CULTURAL AND SCIENTIFIC INCLUSION THROUGH DANCE AND SCIENCE: LESSONS FROM A PROJECT IN BRAZIL

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The purpose of this article is to discuss the association between science and art, based on the hypothesis that the access to art, and to the perception of the many ways it can be made, interpreted and acknowledged, enables the coexistence of individuals from different social and cultural backgrounds. In this project we describe the creation and production of a dance and music performance, inspired by a scientific theme that aimed to merge science and art through a metaphorical language. The purpose, also, was to create a situation in which a group of students and teachers from the city of Rio de Janeiro, Brazil, could go through the experience of going to the theater, where it was possible to expose them to the codes of art, to the language of dance, music, and plastic arts, and to the numerous possibilities of connections between art and science. Furthermore, this article presents the audience’s aesthetic perception to the experience, in the process of knowing and understanding the work as a scientific, social and cultural production. We find in this report that formal education in Brazil has not been able to promote the cultural insertion of the individuals, denying them the ownership of the social codes, and as result, the possibility of social inclusion and mobility.

Keywords: Education, Art, Science, Dance, Music.

Introduction

The potential that dance, music and arts in general have to be integrated to science and education is not news. However, it is indispensable to discover more elaborate, diverse and meaningful courses to certify the effectiveness of this integration, as much in the school environment as in society in general. Our proposition is to deviate from the conventional practices for researches in the field of science and art education, commonly limited to the learning of techniques and processes removed from the usual manner the knowledge is produced in these areas. On the contrary, we intend to discuss the fusion of science and art through metaphorical language, based on the hypothesis that the access to art, and to the perception of the many ways it can be made, interpreted and acknowledged, enables the coexistence of individuals from different social and cultural backgrounds, allowing the development of social mobility.

Our report describes the creation and production of a dance and music performance, inspired by a scientific theme. Audiovisual societies such as ours see the proficiency in the artistic language as an essential tool for the ability to move through different social environments. The base for our work is the National Curriculum Parameters (Parâmetros Curriculares Nacionais, PCN, 1998), who seek the understanding of not only scientific notions, but also aesthetic knowledge and communication skills, even in diverse areas. Thus, we believe that artistic and cultural actions linked to the process of teaching/learning are extremely relevant. The school, as a social institution, can go beyond its one-
dimensional, objective and generalizing aspects, becoming a place for interaction, partnerships and building of subjectivities and individual practices, with the use of diverse dimensions and languages.

All the stages of this educational experience were developed by researchers from Laboratório Em Formação – Laboratório de Práxis Pedagógica e Representações Sociais ("In Formation Laboratory – Laboratory for Pedagogic Praxis and Social Representations") – in the Medical Biochemistry Institute Leopoldo de Meis (IBqM) at UFRJ, with the participation of professional artists and technicians from diverse fields. The performance was presented in a theater in the city of Rio de Janeiro, to teachers and students from the public school system, and for the general public.

The Past

Throughout its history, IBqM has achieved both national and international notoriety for its works in the top fields of Biochemistry, such as: Biological Membranes and Transport; Bioenergetics; Muscle Contraction; Toxins; Protein Chemistry; Thermodynamics; and others. Among the various projects related to biochemistry in the Institute, there is the Biosciences Education, Management and Dissemination Program. It is a development of one the study areas in the Biological Chemistry Postgraduate Course and it has earned national recognition in the fields of evaluation and developments of scientific and educational procedures, and dissemination of science. The program develops studies in the fields of cognition and conceptual change, new educational technologies, distance learning, non-formal education, school evaluation systems, educational policies, gender issues, scientific evaluation and management, scientific publishing, and interaction between science and art (http://www.bioqmed.ufrj.br/pesquisa/linhas-pesquisa).

The research team at In Formation Laboratory has done impressive work in the field of education, teacher training and pedagogical praxis. Among the projects developed at the Laboratory over the last twelve years, there are two that may be considered forerunners of this endeavour: the Minimum Curriculum and Polo Cine. The first one is the development of the minimum curriculum1 of sciences and biology for the public school system of the state of Rio de Janeiro, including middle and high schools, adult education and teacher training. The latter is a project that presented film screenings in five small cities in the state of Rio de Janeiro for a total of 140 teachers from public schools. Polo Cine intended, at first, to promote the circulation of the general public in the regional poles of the CECIERJ Foundation/CEDERJ Consortium2, establishing new and consistent connections with the academic community, effectively integrating university to school, and science to art and education. A more specific goal was to bring Basic Education teachers together in a network devoted to think about new educational perspectives based in debates regarding teaching professional identity, its determinisms and possible alternatives.

