Constructionism as an Epistemological Option in Courses of Youth Center for Science and Culture – Bahia – Brazil

Elmara Pereira de Souza*, elmarasouza@gmail.com*
Youth Center for Science and Culture – Vitória da Conquista – Bahia, Brazil

Luísa Souza Moura*, luisasouzamoura@gmail.com*
University of São Paulo (USP) – São Paulo, Brazil

Abstract

The goal of this paper is to report on the practice of the Youth Center for Science and Culture, Vitória da Conquista, Bahia, Brazil, a public school for secondary school students. The Youth Center uses a constructionist perspective as an epistemological basis in their courses. The students are the main characters in the learning process and they use the coding languages Logo and Scratch in their projects' development.
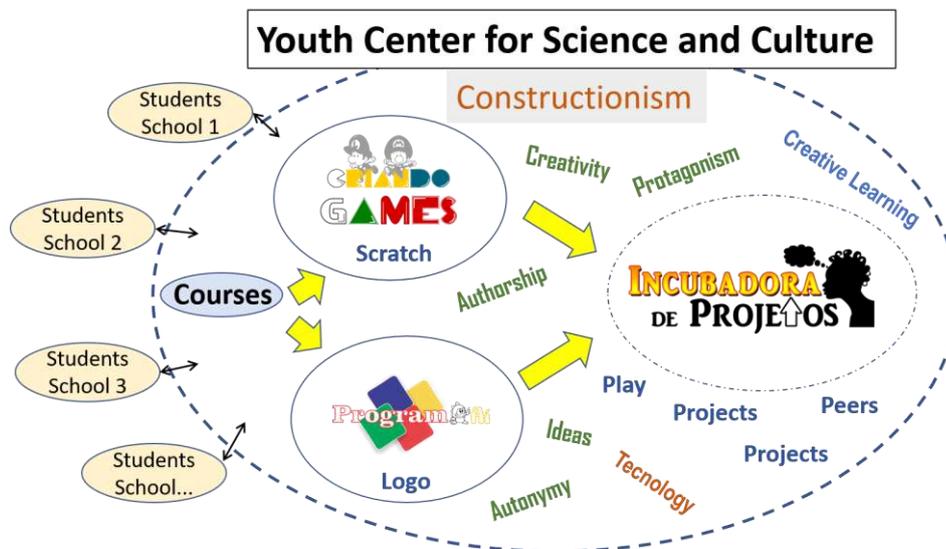
Figure 1. Pedagogical structure of the courses of Youth Center for Science and Culture – Vitória da Conquista – Bahia - Brazil

This experience shows that it is possible to create spaces of authorship so that the public school's students don't turn out to be just users of the technologies, but authors of socially relevant content, that can change their lives and that can provide future perspectives.

Keywords

constructionism; authorship; protagonism of young people

Introduction

We undergo, in Brazil, an educational crisis that has worsened with public political impositions and methodological proposals that are unlinked to the students' realities; pedagogies that reinforce the status quo and that, most of the time, are insufficient with regard to the diversity, to the multiplicity, to the singularity and don't favor the autonomy, the authorship of our students. In the Brazilian educational system, the problems are innumerable.

These problems can be seen by analyzing the indexes of the students' evaluations, the indexes related to the teachers' training; also our own teaching practice in the basic education and, specially, in the secondary school.

The Program for International Student Assessment (PISA, 2015), for example, was applied in 70 countries, and Brazil got the 63rd position in sciences, 59th in reading and 66th in math. Analyzing the Basic Education Development Index (BEDI, 2015), it is verified that, in a scale from 0 to 10, Brazil got a 3.7 average.

When we analyze the data related to the teachers' training, we verify that, from the state public secondary school teachers, 56.2% don't have postgraduate studies and 74.9% don't participate in continuous training (Universidade Federal do Rio Grande do Sul, 2018).

