005)

In this area, because it is still unveiled, the linking possibilities among the contents, subjects and curriculum need to be understood, drawing the attention to the essential role of teachers and mediators of the educational process. As pointed out by Santomé (1998), it is the educator’s role to show students the relationship between the different kinds of knowledge, in addition to generating interests, as they are not innate.

Finally, Science education from the earliest years of Junior High School can be discussed based on the importance of stimulating other kinds of knowledge, such as the development of the Portuguese language; with the possibility of allowing the appearance of talents among children of poorer classes for scientific careers; and, also, due to the fact that the scientific knowledge and the new technologies are essential for the population to know how to behave when dealing with processes and innovations about which it needs to have a critical opinion. (WERTHEIN, 2004)

1.2 Science and Technology with Creativity Program

I insist on being a man of my time,
not a man exiled from it.

PAULO FREIRE

The Science and Technology with Creativity Program - CTC was idealized by Sangari Brasil, a plurinational British institution, with over forty years in the market, present in Brazil for about ten years, with the purpose of *conceiving, developing, supplying and implementing solutions and projects for all levels of learning and scientific research*. Its central proposal is to support teachers, creating a formative context capable of allowing transformations in educational practices so as to contribute for schools to promote and guarantee scientific inclusion of the new generations. The mission of Sangari Brasil is *to promote quality education and social inclusion by developing existing national structures*.

Within this context, the Science and Technology with Creativity Program proposes to give a new meaning to scientific knowledge in a creative way, allowing the rescue of its students’ authorship, raising their self-esteem and valuing the learning process of which they are part. To do this, it develops a pedagogical proposal based on an inquiry methodology, using different didactic materials, such as books, games, videos, experimentation material, among others, aiming at understanding the natural science phenomena studied, based on official documents (LDB, CNE, DCN e PCNs). It is also based on a formative work developed with teachers, expanding and qualifying the pedagogical options in the area. CTC is organized in modules for all Junior High

School grades, with a curricular proposal that covers abilities, concepts and attitudes necessary for this phase. Its organization allows implementation flexibility, by linking the contents, according to the needs of each education system and the curricular proposal adopted.

In general, it can be stated that the main focus of the program is on the inclusion of scientific knowledge as a knowledge amplification generator, both for the student and for the teacher, considering that *the most important capital of a country is knowledge*. Knowledge must be shared through an education that takes place with the active involvement of the learner in its construction, as well as previous ideas from students, who play an important role in the learning process. However, such knowledge *depends on the training of people capable of producing it*. Therefore, the inclusion of Sciences since Junior High School must be necessarily associated to a teacher training policy. In this perspective, training educators for the development of the task is an essential requirement for the development of CTC.

The result should be a significant impact of Science education on the quality of education, considering the fact that it involves an extremely important exercise of thought, which should awaken in children their creative spirit, their interest, improving learning of the group of subjects, as learning must take place guaranteeing the conjugation between experimentation and enhancement of oral and written expression.

1.3 The implementation space for the CTC Program pilot project in Salvador

The pilot project for the development of the CTC Program in schools of the Municipal Education Network of Salvador started in the first semester of 2007. According to information presented by the “Report on the CTC Program Implementation in the Municipal Education Network of Salvador” (SANGARI BRASIL, 2007), *CTC actions were thought so that educators of the Municipal Network can acquire its conceptions, enrich and incorporate the practices divulged by the Program, adapting to its reality, so that CTC becomes part of the local pedagogical culture*.

The purpose of the pilot project was to ensure, in 11 (eleven) schools of the Network, each integrated to one of the 11 Regional Education Coordination Agencies (CRE) of the Municipal Education and Culture Department (SMEC), *a quality scientific training, in order to contribute for the personal and professional development of teachers and students, allowing a solid and integrated training*. The pilot project involves about 100 teachers and 10,000 students of Junior High School classes of these schools.

To start the work, the Sangari team organized meetings with the principals of the schools involved and an event to present the CTC, open to the entire Network and local community, followed by a specific training action for trainers. The outspread of this initial stage was the execution of continued training actions for teachers and systematic meetings for follow-up and support in the development of the Program in schools.

Chart 1 – List of CTC participating schools

Nome da escola	CRE
Escola Municipal de Pituauçu	Itapuã
Escola Municipal D. Arlete Magalhães	Pirajá
Escola Municipal da Palestina	Cajazeiras
Escola Municipal de Fazenda Coutos	Subúrbio I
Centro Educacional Carlo Novarese	Liberdade
Escola Municipal Olga Figueiredo de Azevedo	Centro
Conjunto Assistencial Nossa Senhora de Fátima	Orla
Escola Municipal do Beiru	Cabula
Centro Social Mangueira	Cidade Baixa
Centro Municipal de Educação Infantil Cid Passos	Subúrbio II
Escola Comunitária Amai Pró	São Caetano

Source: Sangari Brasil Report.

The pilot project was organized in accordance with the local curriculum, adopting the following CTC units in its development:

Chart 2 – CTC units adopted in the Salvador pilot project

CTC Unit	Grade
Life of Plants	Intermediate CEB
Life Cycles	final CEB
Weather and Climate	3 rd Grade
Corpo Humano	4 th Grade
Ecosistemas	5 th Grade
Diversidade de Animais	6 th Grade
Regulação e Reprodução no Organismo Humano	7 th Grade
Energia e Sociedade	8 th Grade

Source: Sangari Brasil Report.

For the development of these Units, the schools received didactic materials for all experiments (equipment kit), teacher’s book and student’s book. The training was carried out involving groups of teachers coordinated by local trainers, selected to organize and coordinate training actions within schools. Initial training was intended for classroom practice, studies, exchange of experiences and discussion of issues that emerge throughout the development of the work. Each of the Units adopted was the object of a specific training meeting, with a weekly follow-up by the trainers. General concepts of Science teaching were covered, as well as the inquiry methodology and the specificities of the Units.

Chart 3 – Teacher Training Proposal

Actions	Objectives	Themes
Initial Training	<ul style="list-style-type: none"> • CTC Program presentation and preparation for its beginning 	<ul style="list-style-type: none"> • Methodology and general approach of the CTC teaching and learning proposal • Pedagogical proposals, didactics and Science teaching • Specific training for the development of the first Units in the classroom
Continued training	<ul style="list-style-type: none"> • Systematic training meetings de formação • Support for the development of CTC activities in the classroom 	<ul style="list-style-type: none"> • CTC development • Classroom management • Reflection on the practice • Science teaching methodology through inquiry • Other themes related to the development of CTC in the classroom
Procedural assessment	<ul style="list-style-type: none"> • Procedural assessment 	<ul style="list-style-type: none"> • Reflexive reports on aspects related to students' learning, their own professional development and other themes of the program

Source: Sangari Brasil Report.

With these principles, planning and links, CTC was initiated in SMEC and schools participating in the pilot project.

The first results of the CTC assessment are presented below with the view of the main actors of this process: students, teachers, pedagogical coordinators, principals, technicians and SMEC supervisors.

2. Methodology

A qualitative look is essential for a diagnostic assessment of educational programs. Descriptive, monitoring and estimate studies are both accurate and rich in qualitative information. In the case of the CTC assessment, which development agglutinates a number of variables that escape from the analysis based on quantitative approaches, the resorting to this view is of undeniable importance.

Therefore, to assess the relevance, effectiveness and quality of the Project and produce subsidies for its expansion, correction or improvement, a combination of methods capable of allowing a multiple and comprehensive analysis of the Program development in Salvador was used, sheltering the view of the whole.

Focal groups – with students, parents of students, teachers, pedagogical coordinators and regional coordinators –, structured individual interviews – with school principals, technicians and supervisors of SMEC – and the direct observation of the eleven schools where the Program is implemented were the basic procedures of this process, complemented by instruments intended for obtaining quantitative information (questionnaires, characterization cards), mainly regarding the profile of the schools and the actors.

The “focal group” technique, through which components of a certain group narrate and discuss perceptions on the theme, stands out from the others mentioned herein because it provides the attainment of consistent qualitative information on behaviors, practices and perceptions from a number of people which would hardly be produced in a short period of time using other resources.

The selection of the actors researched considered the need to understand the structuring, the operation and the repercussions of CTC with students, schools and communities where the pilot project takes place.

In the chart below, a summary of the field work developed is presented:

Chart 4 – Field work – Participating actors

Actors	No. of People Interviewed	Research Strategy*
Students	49	GF (6)
Parents or tutors	10	GF (2)
Teachers	19	GF (2) e EI (2)
Pedagogical Coordinators	6	GF (1)
Principals	11	EI (11)
Regional Coordinators**	6	GF (1)
SMEC Team***	7	EI (7)
TOTAL	108	

* GF – Focal Group; EI – Individual Interview. ** The group includes regional coordinators and the like. *** Technicians and supervisors of the pedagogical area, Secretary of Education and Culture.

Source: Assessment of the CTC Program in Salvador, 2007.

Out of the total number of students assessed, 59.2% are female and 40.8% are male, as shown in table 1. From the point of view of self-identification by color, table 2 shows that those who define themselves as black and brown-skinned respond, jointly, for the vast majority, comprising 69.4%; white-skinned constitute 8.2% and those who have no color declared, 22.4% of the group.

Table 1 – Distribution of students by sex

Sex	Quantity	%
Female	29	59,2
Male	20	40,8
	49	100

Source: Assessment of the CTC Program in Salvador, 2007.

Table 2 – Distribution of students by color

Color	Quantity	%
Black	17	34,7
Brown	17	34,7
White	4	8,2
Not declared	11	22,4
	49	100

Source: Assessment of the CTC Program in Salvador, 2007.

Participating students range from 6 to 16 years old, with a predominance of the 11 to 14 age group, totaling about 51.0%. The 6 to 10 age group corresponds to 38.8%, whereas students aged 15 and 16 totalize 10.2%.

Table 3 – Distribution of students by age

Age	6	7	8	9	10	11	12	13	14	15	16	
Students	2	3	9	5	1	6	7	7	5	3	2	49
%	4,1	4,1	18,4	10,2	2,0	12,2	14,3	14,3	10,2	6,1	4,1	100

Source: Assessment of the CTC Program in Salvador, 2007.

Aiming at reaching these students – Junior High school children and teenagers -, a specific procedure for the realization of focal groups was developed. Although they use a previous guide, the focal groups are based on the proposition, to students, of playful activities, highlighting the use of drawing as a way to register their opinions and their knowledge.