The Present

Based on these works, the experience herein narrated proposes the popularization of science integrated to teaching and research, according to Programa Nacional POP Ciência 2022 ("National Science Program - POP 2022"), by the Brazilian Association for Science Centers and Museums (ABCMS, 2014). POP 2022 proposes this popularization with non-exclusive criteria, which identify and support the existent actions in the country, developed by public and private institutions, corporations, professionals, among others, promoting new experiences and integration with the civil society on every level.

1Available at http://www.conexaoprofessor.rj.gov.br/curriculo_aberto.asp
2Fundação CECIERJ/Consórcio CEDERJ – Centro de Ciências e Educação Superior a Distância do Estado do Rio de Janeiro, agency linked to the State Office for Science and Technology – (SECT), develops projects in the fields of Distance Learning (Consórcio Cederj); Scientific Publishing, college preparation for social disadvantaged students, continued education (teacher training) and Education for Youth and Adults (http://cederj.edu.br/fundacao/)
Scientific knowledge is an intricate collection of information, actions and behavior, present in the life cycle of all of us. However, we believe that the acquisition of this knowledge should be the main focus of the educational process, for its complexity and conceptual reach. The guarantee of the continued motion through generations of the knowledge produced by man is imperative to the preservation of our social species. Since each individual takes possession of the knowledge to gain social aptitude, those who know and act are the ones who become successful social beings.

Previous studies from the researchers at In Formation Laboratory (Laboratory for Pedagogic Praxis and Social Representations) at UFRJ show that individual actions, outside of the established norms and standards, need to defy the identity that justifies the educational procedures, producing feelings of distrust, isolation, doubt, stagnation and embarrassment, among other emotions that obstruct innovation (Velloso, 2009). In addition, according to Vasconcelos and Amorim (2008):

“One of the most difficult things in life is to institute change. It is obvious to us what kind of change is necessary to others, but our own change faces a lot of opposition. It takes firmness and perseverance to let go of habits and attitudes that damage the professional trajectory and to learn new ones that will certainly bring new perspectives.” (Page 9)

The process of preparation and presentation of the dance performance “Life in Six-Eight” essentially aimed to introduce to students and teachers different ways to know and understand science and art. Under this perspective, the activities proposed in the project were prepared to stimulate learning of the scientific knowledge as a result of well thought out actions, open to subjectivities, and diverse and interdisciplinary practices. As a primary instrument of action, we have used the exposure of the students and teachers of the public schools in Rio de Janeiro to the language of dance, music and plastic arts, and to the numerous possibilities of making good use of art as an aesthetic decoder of the scientific knowledge.

Science and art are distinct representations, but both symbolize the reality of the internal and external worlds. Under this perspective, art and science are systems that build symbols, involving psychological and intellectual processes, unveiling culture and how we can access it, learn it and build knowledge. “These are the bases that support the interrelationship between science and art before the educational needs of today” (PUCCETTI, 2005).

At this occasion, they act in very different manners, as models that show us how to act and recognize. We frame the diverse areas of our experiences in a systematic way, building the imagination as ‘paintings’ that relate fields, phenomenons and procedures that are different and opposite, shaping a coherent system. (FICHTNER, 2010).

All social classes have the right to access the codes of the erudite culture, for these are the ruling codes – the codes of power. It is necessary to know them and to absorb their skills. However, such codes will remain an external knowledge, unless one dominates the cultural references from the diverse social classes, incorporating the awareness of the ‘other’. The interrelationship between different cultural codes is knowingly an essential element for the social mobility and, therefore, an absolutely required element in today’s education.

**Step by Step**

**Our Basis**

The educational intervention that we have accomplished through the presentation of the dance and music performance with a science related theme was based on three basic concepts.

We support the notion that the access to the codes of science and art, with the perception of the many ways it can be made, interpreted and acknowledged, enables the coexistence of individuals from different social and cultural backgrounds, allowing the development of social mobility. Thus, we have given to a group of students and teachers from the public school system in the Rio de Janeiro area the access to the codes of science and art, bringing them together to individuals who have access/proficiency to these codes.
As a second concept, we understand that exposing students and teachers to the languages of dance and music and the many ways of producing pedagogic and didactic connections between art and science is necessary and feasible in educational environments. Through the presentation of the dance performance as an example of the use of the metaphorical language of art, we have put into practice an alternative procedure for understanding the scientific knowledge that may be adapted to the various school realities. In this context, we have included the analysis of the areas where art, education and science converge, through current topics discussed in the school environment. We have sought to understand the limits and possibilities of the access to the various forms of art as a pedagogic resource, in order to build possible solutions for the challenges of decoding and teaching scientific knowledge.

In conclusion, we have considered as of the utmost importance the promotion of more diverse and lasting connections between the school and the academic communities, through the integration of Art, Education and Science, as a mean of popularization of science.