We understand that there are a lot of variables to analyze Brazilian education, only the indexes are not enough to present the real situation of our education, but they can be used to cause a search for innovational educational proposals, that are close to the interest and to the reality of the students and that can deal with the youths' desire for knowledge. The effective usage of information and communication technologies (ICT), of the cyberspace's resources in the pedagogical process and of the insertion of creative learning in the classrooms can be made possible, since the young have a close relation with technology.

The usage of the ICT, of the mobility, of the ubiquitous resources in education can favor the agency of the student's desire to build new knowledge. With pedagogical practices based on constructionism (Papert, 1994 and 1986), on dialogism (Bakhtin, 2000), on affection-joy (Deleuze, 2008; Spinoza, 2009) subjective singularities can be produced in education favoring the training of our young people.

We present, in this paper, the experience of the Youth Center for Science and Culture, a public school of the State of Bahia - Brazil, specially, the experience of the "ProgramAÍ" and "Criando Games" courses, developed for secondary school students, in addition to the Project Incubator, having constructionism as an epistemological option.

Youth Centers for Science and Culture

The Youth Centers for Science and Culture are public schools created by the Education Department of the State of Bahia and instituted through the decree nº 12.829, of May 4th, 2011. They have the goal of offering complementary education and diversifying the public school curriculum, as well as promoting the students' access to contemporary thematics, through studies and interdisciplinary activities. The main pillars of the pedagogic activities developed in the Youth Centers are: (1) the student is the author of his own journey; (2) the school's connection; (3) the knowledge is transmedia; (4) learning is fun.

The Youth Centers are interschool spaces and bring as a feature the logic "one-lots", which means, they are after-school programs offering courses, workshops and activities to students of any state public school of the region covered by the Center. This feature multiplies the attendance and, at the same time, promotes the interaction of students from different schools, ages and degrees, as in every workshop, there may be students from elementary school to secondary school and from multiple schools.

The Centers are a pedagogical innovation laboratory, they are active learning spaces, and they enhance the usage of digital technologies in the creative learning perspective (Resnick, 2017). The proposal is to provoke the students' curiosity and encourage them to create a new relation with the act of learning, motivated by the pleasure of discovery. No Youth Centers activity is required. The students choose if, when and how they'll participate, making possible the effective protagonism of their training.

There are five Youth Centers for Science and Culture in Bahia in the following cities: Salvador, Senhor do Bonfim, Itabuna, Barreiras and Vitória da Conquista.

In this paper we present the experience of the Youth Center from Vitória da Conquista, specially the experience of the "ProgramAÍ" and "Criando Games" courses and the Project Incubator.

The courses "ProgramAÍ", "Criando Games" and the Project incubator

The "ProgramAÍ" is a course of introduction to programming logic and it was created to address the need of implementing courses that are close to the students' interest. It has the objective of providing to the secondary school students the initial contact with robotics systems control and coding, and also stimulate the development of logical thinking, creativity and teamwork for problem solving.

The course "Criando Games" aims to provide the students with the knowledge of Scratch programming language to the development of games and animations. The activities are created in a practical way so that the students can be authors of their projects and the gaming and animation development can be a fun and attractive way of learning. The students are part of the Scratch community, sharing their products and interacting with other youth.

The first experiences happened in 2016 with two classes of 20 students from 1st to 3rd years of secondary school. The workload of the courses was 30 hours each, with two weekly face-to-face meetings and distance activities in virtual learning environments (cjccvc.org[60]).

After one year of performance in the courses "ProgramAÍ" and "Criando Games", we identified the potential of many students in the digital technologies fields and we noticed that they had innovative ideas, but they couldn't keep and/or finish their projects because the courses time was limited. After that observation, we created the Project Incubator, a space of authorship so the students can deepen their projects or develop research projects and innovative products after their own ideas. There is one weekly meeting and what determines the time that each student will be in the Incubator is the project he/she is developing. Any Youth Center student can integrate the Incubator at any time of the year; he/she only needs to develop a project in the digital technologies field, join a project that is being developed or just be welcomed in the group and learn with the others. The objective is to be an open and productive space in which the students can exercise creativity and produce knowledges through research projects and products development.