The option for the drawing as an object of study is based on the premise that this is an important expression form in the learning development of children (cognitive, psychomotor, social, cultural and affective), assuming a relevant role in the educative process. Add to this the fact that it is a resource accessible to all, as it is a frequent practice in schools and, in part, in everyday experiences. As Vigotsky says, children do not draw what they see, but what they know

Very frequently, children's drawings not only have nothing to do with the real perception of the object but also, many times, contradict this perception... when children release their repertoire of memories

in a drawing, they do so the same way they do when they speak, telling a story. The main feature of this behavior is that it contains a certain degree of abstraction, which is necessarily imposed by any verbal representation. Then we see that drawing is a graphic language that appears having as its base the verbal language... these facts provide the elements for us to start interpreting children's drawings as a preliminary stage in the development of written language. (VIGOTSKY: 1991, p.127 e 128)

Through drawing, it was possible to observe several perceptions in relation to scientific knowledge and the way this knowledge is being worked with, as well as its influence as a reading and writing stimulator, an important element of the CTC proposal.

The guide used to conduct the focal groups was adapted to the different grades, depending on the CTC Unit adopted, dividing the programmatic contents as per chart below:

Chart 5 – Distribution of CTC programmatic contents by cycles and grades

Grade	CTC Unit
Intermediate CEB	Life of Plants
Final CEB	Life Cycles
3 rd grade	Weather and Climate
4 th grade	Human Body
5 th grade	Ecosystems
6 th grade	Animal Diversity
7 th grade	Regulation and Reproduction in the Human Body
8 th grade	Energy and Society

Source: Assessment of the CTC Program in Salvador, 2007.

The work put students of the Intermediate and final CEB together, as of items 3 and 4 of the aforementioned guide, through the following activity: on a cardboard, children wrote what they liked the most in their science classes and, on another, what they did not like in the classes. Students also registered, on the leaves of a large paper "tree" they were given, the topics they had learned about, explaining them orally afterwards.

With 3rd grade students, the procedure of registering on the cardboard was also adopted. Besides, these students drew and explained in a few words what caught their attention in the content they learned.

4th and 7th grade students, whose study theme was the human body, were able to show what they learned by outlining a real size body (outlined by themselves), inside which they drew organs of the digestive system, microorganisms causing diseases, the procedure of the birth of a baby– issues they worked with in Science classes.

5th and 6th grade students, on the other hand, showed what they learned by elaborating folders on Science contents, in which they wrote poetry or small explanatory entries about the topics covered in the classes, such as: the construction of a terrarium, the concept of mimesis and camouflage, anatomy of insects, definition of ecosystem etc.

Finally, 8th grade students registered, on a sheet of paper, what they learned during the science classes and then explain to the rest of the group what they had done.

3. The path of the CTC Program at SMEC Salvador

3.1 The experience of SMEC in the area of Sciences and the adoption of CTC

The analysis of the CTC path in Salvador, in this first stage of implementation, shows that its adoption is based on the political guidelines of the Municipal Education and Culture Department, which bring, among its presuppositions, the “guarantee of material, physical and pedagogical conditions that allow the expression of the student through multiple languages, including the new technologies” and the “development of the investigative spirit and the control of basic knowledge, specially reading, writing, Mathematics, Natural Sciences, History, formation of Brazilian society and contents and practices regarding ethnic, religious, generation and gender diversity and promotion of unity, peace culture and equality” (MUNICIPAL ADMINISTRATION OF SALVADOR, SMEC, 2005, p. 20). The statements obtained among the interviewed people indicate the existence of a Science teaching in tune with these presuppositions, but not totally used in practice.

Science classes were more theoretical. Schools were not equipped to do all these rich experiments that Sangari has been doing. So, the teachers loved the training, they did some experiments. (SMEC team)

We had teacher training, in which the contents were discussed, in workshops, so that teachers could work, but we didn't have any material. The teacher had to find this kind of tool. (SMEC team)

I believe that in our work, we needed very little, one of the things was support for the material, pedagogical support so that this work could happen in a more effective way. (GF Regional Coordinators)

In these testimonies, it is possible to notice that the fragile areas identified in the network are the work for the specific training of teachers and mainly the material infrastructure for the inquiry and experimentation work in schools. The adoption of CTC is based on the need to offer alternatives for this scenario, as verified in the words of the Secretary of Education and Culture:

We intended to promote scientific education here in the Network, which was practically zero. The teacher was not enthusiastic, specially the Science teacher, without any kind of support, because we cannot think of promoting scientific education without support. (Prof. Ney Campello, Secretary of Education and Culture)

The Program is one of the alternatives SMEC has been trying (there are several other programs/projects in progress) and, according to the Secretary, it awakened interest due to its logistics – *the way they structure the program, how they customize the classroom so as not to waste the material* –, due to its investment in Research and the quality of the didactic material – *very well organized, both for the teacher and the student*. Still according to the Secretary, his choice had the participation of schools, which were asked to give their opinion on the several possibilities of programs/projects, with two exhibits on new educational technologies: *It was not something imposed from the top, and this is very important to gain the commitment of the school*.

In the testimonies of several people interviewed, these reasons for the implementation of CTC are corroborated, as can be observed in the words of a technician of the pedagogical area: *I believe that the Program was adopted because Sangari's material also focuses on inquiry, it brings new technologies closer to students*. Another technician highlights the fact that the Program matches the effort of the Department to *make a school qualified to discuss current demands and offer quality public education, which is the dream of everyone who is in the public power*, interconnected with existing initiatives, such as PETI – articulation project of the pedagogical practice with technological elements, developed through computer labs -, aiming at the investment in new technologies.

The same technician also highlights the need to revitalize schools from 5th to 8th grade, which were recently incorporated by the Department, as one of the reasons for such investment: *We have schools that were not designed to be schools. That old-fashioned proposal of a closed box... A school without any area, no court and no lab either*. For him, the pilot of the Program would meet the *need of creating something even, so that schools could work together, then we could actually see the positive and negative points and analyze things*.

Considering these remarks, it was also possible, based on the interviews made, to verify some of the expectations regarding the experience in progress in the eleven schools where the CTC is implemented, highlighting:

- The impact perspective in students' learning, as a result of the investment in continued teacher training.
- The perspective of consolidating the presuppositions and guidelines for the area of Sciences in schools.
- The articulation with pedagogical-political projects of schools.
- The perspective of impact in learning in other areas (Portuguese, Mathematics etc.).
- The perspective of impact in the involvement of the family.
- The interaction with other programs/projects.

Regarding the selection of schools

The choice of the schools that integrate the pilot had, as a prime reference, the purpose of testing the Program in each of the 11 Regional Education Coordination Agencies in which the municipal network is organized, so that we could have the entire network talking, said the Secretary, who also

indicates as another significant criterion the compliance with all segments of Junior High School. According to one of the interviewed people, Regional Coordination Agencies invited schools which had, at first, a certain experience in handling projects and conditions to give the Department a feedback on the pilot experience, aiming at a possible expansion of the Program to other schools of the network.

The interviews conducted with other actors show that most of them are familiar with these criteria and procedures:

The work the school develops, right? A committed school, then the teachers also get involved with the issue, and really embrace the projects. So I felt the choice was based on that. (GF Regional Coordinators)

We offered the project to the school that displayed more involvement. (GF Regional Coordinators)

In my school, it was from 5th to 8th. We presented this Program to the school, which has a very present community, participative in all aspects. Then there are teachers who get involved, who embrace the idea and get interested. (GF Regional Coordinators)

Regarding teacher/trainer selection

Regarding the selection of teachers who participate in the specific training for the Program, with the role of promoting the organization and coordination of training actions in schools, it was the schools that indicated them, according to the Secretary, taking care to consider the availability of the teacher of the area, his/her identification with said area and the desire to participate. In the case of CEB to 4th grade teacher, with no specific training in Sciences, the principals were requested to invite teachers who had at least one multiplier factor, aiming at the work to be developed with the other teachers, as stated by one of the interviewed people. Even so, according to another technician, the teachers invited had the liberty of choosing to participate or not, at their discretion.

3.2 The opinions of the technicians and the SMEC management team on CTC

3.2.1 CTC Proposal

The tuning between the CTC proposal and the curriculum adopted by the Municipal Education and Culture Department of Salvador, according to those interviewed, seems to happen in different aspects, also bringing, in the opinion of many, a view compatible with that of the National Curricular Parameters:

It coincides with the PCN, seeking a reflexive posture from the student, this citizen we talk about so much, and requires that the teacher be a challenger. (SMEC team)

There is a political-pedagogical project of the school, there are the Curricular Parameters and, in fact, Sangari came to complement, not only in the area of Sciences, because it is a project that can be applied to other subjects. (SMEC team)

CTC works with something the network already works with. In reality, the Program adds up, improves what is already being done, there is no clash. (GF Regional Coordinators)

Regarding the CTC methodology

Generally speaking, CTC, in its conception and presuppositions, is very well assessed by the people interviewed: I think it has a very interesting aspect, which is to stimulate everyone's involvement for a scientific spirit, to build this scientific view. Some highlight the fact that it is a scientific inclusion program, also considering how unprepared teachers are:

We, teachers, still have a fragmented culture of exact sciences, and this Program unites exact sciences with human sciences. It allows students to use in their practice what they learn in a classroom, also bringing its practice to the classroom and working the issue of independency, decision making, problem solving. The most important thing is the social point of view, that these students can get this content and apply it to human, environment and nature relationships. (SMEC team)

A supervisor considers that there is a new conception of Sciences, in the sense of thinking of Science as we think about our own lives, in any space, with any material, not reducing Science to a lab study: *Learning Science in this perspective, of what I can see here, observing pictures of children and the reaction of children during activities, is another conception of learning Sciences.*

Another valued aspect is the management of knowledge in the classroom, *because students also give their opinions, they have the power to decide, to manage their entire teaching-learning process and this is different from what the teacher usually does.* Besides, the people interviewed highlighted the fact that CTC allows teachers to develop a work rich in experiences, things they talked about in the classroom, but could not put into practice. That is why it is so rich, the child can verify things, the experiments. The testimony of a regional coordinator is very illustrative:

What I notice is that the Program brings sense to the content discussed. The classes happen in a practical way and then theory is related to practice all the time. The content becomes something significant, because sometimes we work with some Science topic and children don't know what it is for... And the assessment can take place in a procedural and more direct form, because if you notice that some student is having difficulties, you can solve that right there, when it is happening. (GF Regional Coordinators)

Regarding group work

We also highlight the perception that the Program opens the possibility of collective work, as opposed to a more individual path most teachers suggest: *The proposal comes as something that*

adds to a network, it comes in a different dimension, in a more comprehensive form, that can be forming a network, not only an isolated work, of one teacher. It is something done as a group.