How and What We have Presented

This study was sponsored by the Program for Dissemination and Popularization of Science and Technology in the State of Rio de Janeiro (FAPERJ Nº 30/2012) at the Fundação Carlos Chagas Filho de Amparo à Pesquisa do Estado do Rio de Janeiro (Carlos Chagas Filho Research Support Foundation of Rio de Janeiro State). Before decisions were made regarding the feasibility of the project, the composition of the team involved, the script of the performance or technical issues, it was our primary concern to determine the venue where the event would take place, and which would be the target audience. Based on our experience with the Polo Cine project, we have decided to integrate the participant group to cultural facilities, removing teachers and students from the school environment and promoting a cultural activity away from their usual surroundings, school uniforms and neighborhood. We have sought to form a heterogeneous and multiracial audience, with diverse cultural and social backgrounds. We have then defined that the performance would be presented at a theater in the city of Rio de Janeiro, being necessary to provide solutions for the transportation of the students and teachers to the venue. In addition to the students and teachers, the audience would be formed by guests and the general public, who used to attend cultural events on a regular basis.

In order to better use the theater and to build a diverse audience, we have faced the challenge of producing a performance with professional technical standards. We have contemplated the option of taking the students and teachers to a play or a dance performance that was already being presented in the city’s stages, but we have ultimately decided to produce a new one, considering the importance of the theme and, most of all, the wish of the research team to acquire new knowledge and experience in the development of actions that involve art, education and science.

After that, it was time to consider all the elements required to produce a professional artistic performance: script, cast, set design, costume, light and sound crew, promotion, and so forth. From the first script, it was decided that the cast should have four dancers and six musicians, presenting a dance and live music performance inspired by the life-cycle and by the rhythm known as six-eight. Then the title of the performance: Life in Six-Eight.

More than thirty professionals were involved in all stages of production, including director, musical director, writer, project coordinator, dancers, choreographers, musicians, songwriters, set designer, video director, photographer, graphic designer, costume designer, gaffer, light technician, PR officer, stage technicians and all the researchers at Laboratório Em Formação. Ten new choreographies were created, as well as ten songs (five adaptations and five that were written especially for the performance) and an over 300 square foot canvas that set the scene. This project also produced a video documentary, a photography exhibition at the foyer of the theater, a website and social media pages.

3http://www.aidaem6x8.com/#!cia/cyyu
4http://www.aidaem6x8.com/#!anteato/c1j83
5http://www.aidaem6x8.com/
The performance baseline was a selection of songs in the time known as six-eight (6/8) or in other beats based on this rhythm. The 6/8 time is amply used in traditional music from Africa, Arabia and Latin America, and also in different styles like jazz and classical music. The 6/8 rhythm music is similar to waltz, but the first is based in two beats and the latter is based on three. This time grants a sense of continuity and lightness to music (contrary to a fragmented one), making it easier to follow and to dance, while it maintains its rhythmic strength. The 6/8 rhythm is strongly linked to the traditional dances in Southern Brazil and Argentina. The rhythm of this performance leads us to develop choreographies inspired by South American folklore, but freely mixed with tap dance, percussion, contemporary dance and flamenco. We also attempt to interpret traditional rhythms and choreographies in a new and deeper way, from the choice of musical instruments to the performance of the choreographies. The choice of the main rhythm and the songs that would be played in the performance was made in agreement by the director, the writer and the musical director. The choreographies had their style and main features proposed by the director, and were developed by the dancers/choreographers through eight months of rehearsals.

In addition to the rhythm, the theme that has inspired the script is the same subject used to prepare the proposals for the development of the minimum curriculum for teacher training: The Life Scheme. The Life Scheme includes the main subjects that are supposed to be worked in science classes through basic school years.

Figure 1. Life Scheme.

The performance was about 60 minutes long, divided in four acts. Each act was inspired by a stage of life.

First act: birth (and the need to feed and to breathe)
Second act: growth (circulation and excretion)
Third act: reproduction (sexuality and reproduction)
Fourth act: evolution, to keep the species alive (genetics and evolution).

The performance premiered in July 2013, in a theater in the city of Rio de Janeiro. Three public schools in the great Rio de Janeiro area have provided buses to transport near 200 students and teachers to the event. The audience was formed also by researchers, artists and other guests, occupying virtually every seat in the house. Four dancers presented the choreographies about birth, growth, reproduction and evolution, accompanied by live music.

6https://www.facebook.com/avidaem6x8
7http://www.youtube.com/user/avidaem6x8
The Diverse Emotions Experienced by the Audience

The audience was surveyed immediately after the end of the performance, in order to capture the emotions based on the studies of Maturana (2002),

It is not the encounter that defines what happens, but in fact the emotion that establishes it as an act. [...] Everything that is human is constituted by conversations and every space of human action is based on emotions. [...] Culture’s character is formed in closed conversation networks that build the shape of emotion (p. 92).

