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## SEMTE AND THE INCREASE OF SOCIALIZATION (AN INTEGRATION BETWEEN SCIENCES, ART AND NEW TECHNOLOGIES)

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**Abstract:** The study sought to evaluate, at the end of the 2015 and 2016 school years, through the SEMEARTE Project pedagogical practice developed at Colégio Brigadeiro Newton Braga (CBNB), a teaching unit belonging to the Air Force, results related to the socialization of Elementary School students. This Project seeks to bring Science, Art and New Technologies closer together through thematic convergence focused on the environment, sustainability and the appreciation and preservation of nature in a broad sense. We established comparisons of indicators of socialization (self-knowledge, self-esteem and school and social integration). Based on responses to a semi-open questionnaire applied to students, we carried out a quantitative analysis, obtained from numerical comparisons, associated with a qualitative one, of students' speeches that expressed satisfaction and praise for this differentiated form of teaching. When evaluating these indices, we verified that the socialization indicators of the students who participated in the SEMEARTE Project, unlike the others, showed an upward curve. The increase in student socialization is echoed in the thoughts of scholars who postulate benefits to socialization resulting from the approximation of science-art-new technologies. The present work seeks to point out ways that make school education more accessible and attractive, awakening the enchantment for the different dimensions of knowledge and the awareness of the importance of valuing and preserving nature in favor of the humanization of the student.

**Keywords:** science, art, new technologies, socialization.

## INTRODUCTION

Opportunities for discovering the other and oneself for both the student and the teacher are always present in teaching work. These discoveries are challenges of exchanges and

collective construction of knowledge, within the scope of reason and emotion. Unique opportunities for awakening creativity, sensitivity and enchantment with the world around us, present themselves in different ways and not always so well perceived by the teacher and the student. The collective construction of knowledge always involves the teaching-learning process from the perspective of approximation and dialogue between the different areas of knowledge, from the exact sciences, in which reason prevails, through the so-called human sciences, to the arts, in which overcomes the emotion.

The challenges present in the educational process always increase when we are faced with prejudices and limits linked to the paradigms of the so-called conventional and traditional model, which in general seem to stifle the cognitive and emotional potential of students. With regard to the aforementioned prejudices and stigmas present in school spaces, the most recurrent are especially those attributed to subjects in the so-called exact areas, which have the highest rates of student failure. These disciplines, in general, are treated in a very mathematized way and disconnected from the reality of the student body, unlike those that belong to the humanities. Their teachers are attributed adjectives such as alienated, insensitive, disapproving, among other negative attributes. These stigmas end up discouraging students' interest in a spontaneous, pleasurable, autonomous, creative and emancipating study, an essential condition in the teaching-learning process without which education cannot materialize in its greater sense of socialization and humanization (ADORNO, 1995; ALVES, 1995; D'AMBRÓSIO, 2013; FREIRE, 1995). This scenario of adversities motivated the search for challenging experiences assumed and lived at Colégio Brigadeiro Newton Braga (CBNB), a school unit belonging to the Air

Force.

In order to overcome these challenges, we seek to develop differentiated work as a way of stimulating and motivating students, aiming to reduce the number of repetitions and retirement. As professors of the most diverse disciplines, we broadly proposed to establish dialogues between professors and students. Thus, we created the utopia of promoting interdisciplinary work involving Science and Art integrated with New Technologies, which, in addition to the learning dimension, had as their goal the socialization and humanization of students and the commitment to valuing their identity, their self-knowledge, self-esteem, acceptance and acceptance of others. Socialization assumes the meaning of humanization, action or result of making people sociable, which inevitably implies a pleasant interaction in the school environment between students, teachers and other school actors. This utopia motivated the creation of the SEMEARTE Project in 2015, an interdisciplinary pedagogical project that postulates the idea that Science, Art and New Technologies can merge in order to transform teaching-learning into a pleasant task for students and teachers. SEMEARTE was inspired by the project Public Policies for Education Technologies, developed from 2011 to 2013 at the Espaço Laboratory of the Institute of Research and Urban and Regional Planning of ``Universidade Federal do Rio de Janeiro`` (LabEspaço/IPPUR/UFRJ), coordinated by professor Tamara Tania Cohen Egler.

