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# SCRATCH PROGRAMMING: THE PROMOTION OF SPONTANEOUS SOCIAL PLAYING IN KINDERGARTEN

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## **Abstract**

Scratch<sup>1</sup> is a ludicity artifact that engages children in active participation where they learn to problem-solve, create and recreate projects by the social playing. Children are therefore able to learn how to think creatively, to express themselves clearly, to analyze systematically, to be fluent in the use of Information Technology programming – which is an important contribute towards literacy in the 21st Century – to build iterative development processes, to put in practice metacommunication and to promote cooperation between children and adults. This research presents the “Scratch’ando com o sapo na infância” – Childhood with Scrach in motion project, which is developed with the support of several institutional partnerships, namely: PT - Portugal Telecom/SAPO Company, University of Aveiro and Inforlandia Enterprise Software, the latter, provided and installed the computers needed to develop the study and Kindergarten of Cooperativa de Educação e Ensino A Torre, which provides study’s working place.

Keywords: Scratch, childhood, pedagogy, ludicity, playing.

## **1 INTRODUCTION**

The project adopts the action research process of problem solving and uses a variety of intervention-training strategies placed in the studies’ horizon where is established the connection between the disciplinary fields of ludicity, communication, creativity, and pedagogy. The main aim of this research is to understand how children with five and six years old interact and express themselves using new technologies, specifically when recreate the Scratch tutorials available at <http://kids.sapo.pt/>, being supported by the researcher, educators and parents, in order to create new projects that are result of their play.

The Childhood with Scrach in motion project consists of several sequential stages, through which it is intended to promote the spontaneous social playing (SSP). The methodology for the promotion of SSP consists in improving an iterative way by adults and in developing SSP among children. Thus, the iterative process of SSP promotion through the Scratch consists of eight development stages: i) defining the basis for inter-institutional cooperation; ii) approach to Scratch and familiarization with children; iii) friendship (using “Amigos na Quinta”– Friends on the farm tutorial); iv) circumscribe (using the “Pópio” and “Pópia” heroes); v) autonomy (support the dependency resolution from adults); vi) sharing; vii) spontaneous social playing; and viii) divulgation.

Through the final results it is intend, firstly, to contribute to innovation of Scratch programming aiming it towards children and, secondly, to promote SSP on digital platforms, as well as encourage the active participation of children with suggestions for improving the application and the programming concepts for this age group.

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<sup>1</sup> [http://info.scratch.mit.edu/About\\_Scratch](http://info.scratch.mit.edu/About_Scratch)

## 2 INFORMATICS MEDIATION OF COMMUNICATION-LUDICITY-CREATIVITY PROCESS

### 2.1 Scratch application

Scratch application (Fig. 1), which is based on programming languages like Logo and Squeak, and it allows, especially children and teenagers, create and share interactive stories, games, music and web animations, profiting from the participatory spirit of Web 2.0.