In all these courses and in the Project Incubator we follow the constructionism as epistemological basis.

Constructionist as epistemological option

The Youth Center is a public school opened to pedagogical innovation, so we chose constructionism as an epistemological basis in the courses "ProgramAÍ" and "Criando Games", and also in the Project incubator.

In his investigations, Papert (1994) looked for different ways to learn, in which kids could be producers of knowledge, leaving their spot as just users to become active in the knowledge construction process. As an author, the students should take control of their own development along with the school as a learning place. So, inspired in Jean Piaget's psychogenic theory, he created a set of ideas called constructionism.

According to Papert (1986 and 1994), with the use of computers, the student visualizes and verifies his/her mental constructions related to the concrete as well as the abstract, following an interactive process that favors knowledge production.

The creation of active learning environments is one of the constructionism principles and, in Center's experiences, is one of the most important actions for the students to be able to develop creativity and produce knowledge. The active environments allow the students to test their ideas, theories or hypotheses and try the creation and implementation of projects. Papert (1993) realized that with the computers, there was the possibility of creating conditions for significant changes in the developing process of the children and, along with a group of researchers from MIT, developed the Logo programming language. Logo is a language that is considered simple, allowing the development of projects, and at the same time as it has the power of a professional programming language.

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[60] This is the address of virtual learning environment of Youth Center.

Recently, the Lifelong Kindergarten Group of the MIT Media Lab, led by Mitchel Resnick, inspired in Logo, created Scratch, a free programming language and an online community in which you can create your own interactive stories, games and animations. Scratch has an easier and more friendly graphical interface that is free and it's available on and offline. By using Logo and Scratch, the children and teenagers have the opportunity to be in control of the knowledge production and the development of their own ideas through the exercise of creative learning.

Creative learning experience is based on four P´s: Projects, Peers, Passion, and Play. Resnick (2017) describes each P:

- Projects. People learn best when they are actively working on meaningful projects – generating new ideas, designing prototypes, refining iteratively.

- Peers. Learning flourishes as a social activity, with people sharing ideas, collaborating on projects, and building on one another's work.

- Passion. When people work on projects they care about, they work longer and harder, persist in the face of challenges, and learn more in the process.

- Play. Learning involves playful experimentation – trying new things, tinkering with materials, testing boundaries, taking risks, iterating again and again. (Resnick, 2017).

In Youth Center, Logo is used in the course "ProgramAÍ" and Scratch in the course "Criando Games". Both languages promote the development of creative thinking.

Some projects developed in Project Incubator

In the Youth Center´s Project Incubator, many projects were produced using Scratch, among them we can highlight the game "Choices", the interactive animation "Are your behaviors ecologically sustainable?" and the game "Aedes Adventure". All projects have the objective of being educational actions and social relevant proposals.

In Brazil, 8.4% of the teenagers from 12 to 17 years old are obese and 25.5% are above the ideal weight. Identifying these indexes and knowing that the teenagers like using digital games, the project "Choices" proposed the creation of a fun and interesting game, that could be an educational channel to make the youth aware of the importance of a healthy diet, physical activity and the consequence of the choices (individual and collective) to life quality. (figure 2).

Figure 2. The first screen of the game "Choices". Player can measure the body mass index - BMI (2017).

In the project "Are your behaviors ecologically sustainable? the students developed an interactive animation with Scratch that was used as data production methodology (variables were created to keep

the users' answers) to know if the students from a public school had sustainable attitudes related to water, energy, consumption, waste disposal and transportation usage.