With the formalization of the partnership between CBNB and LabEspaço/IPPUR/UFRJ, in 2018, SEMEARTE improved, intensifying the use of new technologies at CBNB, within precepts aligned with issues of sustainability and the contextualization of the student as an attentive and zealous citizen with the space you live in. This fusion, present in

SEMEARTE, increasingly pressing in the contemporary world, yields more valuable fruits in education committed to school and social inclusion (MENDONÇA and DIAS, 2019; PHILIPPI, 2013). SEMEARTE's commitment to education presupposes freedom of expression, valuing the identities of school actors within their diversities and contradictions, and positioning the student as the protagonist of the entire school process. Its teachers, stimulating the dialogue between school knowledge, mobilize colleagues and students from the different segments and classes of the CBNB, preparing them to participate in major events, Science and Culture Fairs, as well as in others that take place throughout the year (commemorative dates, visits, internal and external musical-theater presentations, workshops, lectures, etc.).

The fairs take place in the last quarter of each school year, when the works prepared by the various classes, grades and disciplines of the CBNB are presented, within an interdisciplinary dynamic. The journey towards this form of interdisciplinarity, defended by thinkers, directly or indirectly linked to education, is essential to the enrichment of school knowledge (EGLER, 2014; FAZENDA, 1991 and 1999; GOMES, 2011; MORIN, 2000; PIAGET, 1973; REIS, 2005). SEMEARTE is a precious way to revert the negative stigmas that pass-through schools, primarily attributed to the so-called exact disciplines, encouraging a rethinking of a fruitful dialogic relationship between the different areas of knowledge. The Science-Art-New Technologies synchronies were lucidity resources explored, in all SEMEARTE presentations, as tools to stimulate imagination, fantasy, attractions to school studies and to the awakening of enchantment by nature and its natural phenomena, a central idea that transits interdisciplinary, by all

curricular components. SEMEARTE defends the idea that this awakening will inevitably be reflected in ecological awareness and in the necessary care for nature, for life as a whole, humanity's greatest good (BOFF, 2010).

SEMEARTE's activities, in tune with the students' demands, took place and deepened, via new technologies, throughout the school years, including the pandemic years, through the use of video lessons, interactive games in software, exhibition and handling drones, a QR Code that makes up the model of the solar system in the CBNB yard, among other resources, which allow integration and network structuring. Such pedagogical procedures were encouraged by suggestions from students combined with ideas advocated by scholars (DOMINGUES, 2004 and 2009; EGLER, 2014; NUNES, 2010; SHENBERG, 2011) that make us believe that the Sciences associated with Art in tune with the various resources technology, in all its languages, has the potential to contribute positively to school performance, understood here as an increase in learning, attendance/punctuality; behavior (discipline); interest/participation; the perception of the importance of school studies and the satisfaction in apprehending them (GOMES, 2011; MATOS, 2003). As we evaluate and review our pedagogical practices developed through SEMEARTE, we will present below some analyzes of the results of these practices, based on students' perceptions.