The conjugation of several constitutive elements as an integrated solution for the constitution of a *scientific education proposal, to prepare students for Sciences*, is highlighted by those interviewed:

CTC is a scientific education integrated solution, as it works analyzing systemically the Science teaching-learning process. An important fact to me is that it provides training, books, material, methodology and logistics. To me, this is a highlight that guarantees the continuity of the program. This, in the public system, is a preponderant factor. (Prof. Ney Campello, Secretary of Education and Culture)

It is an action that promotes the rupture with traditional teaching practice at schools. The innovation is that CTC is not theory, it is hands on. Not only do we think it is like this, we work hard to make it like this. There is a proposal, material, a book and teacher training material. (SMEC team)

Regarding CTC materials

Regarding the material resources that integrate the program, the opinions verified in the interviews are equally valued, and are one of the most important faces of CTC, mainly when we consider the lack of resources of this nature in schools of the network and the consequent little attractive pedagogical practice. The testimonies below are illustrative:

What does the teacher usually do? Teaches an expositive class, not very motivating, right? Then, with this trying thing, investigating with this material, the student also feels motivated to learn, gets curious, in the same sense as the teacher. (SMEC team)

In the beginning, I guess we were a little worried about how the students were going to react... But curiosity is the same in every child, rich, medium class or poor, right? There was no distance, in any way, on the contrary! I think our children must have these opportunities, they have to have access to this rich material. Give them the opportunity and they will get there. (GF Regional Coordinators)

It is a material that subsidizes, from the point of view of support, the methodology of the teacher. And there is something that fascinated me: teachers have a manual, in which they visualize what the students have in their hands. (SMEC team)

With regard to the material, I didn't hear any complain from the teachers... On the contrary, they only praised it. (SMEC team)

It should be highlighted that some remarks refer to the adequacy of the printed material for students in the early phase of Junior High School. However, the fact is not considered an obstacle to the work of the teacher, even if it requires attention.

3.2.2 Training process and role of the pedagogical team of Sangari Brasil

The training process is one of the most important axis of the Program, according to most interviewed people. Its conception is well assessed and incorporates the perspective of the Secretary of Education and Culture, which indicates as a frequent mistake of teacher training policies the fact that they are not based on reality: *You do a training policy that does not go to the empiric environment, to the classroom. It hires consultants, professionals with an impressive theoretical knowledge, but that does not express the interest of the classroom. You don't theorize practice.*

Although the issue of teachers not participating in the work developed directly by the pedagogical team of Sangari is recurring, many testimonies approve of the process:

The beginning of the training program was, to me, a moment of enchantment, of total seduction. I think everybody left the place extremely involved with the proposal, everyone wanted to take one of those boxes and put it into use immediately, even being Regional Pedagogic Coordinators. (GF Regional Coordinators)

I notice that there is a principle that guides the work in the perspective of what teachers are expected to do with the kids. If we want them to work the world in a dynamic form, we use concrete materials, so that they think about these materials in the training experience. Usually, training models are still focused on the trainer and not always on what teachers need to learn to teach children (SMEC team)

The important thing about CTC is this continued training, this practice of coming here once a month to assess. They visit the schools and solve teachers' doubts right there. It is a systematic follow-up, very committed with the work. A wonderful and committed team. (SMEC team)

Many times, teachers do not have, in their training, access to such innovative resources as those of a program like this, right? I've seen teachers who seemed to be having contact with this resource for the first time. (SMEC team)

The teachers were very welcomed. They were all very receptive, they really knew how to motivate and stimulate, they prepared the ground, showing that everything they were doing was linked to the Curricular Parameters, they had this attention. Teachers liked it, we had no problems. (SMEC team)

Regarding CTC in the context of each school

As this process includes other actors in addition to the teacher, such as the school principal, the pedagogical coordinator is seen as an important person to facilitate the connection of the Program with the universe of the school, as highlighted by a supervisor, in order to integrate and follow the guidelines of the network for the area of Sciences.

The work of the pedagogical team of Sangari is well perceived by those interviewed, translating into one of the most emphasized points, which can be noticed in several speeches:

They gave all the support possible, including to schools whose demands were not the competence of the Department of Education. This is a positive point, this commitment thing. (SMEC team)

They have been going to schools, observing teachers teaching their classes, solving their doubts, giving this support. They don't just train teachers and let them develop the project by themselves. So, this follow-up is being done effectively, because they go where teachers do their jobs, the classroom. (SMEC team)

I think it is important to highlight the connection they acquired with the schools. It was a contact that started during the training period. The program is very close to the schools, just like the Department. (SMEC team)

When they get to the City, they have to learn about the place, about our guidelines, the school project... we had this contextualization dialogue with Sangari. (SMEC team)

Not all schools, however, have been receiving this follow-up with the same regularity, as some interviewed people pointed out, who demand more attention, specially those with little communication resources. For those schools, the possibility of a distance follow-up through the Internet is not feasible.

3.2.3 Initial impacts of CTC

The perception of the people interviewed on the initial impacts of CTC in the universe of the school, considering its main actors, is based mostly in the indirect follow-up – which is the case of technicians and supervisors of SMEC – and visits to schools by regional coordinators. Despite the short implementation time of the Program, people recurrently say that they can identify changes, especially in students and teachers.

Regarding students and their families

With regard to students, the most noticeable impacts, which happen almost immediately, refer to the enthusiasm and interest in the experiments, which is the result of the use of attractive material resources and the association of the activities with their everyday lives, as several testimonies show:

Students get captivated. These are children who barely have access to new technologies. This material involves them, because it is a live class! (SMEC team)

In a school I had the opportunity to visit, I asked some students what they thought was more interesting, and it was the experiment part, the practical thing, more playful, you know? One of them said: teacher, I fell like I am a scientist! (SMEC team)

There was a school which was participating in a robotics championship. They made comparisons with the way to tie this, how to calculate the space, the time... I thought it was very interesting the way they connected a certain project to another! (SMEC team)

I don't think it is too early for us to talk about impact. We do see the impact! If you observe the classes, you can instantly see it. By the students' reaction. (SMEC Team)

Some people interviewed also mention indications of behavioral changes in students. Besides, they highlight repercussions in the family:

We realize that the self-esteem of these kids has improved, the motivation for being in the classroom. The kids are feeling more confident to talk, to give their opinion about things they are trying right there, in the experiment... Kids who did not talk, for being shy or afraid to make mistakes, are more motivated, speaking more... (SMEC team)

Students were very violent, right? So, the school was looking for projects that could work with the issue of students' aggressiveness, and CTC, this year, came to collaborate, contribute to the involvement of students in classes, and parents too. (GF Regional Coordinators)

Students start to question. They are questioned in the school, a lot of "whys?". And they go home with these "whys" and, according to the teacher, the repercussion in the family is clear. Parents ask: What have you been doing with the kids, because they are bombing the family with questions! (GF Regional Coordinators)

The impact with the family is also evidenced in the testimony of a supervisor, who heard, during a parent meeting when a school was opened, from some of the people present, the request for *that Science project my son has in the other school*.

Regarding teachers

Among the teachers, the most noticeable impacts can be seen during the initial training process – in the specific case of those who participate in the work developed directly by the pedagogical team of Sangari – and by the use of material resources, to which, in their daily practice, they have no access:

There was a program, the contents to be covered, and teachers added a few things, brought what was already planned in their practice, their schools, and adapted to the Program and vice-versa. I think they are amazed at such a rich material. In the training, which was a very high level training, they were able to try... and they were satisfied! (SMEC team)

What I could notice is that teachers, during their training, also came with the perspective of working with inquiry, research. So it is not only for students, I guess teachers also go through a new profile, right? They are actually learning to use Science in a more pleasant and practical way, bringing it to the reality context of students. (SMEC team)

They are very happy because they have CTC and also all the pedagogical-didactic material, which is a very relevant fact. They can follow the entire process, not only regarding the student, but their own training. (SMEC team)

Regarding teacher articulation

It is also possible to verify some impact in teachers when it comes to planning the school activities, even though this process, in the opinion of some people interviewed, is slow and difficult, especially in 4th to 8th grade schools.

Not so long ago, I used to talk to some teachers and the school supervisor and she used to talk about the group in an enthusiastic form, saying that everyone was involved, that this project had come to add to the team, because there was a dialogue within the group, and this connection with other subjects is a challenge, because it does require giving in a little, offering a little, a more complex dialogue. (GT Regional Coordinators)

An issue regarding the curriculum is that the idea that Science is for a few people is losing strength. In our case, the school is articulating with other subjects, the teacher makes a connection with Portuguese, tries to do this work without obstacles. Science is for all, it is accessible to all, including poor students. So, we are breaking with that elitist view of a distance Science, especially when it comes to experiments. (GT Regional Coordinators)

Regarding other school areas, other schools and projects

Maybe the impact that most reflects the acceptance of CTC by teachers and supervisors is the fact that the Program is extrapolating the limits of groups, segments and schools in which it was implemented. Other institutions not selected for the pilot experience are requiring its implementation:

When the Sangari material gets to the schools, the other schools that do not have the Program start to call, and this was the first impact I noticed. (SMEC team)

In schools that operate in the three shifts, teachers begged us to extend it to EJA, at night. Although we didn't, because the material is not designed for EJA, they are using it, making adaptations. Kindergarten and other schools that are not in the project also asked. They borrow the material from the other schools... (SMEC team)

There are schools that are multiplying the Program within their own space. In fact, there are some supervisors who even wanted to take this to "Escola Aberta"! (SMEC team)

Finally, it is important to highlight the fact that some of the people interviewed point out some articulation between CTC and other competing projects in schools, although this process does not seem consistent yet:

At the school there is PETI, which is a pedagogical support for the teacher. The teacher has a plan and goes to the lab to research, and this really matches the purpose of CTC, because the Program has all the material. And usually, 5th to 8th grade schools have computer labs. (GF Regional Coordinators)

The project “History and Memory of Itapagipe” has one part about the environment and it is being developed in all schools of CR, which is making a link with CTC so that the group can broaden up their view on Itapagipe, based on their experiences on the environment. (GF Regional Coordinators)

This year, almost all schools, are working with the environmental guidelines, each making their own project. So, those who embraced CTC only gained. (GF Regional Coordinators)

4. CTC Program in schools

This is life, we are born, grow up and die...
Then everything again, like a wheel.
(4TH GRADE STUDENT)

The result of the field work carried out in the schools that develop CTC in Salvador offer a rich set of testimonies and analysis on the Program, based on the view of those who are more directly involved: school principals, teachers, pedagogical coordinators, students and parents. Reference is made to the visits to the eleven schools, where questionnaires were applied, interviews and focal groups were carried out and the direct observation of the physical and social space took place.