Our purpose was to identify the aesthetic perception of the audience, in the process of acknowledging and interpreting the work as a scientific, social and cultural production: What did you think of the performance and why?

– “This is the first time that I’ve been in a theater. It is amazing! I will pass this experience on to my relatives, friends and children. I will tell them that it was a wonderful experience. I plan on doing this again many times.” (43 years old, saleswoman and student).

– “I have liked it a lot. It was my first time at the theater. I will pass on this experience to my children and neighbors.” (55 years old, administrative assistant and student).

– “I have found this vigorous, exciting. You have given us a wonderful evening. Thank you for making this happy moment possible.” (48 years old, eldercare professional and student – she has stated off-the-record that it was her first time in a theater).

– “I think it was really interesting. I hope to return here often.” (29 years old, cook and student – he has stated off-the-record that it was her first time in a theater).

– “It was very different than what I had imagined. I think it is essential to give the opportunity to people from the outskirts to see what you are doing here.” (30 years old, School Coordinator).

– “It was different than what I had imagined, it was amazing” (29 years old, baker’s assistant and student).

– “What has impressed me the most was the rhythm, and also the way life develops gradually. The emotion has built up as I watched the performance.” (60 years old, psychologist and pedagogue).

– “I’m finishing my studies at school and I was having trouble deciding on what to major in college. I was torn between dance and med school. Tonight, after watching this performance, I will leave here with my mind made up to major in dance. This is what I want for me.” (17 years old, student).

The Future

In everyday life, art and science are metaphors mediated by the formation of systems. The metaphorical principle is an essential part of changes and transgressions that build the new (LOUREIRO JR, 2006). “The boundaries for a given field of experimentation may be dislocated, stretched and broken through the formation of new relationships, crushing stereotypical and automated references of reality” – they don’t change reality, but they make change possible (FICHTNER, 2010, p.78).

Contemporary society challenges each individual to develop adapting strategies to survive its intense and accelerated process of social, cultural and technological transformation. There is urgency in the demand for a new kind of professional, who is prepared to combine technological contemporariness and cultural diversity, and who can respect and recognize the scientific knowledge
not only as a tool for the study of the reality, but also the most efficient way for social and cultural intervention. To react to these changes, students and teachers should improve themselves as creative beings, with initiative, able to interpret and to solve problems, and to search, understand, organize and produce information.

Times are changing! Today, the dynamics of economics and the workplace motivate the need for a higher education. Teenagers and young adults need to learn how to be creative and independent, and that is a challenge for the educators that they meet through the educational process. The predominant guidelines in every field merit the young population, with its potentialities and forms of self-expression, paying special attention to the consolidation of responsible, independent and creative actions. However, these guidelines are wasted in the current science education procedures. This happens, in the first place, because the matter of decoding and transference of the scientific knowledge is always controversial and extremely complicated when it comes to finding out how to make it meaningful. Also, in general, the experiences, voices and stories through which the students are provided with tools to give a meaning to their own lives are not taken into consideration in the educational process. Actually, the very presence of the students in the classroom is reduced to a flat participation, bound to a routine that intends to enforce the processes of transmission and imposition of a tight scientific knowledge, removed from reality and imposed by the present ideology.

If we become aware of the school environment as a place/time for experimentation and creation, and if we believe that the pedagogical doing is a political and cultural act, we may defend the idea that this environment is a privileged locus for the expansion of human abilities and potentialities, contributing to the practice of original actions with the purpose of significant living and the exercise of authorship, on the way to effective social integration.

Conclusion

The initiative to produce a dance performance based on a scientific theme, dedicated to basic school students and teachers, has indicated that it is possible to develop projects that promote the effective interaction between art, science and education, and that there are many professional from diverse fields that would be interested in participating in this type of effort. Nevertheless, we assume that the most relevant matter is the emotion expressed by the audience, caused by the fact that it was their first contact with the art of dance and music, outside the educational environment, in a conventional theater, in a session open to the general public.

Even more impressive is the fact that we have heard from many students, from fifteen to sixty years old, that it was their first time in a theater, watching a performance, having access to a place where art is traditionally presented. This doesn’t seem to be a trait exclusive to this group, since near “60% of the Brazilian population has never been to a theater or to a dance performance, and approximately 70% has never been to museums or cultural centers. Even among those with a college education, about 70% has never been or rarely goes to theaters and dance performances” (BRAZIL, 2011, p.133).

In spite of the fact that art education is, by law, required to be a part of the school structure, the formal education in Brazil has not been able to integrate it to the other fields of knowledge (PCN, 1998), or to promote cultural introduction of the individuals, denying Brazilian citizens for decades of the ownership of the social codes and, therefore, the possibility of social inclusion and mobility.

References