## **METHODOLOGY**

This work was developed with CBNB Elementary School students, in the academic years of 2015 and 2016, with the help of Science and Mathematics interns. Over that time, the purpose of the work was to compare the levels of socialization between students who participated and those who did not participate in the SEMEARTE Project. We

define objective and subjective assessments as indexes of socialization, complementing each other. Comparisons of these indices through objective data were possible, on the one hand, through quarterly test scores on themes related to the environment, within the scope of natural and human sciences, with values from zero to ten as a quantification parameter. On the other hand, through the attendance/punctuality of students in each class, having as a quantification parameter percentage from zero to one hundred percent. Comparisons of indices from a subjective point of view were possible through answers to an optional questionnaire and without identifying the student (Figure 1), provided at the end of each of the quarterly tests, so that he, anonymously, had the opportunity to express perceptions, through numerical values and/or written representations, about how much the student feels valued at school, about the importance of interest and participation in school activities, about the importance of the theme of the environment inserted in school subjects and about the satisfaction that the student is having in living with colleagues at school and finally, through free comments, students had the opportunity to express criticisms and suggestions to the school. This is a research that is characterized as mixed since it reveals objective information (scores obtained in the tests and percentages of attendance/punctuality) and at the same time reveals subjective information (perceptions of students) and these work with meanings, beliefs, values and attitudes (LUDKE & ANDRÉ, 1996) which enriches and diversifies the deeper analysis of the student's relationships with the class and, consequently, with the school. The search for this diversity was motivated by the best way to establish a relationship between the use of art and changes in the scenario in the results of teaching work.

Reply and comment if necessary.

1) Question 1: Rate from zero to 100 how much you feel valued at school. Response: .....%

2) Question 2: Rate from zero to 100 the level of importance of interest/participation in school activities. Response: .....%;

3) Question 3: Evaluate from zero to 100 the level of importance of the theme environment inserted in the school subjects. Response: .....%;

4) Question 4: Evaluate from zero to 100 your level of satisfaction in living with colleagues at school. Response: .....%

Figure 1 - Optional questionnaire without student identification provided at the end of each quarterly test

## RESULTS

We now present results from the comparison between students who participated and students who did not participate in SEMEARTE, in the academic years of 2015 and 2016. To do so, we focus on objective aspects such as: the average test scores, administered by interns, on themes related to the environment, within the scope of the natural and human sciences (Table 1) and the percentage averages of student attendance/punctuality, collected by interns (Table 2). Both Tables, in general, show, with regard to students who did not participate in SEMEARTE, in the two school years, small oscillations, sometimes with an increase, sometimes with a decrease in the averages, but always maintaining regularity. On the other hand, with regard to students who participated in SEMEARTE, in the two academic years, we can see a constant growth in averages, from the first to the third Quarter.

As for the subjective aspects, we now present results, referring to the 2015 and 2016 school years, which involve: student perceptions about how much they feel valued at school (Table 3); students' perceptions about the level of importance of interest/participation in school activities (Table

4); students' perceptions about the level of importance of the environment theme included in school subjects (Table 5) and student's level of satisfaction with living with schoolmates (Table 6). The Tables, in general, show, with regard to students who did not participate in SEMEARTE, in the two academic years, small oscillations, sometimes with an increase, sometimes with a decrease in the averages, but always maintaining regularity. On the other hand, with regard to students who participated in SEMEARTE, we see, in Table 3, a significant and constant growth, from the first to the third Quarter and greater in the year 2017; in Tables 4, 5 and 6 the growth remained constant and more accentuated in the third Quarter.

Regarding the opportunity given to the student to make comments, criticisms and suggestions through the questionnaire, as is of interest to the present study, we considered only the representations of the students who participated in SEMEARTE. Thus, we recorded that approximately 82% of the students in 2015 and approximately 94% of the students in 2016 made positive comments, most of the time praising the SEMEARTE Project.

Below, we present some of the most expressive statements that can contribute to a better understanding of what was numerically summarized in Tables 1 to 6.