At first, with regard to the schools, attention is drawn to the good acceptance and positive assessment of the Program. Up until now, CTC is practically unanimity among educators, students and those responsible for students. The interviews and focal groups carried out tried to know the opinion of those involved about issues related to its implementation and development in schools; the relationship with Sangari Brasil and SMEC; the involvement of pedagogical coordinators, principals and teachers with the Program; its acceptance by the students and the impacts perceived in the learning process.

Regarding the introduction of CTC in schools

The first aspect to be pointed out refers to the way the Program arrived in the schools of Salvador and how its implementation process and appropriation by educators took place. Unlike what is usually heard about projects that get to schools disrespecting paths, arriving as “packages” to be adopted as the last pedagogical novelty, without considering the accumulations and political-pedagogical choices of each school unit, the assessment of educators, principals and students regarding CTC is very favorable, because it highlights the respectful way it arrived in the schools, not only allowing but also stimulating adaptations and adequacies to the curriculum, to existing programs and the reality of each school.

They brought something and left it up to the teacher to use it. They didn't say: “you are going to have to implement this project”. It is an open and flexible project, so that is where the respect starts. Just by making you comfortable to articulate inside your process is better than saying: “change everything, this is how it is going to be”. Then not only you but also your students get lost, trying to do something that is not appropriate just because it is an obligation from the system. CTC, on the

contrary, is contributing for the progress of the process here in the school. (GF Teachers from CEB to 4th grade)

It wasn't only that story of receiving a bunch of equipment in the school, a whole lot of books and "do it!". No, you did it before, so you experience it and if I experienced, it is easier to teach. (GF Teachers from 5th to 8th grade)

Of course we have some projects that get to us on a macro scale, but me, as a supervisor – and I also assume a role in the pedagogical coordination – I try to make those things that arrived match our pedagogical proposal. So I try to make this arrival as smoothly as possible. That has to be actually important for our community. And CTC, I can assure you that it didn't just accidentally land here. It landed very well on a fertile ground. (Principal)

Unlike other projects, I think CTC had an advantage, which was the fact that they showed us what they did and how they did it, in other words, they had the ability to bring us inside the project and not force us to join the project. (GF Teachers from 5th to 8th grade)

Regarding training

The principals, coordinators and educators also highlight the quality of initial training, which presented the CTC proposal and material, but they resent the fact that not all Science teachers participated, as the model adopted was that of trainers-multipliers. They also present a recurring demand for more follow-up from educational advisors and consultants of Sangari, through a more systematic presence in continued training, which should preferably occur in the school.

The implementation was excellent. We went to Hotel Vila Velha, at Corredor da Vitória. This implementation was a First World event. Now, the follow-up was good, because I thought we were going to have more follow-up. Here, we had difficulties with weather and climate, the meteorological station thing. Then we felt this lack of a closer support. They came, they did come, but I thought it could be a more effective follow-up. Coming here, watching, seeing the classes. (GF Teachers from CEB to 4th grade)

As the project works with the theoretical-practical issue, then, in my opinion, we lacked more support regarding the practice and use of the instruments. The theoretical issue was very well put by the Sangari staff, the view, the objectives of the project. But the practice...Because in each class, you handle a lot of materials to reach the purpose of the class... So I think we lacked this support. (Vice-principal)

People would like to have participated there because it is one thing to see it with the other teachers at that time and another completely different thing you being in the school and I showing you... No matter how hard I try to do a good job, it is not the same experience. (GF Teachers from 5th to 8th grade)

Regarding the CTC material

The pedagogical material used in the Program is also the target of enthusiastic comments from the people interviewed.

When I saw the material, I was so amazed that I asked them to get in. And so I did... I invaded the program! (GF Teachers from 5th to 8th grade)

The night teachers were delighted with the material and so were the kids, including the Telecurso people, who did not fit in the 5th to 8th. (GF Teachers from 5th to 8th grade)

Its vocabulary is easy, not too elaborated, anyone can sit down, read and understand. (GF Teachers from 5th to 8th grade)

When questioned about the reason for this demand for a more systematic follow-up from Sangari consultants, according to criteria established between SMEC and Sangari when the Program was implemented, we emphasize the importance that continued training be the responsibility of a permanent professional of the local system. These educators demonstrate a certain difficulty to handle the liberty to enjoy their own experiences with the Program, as observed in the statement below:

First, because their experience with the project is much higher than ours. Second. Because the doubts would be solved on the spot. Because they should know the dosage. For example, when I say: "the text is dense". Someone from CTC here would certainly have more practice, or because they worked with the Project in other States, handling other problems, how to signal and soften this until it is immediately solved. We would stop this "I think this is going to work". We had something that already works. (Principal)

It should be highlighted, however, that most schools that adopt the Program in Salvador do not have pedagogic coordinators or supervisors, and the entire follow-up is done by the administration, which should be in charge of pedagogic and administrative issues.

The teachers talk, sit down and exchange experiences and everything they experienced with the project. That's all. There is no follow-up or a systematic group for study. We would need this pedagogic coordinator to make this interconnection. It is a huge school, I don't have a vice-principal, I don't have a coordinator, so I am the one who makes the decisions in pedagogical issues, as well as administrative issues. (Principal)

Working conditions can also help understand the demand for a more systematic follow-up by SMEC.

Regarding the Department, they should have followed up better. We've already talked to them and someone will do the follow-up as of tomorrow in a more systematic way. (Principal)

Regarding the maintenance of CTC equipment and material

The testimonies say that there is a great effort by students and teachers. In only one school a report of cabinet breaking was reported, which may not have been the students. The parents also approve of the maintenance system for the equipment and highlight the importance of students having their own material, but not taking them home, for safety and care reasons.

Everything is treated very carefully, both by the student and the educator. It is ours. You have never had it, so you have to take care of it because you don't know when you are going to have it again. So, we don't have this habit of discarding things. We use it and store it. Here is what we thought in the beginning: CTC may not be here next year, but what we learned from the Project will stay... So, all this material will be reused by another class, we have to take care of things because we will need them next year. And the kids are aware of that, because they do this with their own textbooks, with the material they have in the classroom, with the games. Everything they use, they know it is not theirs. It will be used and stay there. In the following year, it goes to another class, which will have everything, but someone preserved it so that it could be there. (Principal)

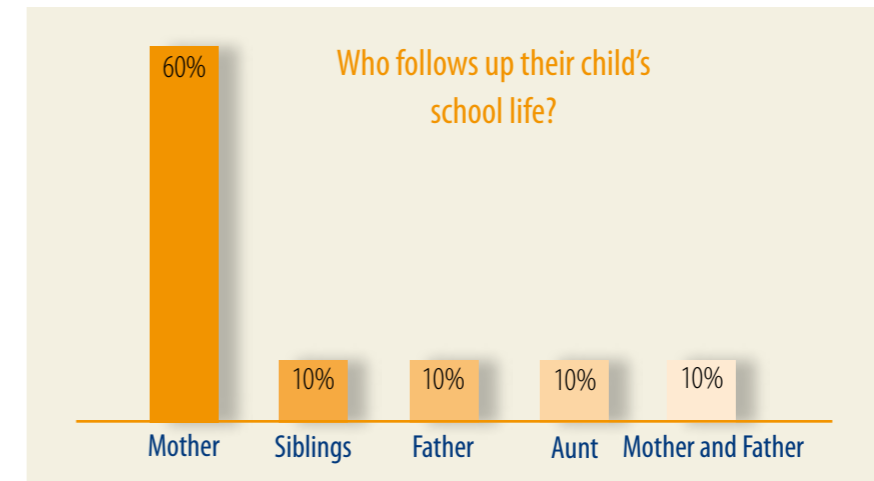
As soon as CTC arrived, this issue was our concern. How are they going to handle the material? Because it is a big class. Our classes have, on average, thirty students. Are they going to break it? Are they going to ruin it? Are they going to be careful? And, fortunately, I haven't had any report from teachers saying students are not careful with the material. They are taking good care of their material. (Principal)

It is individual, I think it is great, it is well organized, and I thought it was a good idea not to take it home, because it is going to break, it will be ruined. Many mothers work, you know what I mean? The kid is home alone. We know that children with their mothers are a handful, let alone without them. So I really like this because they receive it, it stays here and they use it here, because that's where it is supposed to be used. I like this system. (GF Mothers of students from CEB to 4th Grade)

Regarding family follow-up

Many children go through an early independence process in their school life due to the survival conditions of the parents, which prevents them from following their kid's everyday life up closer. However, even considering this fact, in 80% of the cases it is the parents – specially the mothers –, who follow up their children's school life, as per answers provided for the question “Who follows up their child's school life?”, illustrated in graph 1.

Graph 1 – Follow-up of students' school life



Source: Assessment of the CTC Program in Salvador, 2007.

Some parents also seem to be proud of the way their children use some of the instruments and equipment.

I think it was one of those experiments, the one you get the glove, put it on... There was the one with the lens, that they put it here. That was a very interesting thing for them. (GF Mothers of students from CEB to 4th Grade)

Regarding class dynamics

In a general way, what students like the most are the experiments. Handling and observation is what awakens their interest for the classes.

What they certainly like the most are the experiments, when they can handle, when they can see the experiment happen, all that practical part. (GF Teachers from CEB to 4th grade)

The little ones like living things: dealing with plants, worms and instruments they can handle. (GF Teachers from CEB to 4th grade)

On the other hand, in all focal groups, students are reluctant in relation to activities that include reading and writing.

This fact seems to be the reflex of activities with very little creative practices experienced previously, in more conventional class situations – frequently criticized by them –, more expositive, involving copies, individual reading, questionnaires etc.

When asked about “what they liked the least in CTC classes”, they answer:



I don't like copying. (GF Students – 7th grade)

I don't like writing, when we have to write a lot... (GF Students – 5th grade)

There was only one class that was kind of boring. We were just reading and reading and reading... We didn't do anything, and what everyone likes are the experiments, this kind of thing. (GF Students – 4th grade)

When we don't do any of that, it gets quiet, we just pay attention, nothings is done. It is boring, isn't it? To just sit there. (GF Student – 4th grade)

The large number of students in the classroom – some even have 40 students or more – prevents a more careful follow-up by teachers and a more effective participation of students.