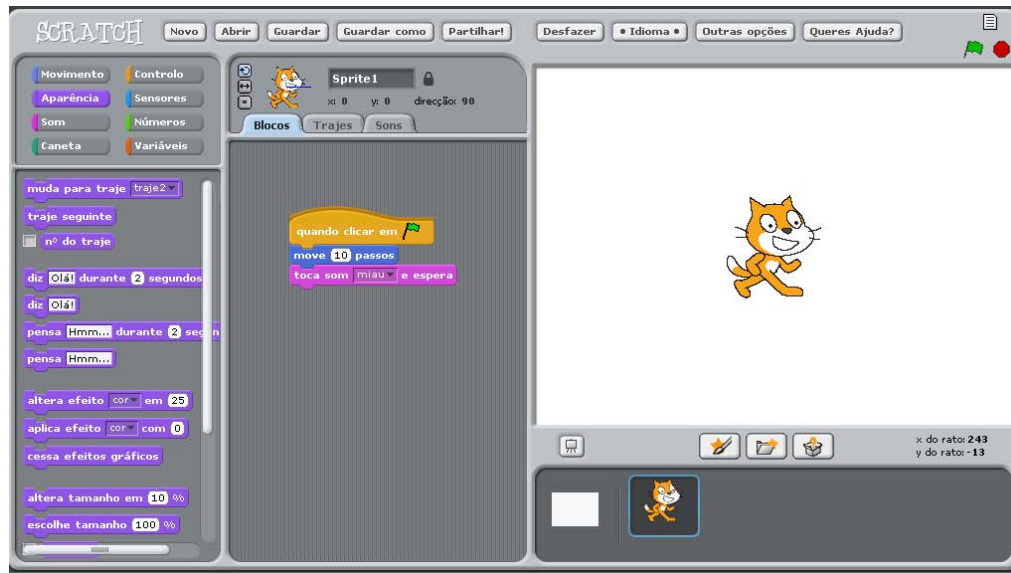


Fig. 1 – Scratch application and programming environment

The innovation of Scratch is related with the support of new programming paradigms and activities that were not previously possible, providing better use and intuition in programming, while taking advantage of computers' processing capabilities to expand the different domains in which children create and learn.

The MIT Media Lab has been working with the Lego Company, supporting the development of Lego Mindstorms (structures and blocks for technology education). The children's creativity is stimulated from Lego blocks, while they fit them, play and develop projects, and also they define objectives and strategies that change organically, forming structures and stories. Similarly, the Scratch grammar is based on the graphic blocks aggregation that children fit together to create programs. Into Scratch there is no place for complex syntax or commands from traditional programming languages. Similar to Lego pieces, the blocks connectors suggest how these should be aggregated.

### 2.2 Participation, autonomy, sharing and co-authorship in Web 2.0 environments

For a long time, Web was, for most users, just a place to collect information (Web 1.0). Using the Web as a channel of sharing knowledge for a significant proportion of users, was something that just started to be a reality with the emergence of services currently identified as part of Web 2.0.

It is now a reality that these new services have encouraged a more active and participatory presence from a growing number of Web users. Services such as blogs, social networks, wikis, social bookmarking, video and photo sharing, podcasts and micro-blogging enhance the sharing of ideas, knowledge, experience and resources to a wide audience. These Web 2.0 services are easy to use and require no continuing maintenance, enabling the creation of new content, new communication forms and new knowledge among the users.

The Web 2.0 concept, created by Tim O'Reilly in a conference between the company O'Reilly™ and MediaLive™ International in October 2004, was outlined by the following statement: "Web 2.0 is the



business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this: Build applications that harness network effects to get better the more people use them.” [1]. For this author the Web 2.0 concept is not rigidly limited, having a gravitational centre that attracts several services and ideas with different forces.

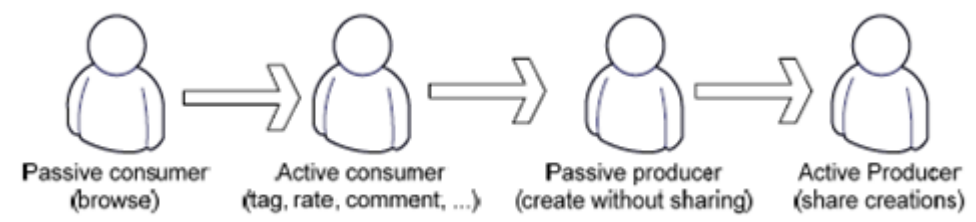
According to Downes, Web 2.0 implies more a social revolution than a technological one, that is, the basic aspects of this new Web are concentrated in the participation of the users through open source applications and services [2].

Considering these two perspectives we understand that Web 2.0 consists of a combination of tools and platforms that stimulate and promote the collaboration, the participation and the sharing of contents. In this way, the Web users start to be dealt as co-creators of contents that enable the creation of a collective intelligence.

In this context of sharing and co-authorship is included the Scratch online community, in which its users create and share projects based on the Scratch programming language. The sharing platform offers several types of interaction among the community. Children can comment on community projects, submit their own projects and being part of other projects development. In addition, the platform repository of user-generated content works as a source of inspiration for new ideas. Children can establish social networks based on groups and projects that derived from a topic of common interest.