"It's fun and I love classes with interactive games, with ambient music and I really enjoy rehearsals and the Science and Culture Fairs, everything makes us like school and colleagues more, I got attached to SEMEARTE and it has to continue every day. years!";

"I agree that the use of technologies and art helps a lot in the study of subjects and the class is generally interested, but this is not for the whole school. They must always do it for all students.";

"Theater and video combine well and make us concentrate our attention. The people in the

Students who participated/did not participate in SEMEARTE	2015			2016		
	1° Quarter	2° Quarter	3° Quarter	1° Quarter	2° Quarter	3° Quarter
Students who participated	5,5	7,5	8,3	7,0	7,8	9,0
Students who did not participate	7,3	6,5	7,0	7,5	6,5	8,0

Table 1 - Average test scores on topics related to the environment, within the scope of natural and human sciences

Students who participated/did not participate in SEMEARTE	2015			2016		
	1° Quarter	2° Quarter	3° Quarter	1° Quarter	2° Quarter	3° Quarter
Students who participated	75 %	93 %	95 %	78 %	90 %	95 %
Students who did not participate	88 %	93 %	90 %	95 %	90 %	88 %

Table 2 - Percentage averages of student attendance/punctuality

Students who participated/did not participate in SEMEARTE	2016			2017		
	1° Quarter	2° Quarter	3° Quarter	1° Quarter	2° Quarter	3° Quarter
Students who participated	70%	75%	85%	63%	78%	90%
Students who did not participate	78%	83%	65%	80%	73%	75%

Table 3 - Student perceptions of how much they feel valued at school

Students who participated/did not participate in SEMEARTE	2016			2017		
	1° Quarter	2° Quarter	3° Quarter	1° Quarter	2° Quarter	3° Quarter
Students who participated	70%	78%	88%	80%	85%	93%
Students who did not participate	75%	90%	73%	80%	80%	75%

Table 4 - Perception of the level of importance of interest/participation in school activities

Students who participated/did not participate in SEMEARTE	2016			2017		
	1° Quarter	2° Quarter	3° Quarter	1° Quarter	2° Quarter	3° Quarter
Students who participated	70%	73%	90%	75%	80%	88%
Students who did not participate	83%	80%	85%	80%	90%	78%

Table 5 - Perceptions of students about the level of importance of the theme environment included in school subjects

Students who participated/did not participate in SEMEARTE	2016			2017		
	1° Quarter	2° Quarter	3° Quarter	1° Quarter	2° Quarter	3° Quarter
Students who participated	65%	68%	88%	70%	80%	95%
Students who did not participate	80%	83%	78%	83%	75%	78%

Table 6 - Level of student satisfaction in living with colleagues at school



auditorium loved it. I lost the fear. I felt firm.”;

“I was embarrassed at first. But later, when the crowd laughed, I laughed even harder. It ends up that we are not ashamed and we feel that our colleagues like us more and the company likes them more.”;

“The theater disinhibits us and the crowd applauds and comes to praise us coolly. The stories make students learn things about nature that are not achieved in regular classes.”;

“When we use interactive games, time passes quickly and we are able to discover important things. Better than class and textbook and boring exams. And everything becomes easier and we understand more without getting tired and stressed.”;

“SEMEARTE gives students the chance to speak and to be creative and valued. We feel that we are more important than we think.”;

“We learned a lot in the fun, in the friendship with other people from the school. School tasks are more enjoyable and easier because we get together to do group rehearsals. We study and do homework together and that’s why it’s easier for us. It’s a very cool enjoyment.”;

“We can participate in the Fair to play and sing and make friends with people we didn’t even like. We learn while having fun.”;

“Interactive games, music, theater and students showing models at culture fairs. It’s all very good crazy stuff that has to keep going like this and be done by all the teachers in every class.”;

“The biggest show is the theater of students playing characters along with the screen showing video, showing nature and teaching how to preserve the nature of our planet which is our only home!”;

“I improved my grades and I don’t miss as much as I used to. That alone is worth everything as my mother said. I always participate in rehearsals and fairs at school.”;

“I had never liked school and my classmates so much before participating in the Project. It

is unforgettable to be a theater artist.”;

“We discovered our talents for drawing, singing, dancing and everything in between. We want fewer boring classes and more projects every year.”