The difficulty I am referring to is that you have a class with forty five students and then it is complicated for a teacher to do a job like this. How are you going to divide the groups? Then you do an excellent job, but the class is full, everyone wants to touch the objects, see them... Even if you divide into groups, which is the suggestion... This is an obstacle, because there are too many students and the classroom is not large. (Principal)

In a classroom with 40 or 30 students to work with this kind of material, you have to agree with me that it takes some effort, because it is one thing to work with 15 students, 10 or 20 and another thing to work in a classroom with 40. In 8th grade, there are 49, here. It is difficult. It takes, I repeat, a lot of effort. (GF Teachers from 5th to 8th grade)

At the same time, the excitement with the Program is such that the issue of large classes is not an impediment for the use of the Program. On the contrary, because CTC classes draw the attention of the student, some alternatives have been thought, such as the division of the classes and the involvement of other professionals to help the teacher in the classroom.

We are actually thinking about creating a strategy, in certain experiments, of dividing the class in groups of fifteen. In other words, as we have computer and English classes, we are going to think about a strategy of, on this day, 15 students having English and 15 doing the experiment. (Principal)

Regarding the CTC methodology

Although many schools have stated that they already developed projects emphasizing Science education, the adoption of CTC in schools is seen as a novelty, as new orientation from SMEC, as the focus before was the development of language and mathematical thinking. May I remind you that out of the total of 327 teachers who work in the eleven schools where CTC is developed, only 7.6% are Science teachers. Besides, only 9% of schools have a Science lab. Educators seem to know that the adoption of the Program, even as a pilot project, is successful and that it should be extended to other schools of the Network.

I think it is the implantation of the new. Because CTC is something new. You work theory and practice in parallel, it wasn't like this before. So, you make students think, reflect, see, analyze what they are observing, and they were not stimulated like this. So I think this was one of the important steps of the Department, when they brought the Project. As I was saying, it used to be very traditional. Science for Science. Now it is not, they have the view of the practice to the theory. (Principal)

The project took Science class from the sameness, from that traditional class, in which you have a book, the teacher and the blackboard, now you have a practical class, very dynamic. This stimulates and facilitates learning for the child or even the adult. Handling, holding, touching, seeing, touching what you are doing. This helps a lot in the learning process... So, it [CTC] came to add a lot. It was a novelty that came to the school to make a difference in the entire school. (Principal)

Regarding the articulation with other areas

Regarding the fact that Science education, after the adoption of the CTC Program, can count on an innovative methodology and pedagogical material appropriate for a more investigative attitude from students, we can observe that educators and parents of students are practically unanimous when it comes to acknowledging the positive impacts that can result from this new *way of teaching and learning Sciences*. Some testimonies refer to the relation with the other

areas of knowledge and its contribution for the teaching-learning process, the relation with other subjects and higher quality. Others reinforce the understanding of the interdisciplinary nature of the CTC methodology.

We are letting these kids perform a scientific investigation, from an early age, allowing students to first bring their hypothesis, their previous knowledge; then, observing the phenomena, which is very important, the registration of these phenomena, the experiment itself, practicing and validating or not their hypothesis. So, they contribute not only for the area of Natural Sciences specifically, but for the area of Portuguese. Because this student becomes a reader and a writer, in a more systematized way. The reports are a very rich kind of text, with a very important textual typology (Principal)

Now, their interest is greater. Because I believe children develop more when they can handle things. More than copying from the board. This I think has improved. By their own initiative, right? Of wanting to take care of the worm... It is the same old story: they eat a banana in the morning and don't throw away the peel because that can feed the worm... They don't throw away the leaves of the broccoli because they have to give it to the worm. So everything is reused. There is also the conservation part too. I think this is a very good thing. It puts together the sense of responsibility – I mean, they know they have to do that – and the learning, then you actually learn. You don't memorize, you learn. So I think it is very nice. (GF Students' mothers from CEB to 4th grade)

Regarding context contextualization

Educators state that the experience with CTC has been contributing for the understanding that Science education favors a teaching-learning process much more “tuned” with our everyday lives and the experiences of children and teenagers.

Today everyone talks about the environment, preservation... So, Science makes them investigate and interact with this new environment where they live. (Principal)



Science education is essential because when students go to school, they have a huge curiosity in relation to the world around them and find many answers in Science education. Children and teenagers can discover, through this study, explanations for the phenomena, even find out ways to prevent certain diseases, ways to live better in society, ways to save energy. Science helps them relate better with the world. So, Science education is essential in schools. (Principal)

Regarding the reality of communities

A meaning given to Science education, which is very important and hardly ever noticed, refers to the fact that most schools that adopted the program are located in poorer areas, where children are alone because their parents need to work, which, according to the testimony of a principal, gives a useful and urgent nature to education in this field.

We live in a community where children are alone most of the time. They need to learn to deal with and understand many Science-related issues to know how it works and how to protect themselves. Because once you know how it works, you know how to deal with that. (Principal)

This relation between Science education and the poverty condition of public school and periphery students also appears in the testimony of a principal, who says that these children have more possibility of observing and experimenting natural phenomena and, therefore, have an advantage over children who are locked up in apartments and have less contact with nature.

Our children live like butterflies flying around the school; running after a lizard to tie a piece of thread and make it carry an object in its tail and wag it. We have to go after them and say: “don't do this”. We have students here who bring ants from home, to set up a ring during their break. But we go after them, asking them not to do that.

Students bring the ants in matchboxes. They are small, 6 or 7 years old. They gather their friends in a circle to see who is fighting who or who is going to win the race. They are very used to dealing with that. It was Science, but not systematized, it was loose, they need to work with that. I believe that a boy who lives in an urban center, who does not have earth to walk on – earth, real earth – just pavement, well, I believe my boys are profiting much more. Their interchange is much faster. (Principal)

Regarding the community

Despite the short time of adoption of CTC by schools, its assessment by educators, parents of students and students is very positive, not only when it comes to the Science teaching and learning process, but also regarding the changes occurred in students' behavior, at school and in the relationship with the family. It is very illustrative the way a principal says how students started to get more involved in school projects and become interested in home activities. On the other hand, the speeches of two mothers mention, in different ways, the impact of learning new things in Sciences.

Other testimonies mention a greater concern with the environment, changes in the relationship with animals and cares with trash, at home and in the community.

We've already had, here at the school, demonstrations from the little ones about environmental preservation; we've had them watching, taking pictures of the bulbs when they were growing to register it; taking care so that the bulb could blossom again next year. Some 6 or 7 year-old children are bringing plants from home. Because if the bulb can stay here, they can bring it from home. It is a very good thing. It means that we are transcending the gates of the school and extending it to their homes. (Principal)

My daughter has this habit of eating very fast, she puts the food in her mouth and swallows it. Then she had a class about the human body and realized she can't do that, she can't eat that fast.... You have to eat slowly... Now she does. (GF Students' mothers from CEB to 4th grade)

Like she asked me at home: "are going to raise frogs?" I said: "Not here! Not at home, we are not raising frogs!". Because they are so excited! (GF Students' mothers from CEB to 4th grade)

Regarding the expansion to other areas, schools and projects

The positive assessment of the Program has been leading principals, teachers and parents to desire its extension to other grades and other educational segments.

In some schools, the use the Program is being adapted so as to be used in the Education of Children, Teenagers and Adults. It is very interesting to observe the strategies used for these adaptations and also the results obtained. It was particularly possible to observe this in the speech of a principal, telling details of the use of CTC by EJA classes, known for lacking specific didactic materials. A significant data in this experience is that some EJA students are also parents of students in the morning shift, which has allowed new appropriations and meaning for the Program.

The material is more important for the night shift, because they don't have didactic material. They have a book that the teacher borrows from the morning shift. Very few of them actually buy a book and bring it to class. The teacher uses materials, practically just paper, the board, mimeographed texts, but there was no book, material to handle. At night this didn't exist. So their self-esteem went way up: "This material belongs to our class, it is ours". Not to mention the meteorological station. They never forget it is time to look. You see a bunch of men looking. One looks, another one writes and they go back and set up a board, very excited. "And it didn't rain today? And the weather is like this... How can this thing measure the amount of water that rained, if it is so thin and the rain is so thick?" (Principal)

It would be good if we had it at night, right? Because what do we have at night? Second, third and forth... The other day I saw the third grade teacher doing an experiment with a glass of water... She filled a glass of water, put a paper on top and turned it and the water did not go down... I thought that was very interesting. I tried to do it at home and it didn't work. (GF Students' mothers from CEB to 4th grade – EJA Student)



The main experience of the Program in the eleven schools observed is with Junior High School classes, and it was from 5th to 8th grade that they made the main observations. The main ones are related to the appropriation of the Program, its limits and possibilities, main difficulties faced and innovations resulting from the new Science education methodology.

It should be highlighted that there are significant differences in the use of CTC among classes from CEB to 4th grade and from 5th to 8th grade, as the educators mention. According to them, in the first grades, usually the teaching of the different areas of knowledge is the job of one single teacher, which has allowed more radical changes in the way of teaching, in addition to favor a more effective integration of all subjects.

Regarding the articulation with other areas

When the discovery of Science education after the adoption of the CTC methodology was mentioned above as a privileged way of providing integration of subjects and contributing for learning in other areas of knowledge, the reference used was mainly the grades in which educators have been concretely trying this integration, as can be noticed in the speech of educators, students' parents and the children themselves, even the youngest ones, who still don't understand this concept, when asked "what is Science education for?":

To learn more things, to learn how to read, how to write. To learn about the human body, to learn about body cells, how to water plants, take care of worms. Take care of human beings, plants and animals. How they are born, reproduce and die. (GF Students - CEB to 4th grade)

This perception is reinforced by the speech of educators and parents:

It is a material intended for the area of Sciences, but it is interdisciplinary. It works with Portuguese, Mathematics, Human Sciences. So, it is a material with content. (Principal)

That is why I mentioned this story to other subjects, because you know what happens? Mathematics, nobody wants to attend a Math class: “We have to copy!”. So, as they are enjoying it, add a few things. “Let’s calculate the weight of the frog. How do we calculate weight? How long did it take for the worm to gain weight? The fraction of the banana it ate. Now let’s see, how do you say “borboleta” in English?”. Teachers can play this game because they are going to learn, they are not going stop enjoying it and they are willing to do the butterfly and worm thing. (GF Students’ mothers from CEB to 4th grade)

In the grades of the second segment of Junior High School, it is not that this integration is not perceived as something possible to be achieved, but teachers’ working conditions, with little time for collective planning, the lack of more systematic pedagogical follow-up and the lack of information on the Program by teachers of other areas have been making this relation difficult or even preventing it.