Monroy-Hernandez and Resnick [3] advocate the sharing and collaboration among children through the creative appropriation, in other words, children can contribute with projects to community and learn through them. Thus, the Scratch community demonstrates the ability of children to produce interactive content as a key element for the development of digital literacy and for the more involvement in online spaces.

The aim of the Scratch community is to promote creative learning as part of a social experience online. Monroy-Hernández [4] was inspired by the description of Jenkins [5] about the stages of participation in fans communities of drama series, to state his idea that the members of a creative community as the Scratch tend to organize themselves into four stages: passive consumer, active consumer, passive producer and active producer (Fig. 2).



**Fig. 2 – Participation stages in the Scratch community on-line [4]**

According to the author, the level of involvement and the state of participation differ from user to user and from temporal moments. The Scratch community was designed to integrate all types of users regardless of the stage where they are. For active members of the community, whether consumers or producers, the social connections that are established and the feeling of being able to control their own community, are very important characteristics.

Thus, the Scratch online platform seeks to encourage creative learning in a social context, allowing participants to engage themselves in different activities, such as the supply and reception of inspiring ideas through the feedback from and to the community.

### **3 THE LUDICITY CONDITION**

#### **3.1 Spontaneous social playing: a ludicity manifestation**

According to Lopes [6], the concept of ludicity is defined as an essential condition of human that is manifested through the everyday experiences such as play, game, recreation, leisure and build ludicity and creativity artifacts. These manifestations are dependent on an explicit or implicit contract established between who interacts. From this contract the protagonists of the situation establish an order in social interaction that is the ludicity.

Lopes [6] believes that the ludicity phenomenon to be understood, must be studied taking into account the three dimensions of analysis, specifically the dimension of the humankind condition, the dimension of its manifestations, and finally, the dimension of their effects.

The concept of spontaneous social play is defined by Lopes [7] as "the privileged co-production process of the learning of humans' social relationships, and also a ludicity manifestation".

The ludic manifestation of playing integrates the spontaneous social playing that proposes new strategies and contributes to understanding the co-learning social process of the autonomy performed by children through play.

Playing is one of the most evident cultural manifestations of childhood, and when children play, they actually enjoy that. There are clear signs in playing that the common knowledge appropriated throughout the time, these signs are giving account what is playing or not and revealing guidelines about this phenomenon so well known and yet so misunderstood.

Through ludicity, and more specifically by SSP, children have the opportunity to incorporate values, develop them culturally, assimilate new knowledge, and develop autonomy and creativity. Thus, children can find a balance between real and fantasy, being able to create through play.

According to Lopes [7], the SSP is the affirmation process of children autonomy in relation to their daily routine, emphasizing the SSP role in the social and cultural development of children. In this way, the SSP emerges as the communication and experience strategy that consolidates the autonomy and cooperation among children, and among children and adults.

The SSP occurs always spontaneously, suggesting a variety of learning and changes in all the participants involved. Thus, the SSP is revealed as a ludicity manifestation of human that results of co-produced learning.

The SSP conceptual framework evolves over seventeen propositions based on Bateson's ludic metacommunication theory [7]. These propositions are elements that contribute to the distinction between the SSP manifestation and the ludic manifestations of play, recreation and leisure.

The humans, who spontaneously and deliberately engage themselves in SSP, do not expect reward, only intend to stay in the agreement that initially assumed, defining the rules of interaction and interrelation among them.

### **4 METHODOLOGY**

#### **4.1 Intervention methodology – the co-participative octagon**

The co-participative octagon (Fig.3) results from the conceptualization of action research methodology and it is an iterative process developed in a spiral of search, reflection, action and active communication with the research target group, in order to co-produce learning and changes.