This project was also an educational action, as the subjects of the research, by having fun with the animation and answering the proposed questions, gave feedback about each theme related to sustainability and could reflect about their own attitudes (figure 3).
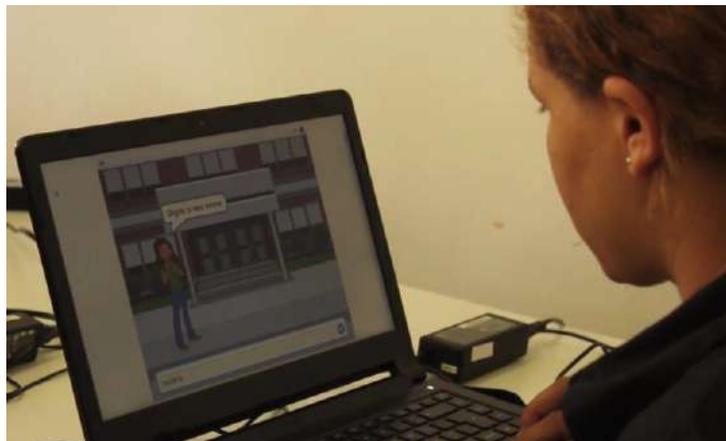

Figure 3. A girl using the animation "Are your behaviors ecologically sustainable?" developed in Scratch (2017)

The game "Aedes Adventure" was created so people could think about the importance of combating the bug Aedes Aegypti's breeder. In this game, we used augmented reality and, with a computer's camera, the players could use their bodies to "kick" the breeders and the bugs.

Besides providing the students' authorship, we had exciting results with this project that have been changing these boys' and girls' lives, as well as their families'. (1) The game "Choices" has won 3rd place in the Edital Tecnologies for Education from FAPESB and the students got a R$ 5,000,00 prize; (2) we wrote an article about this experience in the development of the game "Choices" that was presented in the Meeting of the Brazilian Society for the Progress of Science (boys who had never left their hometown had the opportunity of being in one of the greatest events on the science field from Latin America, of presenting a paper among ungraduate and postgraduation students); (3) we received honored mention in this event, for the merit of the work; (4) we received a motion of Applause at the Vitória de Conquista City Council because of the developed work; (5) the project of the interactive animation "Are your behaviors ecologically sustainable?" was finalist of the Brazilian Science and Engineering Fair 2018; (6) the students presented their Scratch developed projects in the Campus Party 2017 and in the Meeting of Students that took place in Salvador - Bahia.

In the Project Incubator, there are no proofs or traditional learning measurements. The evaluation is effectively developed in the process of knowledge construction. We evaluate every stage of the project, the involvement of each student; we reflect about all the steps taken and we identify which path to follow, which subjects to deepen and to study. The partnerships with teachers and Universities are fundamental to the Incubator's projects development.

In the Incubator, everything is built in partnerships, after the students' ideas, who are protagonists in this project. Each one learns and contributes according to his rhythm and knowledge. In the end, we all learn about contents and about coding, about how to relate with the other, about group work, about overcoming our own limits and going beyond the imagined, about trusting our capacity. The Project Incubator brings secondary school students in contact with University education, providing them with future perspectives.

The projects of the Project Incubator are available in the repository of learning objects cjccvc.org.

Conclusion

Considering that the contemporary subjectivity is anchored in capitalistic devices that try to standardize, form consumer subjects and social, economic and cultural products users, developing educational

proposals that allow the students' authorship, the youth's protagonism is relevant, especially in an unequal country such as Brazil.

Constructionism as epistemological option in the courses and activities in Youth Center for Science and Culture from Vitória da Conquista have shown themselves very productive, since, in the courses "ProgramAÍ" and "Criando Games" as well as in the Project Incubator, the students express their feelings and ideas through the project development; they, are authors, share their productions, work in groups and learn with interaction and technological artifacts.

The experience of projects, games and digital animation production shows that it is possible to create authorship spaces so that public school youth don't turn out to be reproducers and users of what's already made, but producers and authors of socially relevant educational content.

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