It is the Science teacher who is in charge of the Project, so it can happen. The other areas receive information from the other teachers. But there is no connection among these areas. The other teachers only collect the information, see the experiments, but we can’t say they are bringing it to their course. We don’t have this kind of time or space to make this connection. (Principal)

In the opinion of educators and parents, this subject integration is something that should be stimulated in all grades, considering the benefits it can bring for a more contextualized and attractive learning for children, teenagers and young adults.

CTC has been allowing you to work in an interdisciplinary manner. Because you can make a bridge with Geography, Portuguese, Mathematics... It was well accepted. (GF Teachers from 5th to 8th grade)

My boy, who was a little older, learned the history of the pyramids, then the Math teacher took over. So he knows a little bit of everything, he knows about the Pyramid in Egypt, how much



is an angle, how much is this or that, how much he calculates... And I believe that with this project you can do this, because they handle everything, right? (GF Students’ mothers from CEB to 4th grade)

Regarding reading and writing

Another peculiarity observed in the different uses of the Program in initial grades and more advanced grades refers to the content proposed. In the assessment of principals and educators, the material is very dense, if we consider the reading difficulties of students from initial grades, which required adaptations for the use of certain texts. In more advanced classes, the density of the material has been helping stimulate students to learn more, to deepen new knowledge.

Our 2nd grade students do not read well enough to follow the texts. In 3rd grade they follow well and in 4th grade they love it (Principal)

Because when we compare with a private school kid, in the first grade he can read and write. So, for a child who is beginning the reading and writing process, it is not a great contribution because the texts are very long. On the contrary, this child feels, in a way, in a conflict situation, and if the teacher does not mediate well, he may give up reading that long text. This is what happens. As he doesn’t have control, he is scared. For other kids, who can read and write, like 3rd and 4th, 5th, 6th, it is excellent, because the texts use their language, stimulate writing... So these kids develop reading, develop writing skills. (Principal)

Another important assessment regarding the CTC reading material is the fact that it is a very attractive material, with a good presentation, which also stimulates in students the interest in reading.

The arrangement of the book is different. The first contact with Sangari was through the book. On the day we distributed them, in the first class, they really enjoyed it. Especially the human reproduction part, right? 4th grade boys? They are interested in human reproduction! (GF Teachers from CEB to 4th grade)

Regarding the pedagogical plan

Another issue is related to the themes proposed for each semester. There are several testimonies from educators who say there is too much content. This assessment is minimized by other educators, who consider an obstacle the short time of adoption of CTC and also the fact that the Municipal Education Network went on strike, in addition to the winter break and some cases of delay in the Program implementation process. But in general, what they say is that many of the activities proposed for one class can be taught with more time, respecting the paces and difficulties of students, a factor of a possible unbalance with the content intended for one semester. However, the flexibility in the CTC composition with the school curriculum is also highlighted.

In a general way, I think it is good, but there are some classes that we need to adapt to our reality, and teachers are free to adapt their classes in a very specific way. You get a class that could be taught in one day, but we teach it in four stages. If necessary, we do it in four days. There is no need to rush. If we have to, we can distribute like this. And Sangari made us comfortable with that. (Principal)

Even if you work only with CTC, there wouldn't be time to work until June, which was the case of my school... There was not time because of strikes, holidays... So, even working only with CTC, time was short, there was not enough time to work. (GF Teachers from 5th to 8th grade)

Sangari's proposal was that CTC could be a complementary work, which operated in parallel with the planning we had in the school. And in my case, this couldn't happen no matter how hard I tried, right? We couldn't handle CTC and handle the planning we had prepared in the beginning of the year. So what did we do? We prioritized CTC, because we had a period work with this module, and our planning was actually left aside. (GF Teachers from 5th to 8th grade)

What we observed in the CTC issue is that it could be flexible. You didn't have to do what was planned, class one, two and three. You could adapt CTC to your content and your curriculum. An example: suppose I am working terminology in the first unit and I have the CTC material for terminology, this content fits in and the others end up staying for the next units, with other contents. (GF Teachers from 5th to 8th grade)

The good thing about CTC is that we don't need to start from zero, you know? Create the wheel, as many programs that arrive in the schools. It can be adapted to what we were already doing. (GF Teachers from 5th to 8th grade)

Regarding group work

A very positive aspect in the CTC assessment is the fact that the Program, from the work with younger children, has been favoring a new conception of group work, in which all students have a greater participation in the activities, in addition to learning to listen to their classmates, raising their hands to ask permission to speak and have a more cooperative and responsible attitude.

One was planting, the other one was watering, the other one was putting the earth and one was planting too...everyone helped. (GF Students - CEB to 4th grade)

I think this also stimulates the sense of responsibility in students. It makes them grow. (GF Students' mothers from CEB to 4th grade)



Regarding family

Parents' involvement in experiments and scientific observations of their children is a positive aspect of CTC, which, according to educators, has been contributing for a stronger presence of parents in the schools and, according to the parents themselves, for an experience in which they also learn with their children.

Not to mention that I thought frogs were born like this, tiny, and then just grew. I didn't know they went through all this process. I didn't even know that their back legs grew first and then the front ones... (GF Students' mothers from CEB to 4th grade)

She told me that if a butterfly, if I am not mistaken, is taken from the cocoon too early, it only lives 24 hours. I didn't know that... So it is a good exchange. Because there are things we have forgotten right? (GF Students' mothers from CEB to 4th grade)

Some try to learn, get involved: "explain this research better to me, he said it is a cool thing". Then we explain, show them the material. The father is used not to have anything, barely a book that this year we didn't even have enough for students. We have to alternate the books. And they see how rich the material is, the parents get excited when they see something like this in a public school. Now, not everyone gets involved. The interesting thing is that those students whose parents get involved have a much better development. When this happens, the relationship of parents with the school, the kids, in reading and writing, everything changes. (Principal)

Regarding continuity

Gratitude for the Program is noticeable in some parents' speech, as well as fear or suspicion that it might be discontinued.

They always say that this school has a lot of projects, thank God. There were other projects here too and everyone worked hard, even parents had to get involved, there was a walk... (GF Students' mothers from CEB to 4th grade)

It is being fun, because no matter how much you teach a lesson, like the one with the butterfly, they know about the butterfly, but they didn't know it went through all this process... I hope this doesn't stop. Otherwise it is going to be a waste of work. (GF Students' mothers from CEB to 4th grade)

Regarding the school environment

It is in the speech of many teachers, however, that we can see that CTC already causes a tangible impact in schools, in different dimensions – including in the improvement of the school environment –, also evidenced in the desire they manifest for its continuity.

You feel an indication of impact among students when it comes to their availability to study Sciences or learn it. (GF Teachers from 5th to 8th grade)



These were the kind of students who failed all the time, who wanted nothing, who did not stay in the classroom, who disturbed other classes. This was in the past! Now the principal does not get any complaints about my students. They got so involved that they don't feel the need to get out, disturb their classmates, and I am beginning to realize that they are actually developing and producing. They are producing something they didn't before. (GF Teachers from 5th to 8th grade)

They are really willing to read, to do things... I scheduled a project for them to hand in, everybody did it. This was a great difficulty! (GF Teachers from 5th to 8th grade)

I also notice the interest of other classes, because there are three classrooms close to each other and the students from the other class, which hasn't adopted the CTC proposal yet, get curious, want to get out and say: "Teacher, I want to get out, I want to stay in CTC". (GF Teachers from 5th to 8th grade)

Sangari allowed the adequacy of computer classes with Sciences. Then it also opened the space of the reading room, which allowed more practice of experiments. (GF Teachers from 5th to 8th grade)

It is not only proposing to do new things, having a methodology... It is giving the support for the teacher to do this, it is to follow up. And things like this we didn't see in the past. So now there is support, material, involvement of teachers, students, the management team. Two thumbs up! (GF Teachers from 5th to 8th grade)

I think CTC is a process, it is a proposal that will show its result in the future, if it is continued. I think in six months, maybe five, we can't really see the results. If it was kept, it would be great because you could give continuity next year. (GF Teachers from 5th to 8th grade)

Finally, students participating in focal groups easily carried out the activities proposed.

Not only did they draw, they also taught researchers how to handle the CTC kits, expressing a lot of concern with taking care of the material.

During the activities, in addition to the drawings, without the need to stimulate that, they explained the processes orally and also registered, in writing, some aspects they thought needed to be “clearer” regarding what they were drawing.



5. Ideas, suggestions and perspectives of the actors involved for the improvement of the CTC Program in the Municipal Public Education Network of Salvador

The several actors who offered their testimonies for the construction of this assessment of the CTC pilot in Salvador have expressed, explicitly or not, a varied and consistent roll of ideas, suggestions and perspectives that offer clues and deserve to be considered due to the paths to be taken by the Program. Many of them appear in the previous items. Others are systematized here, according to the most recurrent categories and preserving its form and authorship, so as to allow the identification of the place and context they come from.