## DISCUSSION

The results obtained from this work bring us indications that point to the great potential that we have in schools, to the human material sensitive to novelties and willing to leverage works that make use of artistic languages associated with the resources of new technologies, as valuable instruments to improve the quality of school education. We refer here, firstly, to the interns who supported the operational part of administering the tests, administering the questionnaires and collecting data on students’ attendance and punctuality. It is worth emphasizing the fact that our students understood the developed proposal and brought us elements that helped us to argue in defense of the systematic and institutionalized use of the science-art-new technologies triad in school activities.

As shown by the results gathered in six tables and complemented by students’ speeches, in general, the SEMEARTE project participants, unlike those who did not participate in this project, showed constant signs of improvement in the process of socialization and humanization over the course of the quarters, in the academic years of 2015 and 2016.

Regarding Tables 1 and 2, what was of interest and what made the difference between the students who participated and those who did not participate in the SEMEARTE Project was not the total average of the grades nor the average of the attendance/punctuality percentages, respectively. What really mattered was the advantage of the students who participated in the SEMEARTE Project over the others in relation to the growth

curve and the constant evolution of the grade averages as well as the average attendance/punctuality percentages.

Regarding Tables 3, 4, 5 and 6, as in the previous Tables, what is relevant for our study is not the numerical values in a watertight way, but the evolution of these numbers over the quarters in the two academic years considered. What really matters is the advantage of the students participating in the SEMEARTE Project over the others in terms of the growth curve and the constant evolution of these averages. This scenario that portrays students' perceptions reinforces the relationship between the improvement of grades and behavior (attendance/punctuality) depicted in tables 1 and 2, which confirms the relationship between the two groups analyzed and their differences due to the differentiated work developed by the SEMEARTE Project. Therefore, the comparisons made between students who participated and students who did not participate in the SEMEARTE Project reveal indications of success, of students' school rescue and that the art-technology binomial may have favored the stimulus to school inclusion through intrinsic motivation, as we are told. scholars who, in summary, defend the strength of the emotion of playfulness and enchantment as the most powerful lever in the learning process (ALVES, 1995; BOFF, 2010). The strength of emotion that emanates from this binomial expands spaces for cognitive and, mainly, conative development. Art is an element of creation and, as such, capable of helping to build self-knowledge, which implies reinforcing self-esteem and autonomy, assumptions of an emancipatory education (ADORNO, 1995; FREIRE, 1999; PIAGET, 1973). Therefore, the work developed in the SEMEARTE Project achieved its goal by encouraging its students to self-sociability and self-inclusion in school and society.

## CONCLUSION

The rapprochement between Science, Art and New Technologies, taking themes linked in the broadest sense to the environment and sustainability as a point of convergence for all school subjects, is a plausible manifestation of the process of reconnecting human knowledge, a fundamental challenge for the present and, even more, for the future that makes possible, as in no other situation, the dialogue between reason and emotion. Thus, among the different types of knowledge that circulate within the different areas of human knowledge, art and technology as didactic instruments are fundamental starting points for the construction of a truly interdisciplinary education (MATOS, 2003; MORIN, 2002).

The work dialogues with the thoughts of those who still believe that it is possible to find alternative ways to increase the quality of school education by stimulating self-esteem, respect for identities and the development of creativity and the ability to produce knowledge of our students. This scenario exposed and experienced in the SEMEARTE Project needs to be widely discussed within schools and by different bodies responsible for educational planning.

We think that the school assumes, in these terms, its socializing, humanizing and inclusive role as it positions itself towards greater freedom of expression and the establishment of more dynamic and fruitful playful and dialogic practices, a utopia capable of promoting the enrichment of teaching school.

This way, we hope that the present work can stimulate reflections on the enrichment of the educational process through the integration of Science-Art-New Technologies, making it more accessible and attractive and, above all, an instrument of enchantment of students by the school and its knowledge.



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