5.1 Regarding planning and organization of the Program in Salvador

Theme	Testimony
<ul style="list-style-type: none"> That the planning of CTC activities is integrated to SMEC and school planning before the beginning of the school year. 	<p>It is a great proposal, excellent. Now it needs to be organized before the school year begins, so it doesn't arrive after the planning is done. We stopped one week to do that planning and adequate it to the proposal of the school, to the Policy Project of the school. (GF Teachers)</p> <p>CTC has to be considered before the beginning of the school year, before any planning is made. (GF Teachers)</p> <p>A necessary adjustment: alignment of schools with the units developed by CTC. (SMEC team)</p>
<ul style="list-style-type: none"> That initial training takes place during the “pedagogical period”, before the beginning of the classes. 	<p>Training should have been done during the pedagogical period. (GF Teachers)</p> <p>The only complaint my school has is that unfortunately teachers couldn't go. Because we would have to suspend classes for one week. So, the city hall didn't release us. But they complained: “It is not the same thing, we had to be there too because it is different when you are present”. I think these complaints are valid. (GF Teachers)</p>
<ul style="list-style-type: none"> That the distribution logistics of the CTC material (didactics; cabinets) consider the enrollment information and the schedule of activities for the year. 	<p>One limitation I see is that the year should have started with these cabinets and material in place. This created a limitation. Because it would be different if we had this training during the pedagogical period, and if we started the year with the material in the room... (GF Teachers)</p> <p>There wasn't enough material for all students, but that is because the list was made based on the number of students from the previous year. According to the number of the census, not the number of enrollments. I think this should be reviewed... So some kids did not have the material. In a class of 38 students, there was material for only 32 students. It was ok because we do a lot of group work, so we were able to solve this problem, but it would be interesting, wouldn't it? To review this issue. I think this should be reviewed so this won't happen again. (Principal)</p>
<ul style="list-style-type: none"> That the follow-up plan for the CTC takes place prior to the beginning of the school activities. 	<p>Part of this difficulty to follow up is due to the problem with the administrative process, because the financial resource was released by the Treasury Department very last minute for us to start. (SMEC team)</p> <p>We didn't have enough time to articulate more so that the Project could be followed under Sangari's coordination. It was hard.... (SMEC team)</p>

5.2 Regarding initial training and follow-up of the Program in schools

Theme	Testimony
<ul style="list-style-type: none"> • That more teachers are involved in the training process so as to reduce the need for the “multiplying effect”. 	<p>Among the main problems, we can detect everyone’s desire to participate in the training process, or even count on Sangari/CTC team in a more systematic way. Teachers report difficulties with some experiments and with the contents. It is clear that teachers need to study more, seek their self-development. This thing about being a Science teacher, of course it is not necessary, but he has to have this time to study, to try to study. (SMEC team)</p> <p>Training with all teachers. They complain a lot because only a small group can attend the training. Maybe Sangari should be present with all teachers. (Principal)</p> <p>The first limitation is regarding teacher training. I think it should include more people, to eliminate the difficulty of this multiplying process. I also see the number of schools involved in this project as a difficulty, 11 schools, as compared to 368... We have to think 368. So this impact in the Network is still very small. I hope all this repercussion is an ally to extend the Program. (SMEC team)</p> <p>One of the problems is the multiplication issue. The teacher who attended initial training and then comes back to multiply it among other teachers. It works the same way. It is proven that a teacher training process like this represents a reduction of what gets to the teacher. This is complicated! A cordless phone! Communication may arrive with some noise, things the person doesn’t think are important to mention, but for others would be important. So much so that we, in the Department, hardly ever perform activities with multipliers. But then there is something else: the assurance of the school days of teacher in training process. The ideal would be for us to have all teachers in the training process. (SMEC team)</p> <p>That the multipliers somehow have classroom experience or have been to a classroom so that they can have the opportunity to reflect on why they are being trained. I think this way I could soften the risk of multiplication, then I keep the coordinator. It aims at the following criteria: the person needs to have classroom experience because we need this experience as the object of reflection for the project. I think this could soften things, although it is another risk. (SMEC team)</p> <p>The Program implementation system was very fast. I felt we needed more people in that one week course. I think more teacher should have access. I also think that Sangari should have some time in the schools. With their group, with the same work developed before, so that the teacher could come here to multiply. I guess it was necessary, maybe, the same class hours this teacher had out there, but he should be present in the school. Seeing the progress, helping whenever possible, solving doubts. If this happened at least once a month, it would help. Avoid having a multiplier from the school, it should be from Sangari. He should come here and multiply. (Principal)</p> <p>We could consider including in every training process a visit to a school which already has the project. In the 1st stage, it was not possible, because we didn’t have schools, but now we do. This is a way of seducing those who arrive and commit those who are already in it. It is a two way street. So the entire training process of the CTC project will include one day of school visitation, to the 11 ones we already have, where they will show a classroom situation, the project being applied with the children. (SMEC team)</p>

- That there is more regularity and coverage of the follow-up activities, both by Sangari and SMEC.

It takes some follow-up, monitoring from the Department, technicians, closer to the school and teachers. They are there, doing the best they can, but we don’t have a permanent monitoring. The Department sees this, but we don’t have “legs”. (SMEC team)

Some schools feel little contemplated by Sangari when it comes to follow-up, specially regarding visits from Sangari’s trainer and others strongly need this because they have no means, they have no Internet, they feel abandoned. So one of the requests is to have training in which Sangari’s trainer spends a day in each school. Go there, see the school, the teachers, discuss. (SMEC team)

Some schools have been privileged because they were visited many times, and others were visited only once. This, in the addendum, when these six months are renewed, needs to be reviewed. (SMEC team)

It is like we said in the coordinators meeting. We would like Sangari to be present in other moments. Both Sangari and the Education Department could visit us more times, in a more systematic way, so that the teacher could feel more stimulated. (Principal)

We lack a better follow-up. I think Sangari should do this, be closer to the schools, be here, present. It is not just calling, it is not inviting teachers to go somewhere else, but be here inside this reality of the X municipal school, so that we can continue contributing for the project to happen the best way possible. They wouldn’t have to be here every day, every month, they could set up a few meetings in the school, live in this space for a while, to see how it works, what the needs are, the difficulties this school has to work with the Project. (Principal)

Sangari followed up recently, now we need a closer follow-up from the Department. (GF Teachers)

5.3 Regarding material resources and pedagogical activities

Theme	Testimony
<ul style="list-style-type: none"> • That during the training process, possible alternatives for the use of didactic material are better worked with, considering local cultural and social features and specific needs of initial grades regarding reading and writing skills. 	<p>What I feel is that this issue should be more contextualized to our reality. There are some examples that do not match the reality of Bahia, the reality of the northeast. Because the material is in fact conceived by people who live in the Southeast Region. So, it is a different reality. We are Brazilians, but we have our peculiarities. We have some issues that are typically ours. The way we speak, for example. It is not necessary to bring language stereotypes, but we have to be careful because we want to develop a regional work. (Principal)</p> <p>When Sangari came here, I remember a teacher said that an activity notebook should be provided together with Sangari’s material. And if the idea is to make a very specific material for each city, maybe then listen to the Department a little and the pedagogical coordination to see if it is necessary to make a readjustment in order to condense the content, propose texts closer to our reality. And the Science Journal that we make today. If it can come with the material, that would also be a good suggestion. (Principal)</p> <p>One adaptation that needs to be done in the material is for initial grades, for us, not only for our school, but for the reality of the city of Salvador, for the children from the city of Salvador, because they still can’t read as they should. Unfortunately, this is a problem in our city... I think it is all over Brazil. To give you an idea, now in the SAEB exam, the national average was 4.3. Our school had 3.9 and they even congratulated us! I was embarrassed, can you say 3.9 is a good grade? (Principal)</p>

	<p>El have an unusual situation, because I have an initial grade and, in fact, they are five and six year old students who are starting school now, many have never attended schools and the material that came is too advanced for them, they can't write. All the registrations have to be through drawings... Every text has to be like this, it is like "getting blood out of a turnip". Through a collective text, they say and I register on the board, you know? It is hard because of this, the material is too advanced for them. So I have this difficulty and my friends who have the CEB are experiencing the same difficulty. (GF Teachers)</p> <p>When they start working with bloodstream, I guess in 7th and 8th grade, but not in a specific way, I would suggest including in the program something to remind that Salvador has 80% of black people, there should be something like this specifically for this work. (SMEC team)</p>
<ul style="list-style-type: none"> • That alternatives of materials for specific groups, such as young people and adults with special needs, could be found. 	<p>When CTC goes to the schools, I would like them to think of a material for young people and adults. The same material, but with different books, focusing on these people. Because the teacher is adapting, but I know the institution could do this better. I mean, if the Project wants to assist in the Education of Young People and Adults. The other thing would be a stronger presence of Sangari. (Principal)</p> <p>One thing I wanted was to think about materials for students with special needs, blind or deaf students... How could we do this work, the material resource? Because our students are able to use the material... How about the others who are part of our Network? They are in the regular education system and should not be excluded from the process. (GF Regional Coordinators)</p>
<ul style="list-style-type: none"> • That more assessment alternatives, different from conventional practices, be worked with teachers. 	<p>I am the one who elaborates and prepares these assessments, but I have difficulties to elaborate assessments closer to the CTC proposal... With images, colors... So it is a much more conventional assessment, that test we usually do at school is what I have been doing to assess my students. I think if you work one way and assess it in a different way, you end up breaking this process a little. This would be the suggestion, the assessment shouldn't be at the end of the sixteen classes, but after two or three classes, because this would help us in our work. (GF Teachers)</p>

5.4 Regarding the conclusion of the pilot project and the perspectives of the Program

Theme	Testimony
<ul style="list-style-type: none"> • That the CTC insertion process at SMEC is enhanced and intensified, considering its appropriation by the political-pedagogical project of the Network, the partnership relationship and the articulation possibilities with other projects and actions in course. 	<p>The project, when it enters the Network, is no longer Sangari project. It is the Science teacher training project of the Network. And to incorporate it to the network, it cannot be called Sangari project because it goes away one day. We are not going to have this partner for the rest of our lives. This gives the idea that the project continues being our partner's, not the network's. This is my idea, I think this still needs to be developed in the network. What is the Science teacher training policy of the Municipal network of Salvador? It is the network's project, in a partnership with Sangari for its execution ... The project is not Sangari's! The project is the network's! (SMEC team)</p> <p>The network needs to know its own demands, needs, interests, then we invite the partner that best meets these needs... Of course the partner can bring wonderful ideas, that maybe we even thought about, but had no one to put them into practice. So, if you already have this material, let's go for it! But the network needs to have an identity of what it wants, otherwise it becomes dependent on the partner, and this is not the idea, is it? The idea is that they come, contribute, appreciate the work the network does, but we have the identity of what we want. (SMEC team)</p>

	<p>It is a risk to link the action to the partner and not to what the network is proposing because the day the partner leaves, there is the chance that the project ends... This is the risk. So this needs to be included in the training. Then I think that if the partner is really a partner and it wants the network to internalize the project as a network action, if we believe this is worth it, this should be included in the project, so that we don't call it Sangari project. And what is the project? That Science and Technology with Creativity Program? No one says that! So I think we need to include as the object of the training: What is it that we are doing? What project is this? Who are we and who is Sangari? This has to be separate. Sangari made the project, but the Project belongs to the network. I think this has to be the object of the training, because there is only one way for us to help the region incorporate it, to work this out. This is not only our responsibility. If it is a partner, then the partner also helps, because it is in direct contact with the public. Teachers, students... and I think this idea can be rebuilt so that a new one can be built. (SMEC team)</p> <p>Could CTC be in the production center of the multimedia class? I wonder if we could get CTC and put it in the production center and work in eleven schools, but having the about 200 which have labs using these contents? (SMEC team)</p> <p>The network has a very interesting structure, from the physical point of view, of having a team that produces didactic material, including related to their partners and the classes, which is multimedia. There is a team of professionals in this area, in this "factory of knowledge". We have the structure. We need to strengthen this structure so that we can spread this knowledge of the Project in the network, so that it does not stay in some schools. This issue we need to solve in this second semester. The idea is to strengthen the "factory of knowledge", use this structure we already have and that sometimes is not used effectively due to lack of integration. The idea is to strengthen this and Sangari could be a partner. (SMEC team)</p>
<ul style="list-style-type: none"> • That actions intended for systematization, interchange and promotion of the CTC experience at SMEC Salvador be carried out. 	<p>Somehow we need to give visibility to the project in the network. I think that for the change the project proposes to happen, it needs to have more visibility, to create desire in others. And we can only create this desire when we show. I suppose we would need to find an alternative to socialize the experience. Maybe having an event where participating teachers could exchange experiences with teachers who did not participate. (SMEC team)</p> <p>I think it could have a collective result of the eleven schools in a large space, so that other kids could come and see it. That the kids could, at that time, be multipliers to other children.... The eleven schools, to close this year of 2007. (GF Regional Coordinators)</p> <p>It would be interesting if we published these experiences of the eleven schools to the Network. Teachers say they make journals, they register everything. Register a little bit of their feeling toward the project and the impact of the program in that school. And, in parallel, see, with the system of the Department, a "Sangari" link in the website. Then you go there, click and find out what the school is doing. What is Olga Figueiredo doing? What is Palestina doing? (GF Regional Coordinators)</p> <p>It would be interesting if the children could migrate from one school to another, an exchange program, in which 5th to 8th graders could go to a CEB to 4th grade school to see how they are developing their work and vice-versa. I believe all schools working with Sangari have progressed in that direction and need to move forward, it needs to be visualized. This exchange would be good cool too. (GF Regional Coordinators)</p>
<ul style="list-style-type: none"> • That CTC continuity requests be considered. 	<p>Regarding the program in the Network, I believe we can't let this proposal be a punctual proposal. Only one specific year. Our students need to have this material, whether it is expensive or not, because they need to build and have access to knowledge, instruments, pieces of equipment as good as those our children or other people have access to. So I see it as a significant investment for the Network, it may have a high cost now, but it will pay off. So my desire is that Sangari project can be perpetuated in our Network and be extended to other schools so that everyone can have access to it. The network should have a permanent use of it. It should come to actually contemplate the learning</p>

skills and strengthen even more what is being proposed. (GF Regional Coordinators)

There is an interest from other schools to embrace this project. In some schools, people would say to me: "I went to such school and saw it... When is this project coming to our school?!" (SMEC team)

I hope the Project can be extended. Even to further schools, in rural areas, I have already requested that. (SMEC team)

The continuity of the Project depends on the decision of the network based on the assessment of the work already developed, with the intention of making an addendum for this 2nd semester. This is already in progress but I think the continuity for 2008 depends on the result of the assessment. (SMEC team)

5.5 Messages

Under the title "Messages", there are a few speeches of the actors involved in the assessment, collected at the end of the interviews and the focal groups in which they participated, when they were invited to "send a message" to the different instances of the Program's administration. They were selected because they express well the satisfaction displayed by most people with CTC and the desire that it continues.

We would like to have access to the result of this first stage, maybe preliminary, but it would be interesting for us to have access to the entire assessment so that we could improve even Sangari's follow-up. (GF Regional Coordinators)

After all this research Sangari is doing, I would like them to tell us how it went, get a feedback from them. (GF Students)

The program is very good, it is excellent. May it remain as nice and wonderful, the follow-up, the seriousness... Because sometimes they start a program and it just stays there, loose. We don't feel comfortable with it... The support they are providing is something very good. And then we see the seriousness of their work, how they treat us. This is all very good. (Principal)

I wanted them to continue this work, because it is very important to us all. (GF Students)

I would like to know if we will still have CTC next year... (GF Students)

I would like to send a message: never stop CTC, because it is very good... It is a great project, you know? For us to learn and develop our minds. (GF Students)

Congratulations on the job! (GF Students)

I think I learned a lot! (GF Students) Thank you for remembering us. For sending new things for us to see and new things for the class, for us to know that there are new models to be used in class, not only this blackboard thing, but also different things like this practice. And we learned a lot. (GF Students)

5.6 Strengths, delicate issues, limitations and potentialities

Strengths

- The quality of the program as a whole.
- The implementation process negotiated for the Program, its "entrance" in schools.
- The support to teachers' scientific training.
- The serious follow-up of Sangari Brasil's team, acknowledged for its competence in the field of Sciences and methodology.
- Excellent quality material (graphic presentation and content) and in enough quantity.
- Great quality kits, both in quantity and in quality.
- Compatibilization and adaptation of contents to the curriculum and teacher and school planning.
- Inclusion of CTC in the planning and in the pedagogical-political project of the school.
- The influence of CTC in students' education regarding discipline for study, planning and reflection.
- The role of CTC in uniting children, its availability for collaborative work.
- CTC contribution in raising students' self-esteem.
- Improvement of the relationship between students and the school environment.
- The feeling that principals, teachers, parents and students have of belonging to an *important, serious and good quality process*.
- The informal "expansion" of the Program to other segments (EJA, ProJovem, Educação Infantil) and schools.

Delicate issues

- The issue of initial training only for multiplying teachers and the limitation of the "multiplying effect", notably in schools with many teachers.
- The need for investment in teachers when it comes to assessment.
- The equation between class time and the volume of contents and activities of the Program.
- The difficulty in everyday work faced by 5th to 8th grade teachers with regard to the volume of work and interdisciplinary planning.
- Difficulty to work in large groups, with an excessive number of students.
- Space limitation for materials and products for the Program experiments in some schools.
- Space limitation for materials and products for the Program experiments in some schools.

Limitations

- No articulation of CTC commencement with the planning period of SMEC and the schools.
- Irregularity in the direct follow-up by Sangari and SMEC in the schools.
- The possibility of non-continuity of the Program.

Potentialities for the development of the Program

- Awareness of all those involved regarding the social importance of investing in Science education.
- Political will of the supervisors of SMEC.
- The implementation process negotiated with the actors involved (technical and administrative team of SMEC, regional coordinators, principals, pedagogic coordinators and teachers).
- Motivation of all actors involved (technical and administrative team of SMEC, regional coordinators, principals, pedagogic coordinators, teachers, students and those responsible for them).
- Commitment of teachers who participate in initial training.
- Dedication and commitment of the teachers involved.
- Support of teachers and enthusiasm of students.
- The concern displayed by most actors who participated in the assessment with the possibility that the Program might be discontinued and their desire to incorporate it and extend it in the Network.

6. Final considerations

I saw a miracle at the age of four or five, when my father showed me a compass.

The fact that the needle would point in the same direction did not correspond to the usual course of things...

This event caused a deep and long-lasting impression on me.

ALBERT EINSTEIN

The purpose in the conclusion of this partial report is to summarize the common aspects of the assessment of the different actors who produce CTC in Salvador. At first, it should be highlighted as a positive aspect the direct way that everyone interviewed talk about CTC, presenting their criticisms and suggestions. This behavior demonstrates that the Program has been conducted in a very open form, and also makes explicit the fact that people see themselves as part of it, as they feel absolutely comfortable to express the diversity of opinions, both individually and jointly, in the focal groups. A more negotiated administration of the Program, with schools and teachers, allied with the clear political option of the policy makers in investing in a field still left aside in Brazilian education – the scientific field; qualified training of supervisors, as well as the way the Program is being conducted by the Municipal Education and Culture Department are aspects that, as a whole, can certainly be considered indicators of success.

We can say that CTC was well received by SMEC and by schools, that it is being incorporated to planning, curriculum and pedagogical projects, even in an initial form, but it is clear this it should be part of the pedagogical-political project of the Network, not with a punctual action. Maybe these aspects concentrate the greatest potentialities for the program to be successfully rooted in that education system.

Altogether, it is noticed that a great personal and collective investment is being made by supervisors, teachers and students, which has been generating positive expectations, not only for the extension and continuity, but for the improvement of the Program in the Network. The possibility of access to a good quality work, with good materials and an advanced pedagogical proposal, has been nurturing a very positive appreciation feeling, touching everyone's self-esteem, specially teachers, students and parents.

In this sense, students' progress surprised many teachers and principals during the assessment period. Many times, because they are so close, educators cannot see the progresses made. The scientific speech was recurrent in the explanations detailed, in drawings and productions. Denaturalize the idea that these students do not learn is an essential pedagogic and political role to change the educational scenario.

The challenges most mentioned by those interviewed expose how precarious the Science area still is in the Brazilian educational system, allied to other aspects of the problem, more structural. The first one would be little qualification of teachers, which requires a more direct and systematic training. An example of this fact is the constant complaint on the training model based on training multipliers. Due to the difficulties of teachers, it would also be relevant to have a training process where all participants of the Program could be present. The second one, the difficulty to promote an integration of the many areas and support the construction of a more systemic knowledge. The third one, the deficiencies based on students' difficulties to read and write.

Even knowing about the Program's limitations regarding more structural dynamics of the educational system and the society, the set of potentialities that can contribute to create new perspectives and possibilities should be taken into account. Investing in reading and writing, for example, can point out new paths for this hard problem in Brazilian education. Learning through scientific knowledge stimulates students to ask themselves! Maybe there lies something that will start the interest for knowing through the school, which is the space acknowledged and established for this purpose. Rescuing its role is essential and urgent.

Some aspects reported by the actors should be highlighted, as they show important issues for the improvement of the Program, to wit: the extension of teachers' participation in the training process; integration with other subjects and teachers; closer follow-up of the Sangari team and SMEC; disclosure of the work these schools have been developing to the rest of the Network, among others.

It can also be seen that some aspects are associated with a better performance of the Program, such as smaller schools, smaller groups and 1st to 4th grade teachers, who have the possibility of better organizing their time, the contents and the integration of all areas, because they are responsible for the class as a whole.

But maybe the most significant claim from students, parents and teachers is the concern with the non-continuity of the Program, which, at this point, should be carefully thought by the policy makers, considering that this fact can generate loss of credibility and motivation in all actors involved in the school space: principals, teachers, students and those responsible for them.

Finally the positive impacts of CTC in the schools should be highlighted. For them, the Program brought not only an important infrastructure, but also working conditions, training, perspective of a real education, recognition, by parents, teachers and students, that students are actually learning and, mostly, strength to develop the pedagogical work, which is the motivation for the commitment of those who participate in the experience.

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