This method is based on the application of eight steps for the collection of co-production practices made by children in Scratch through spontaneous social playing [8]. The sequence of these phases is:

1. Understand what children already know - to recognize and comprehend what children know (apprehend);
2. Comprehend their points of view - to identify in their testimonies what values and concepts are contained in them (comprehend);
3. Emphasize the most important that is said by children – indicate the values and concepts transmitted by them (point out and summarize);

4. Interrogate and investigate - inquire, clarify, reformulate, suggest, propose, do again, improve, rehabilitate and understand;
5. Explain – send back the organized data to children, now with the new framework;
6. Plan strategies and implement them in order to build new knowledge - learning by doing;
7. Practice metacommunication – evaluate and produce alternatives;
8. Disseminate and share what they produced.



**Fig. 3 – Representation of co-participative octagon [8]**

## **4.2 Intervention sequence – SSP promotion with Scratch**

The methodology for the promotion of spontaneous social playing consists in improving an iterative way by adults and in developing spontaneous social playing among children. The iterative process of spontaneous social playing promotion through the Scratch consists of eight development stages<sup>2</sup>:

Stage zero – Defining the basis for inter-institutional cooperation

At this stage the partnerships were established, there was the definition of protocols for intervention, training and research, it was determined the calendar, the intervention and evaluation methodologies, and the inter-institutional cooperation modalities in the project.

Stage one – Approach to Scratch and familiarization with participants

1st phase – In the first phase is initiated and established the inter-personal communication with participants. More specifically in relation to intervention with children, this is the moment when stories of "Pópio" and "Pópia" are told. These characters are the young guardians of "Scratch'ando com o sapo", which guide the narrative and help children in the Scratch programming). Finally, in this phase are held training sessions about Scratch for educators.

2nd phase – There is the approach to Scratch programming with the application presentation and its menu bar.

Stage two – Circumscribe (using the "Pópio" and "Pópia" tutorials)

1st phase – In this phase are used the "Pópio" and "Pópia" tutorials to introduce and explain the key concepts related to Scratch.

2nd phase – It is made the importation of "Pópio" and "Pópia" characters and friends. Children also practiced the zooming function of images.

<sup>2</sup> There are experiencing and evaluation with data collection in each stage, except in the 'Stage zero'.

3rd phase – There is the consolidation of learned concepts and it is introduced other concepts and blocks, such as, to play a sound and change a frame to a character.

Stage three – Friendship (using “Amigos na Quinta”– Friends on the farm tutorial)

1st phase – In the first phase is presented and explained the stories animation of the “Pópio” and “Pópia” guardians with friends on the farm.

2nd phase – After the introductory phase of the stories is used more complex concepts related to Scratch programming: the block ‘wait some seconds’ and ‘go to x and y position’.

Stage four – Autonomy (support the dependency resolution from adults)

1st phase – After being presented, explained and experienced the Scratch programming concepts, children recreate “Pópio”, “Pópia” and “Amigos na Quinta” tutorials.

Stage five – Sharing

1st phase – After the autonomous recreation of tutorials, children create new projects with educators in Scratch and share them.

Stage six – Spontaneous social playing

1st phase – At this phase, children dominate the Scratch programming skills, show an independence from the investigator and have the opportunity to play in Scratch without the intervention of adults.

Stage seven – Divulcation

1<sup>a</sup> phase – The Scratch projects made by children are printed and exhibited. It is organized a public session of presentation and explanation (given by children and educators) to parents, families and school community.

## **5 INTERVENTION RESULTS**

### **5.1 The children’s experiencing with poetry**

From conversations between the researcher and the teacher responsible for the group of children with 5 and 6 years old, it was considered relevant to develop with children (in a more advanced stage of familiarization with Scratch) the construction of a short story/animation which represents a poem that each child had to discover and develop in their class project.

Thus, the Scratch application was assumed as a support to the educational process. Children were challenged to use the program as a tool to build projects, whose contents have been motivated by the stories of the “Scratch in motion” guardians and the poetry of Portuguese and Brazilian authors.

The experiencing of children's poetry and the support given by the Scratch programming created the basic conditions for children to be advised by the investigator who started in learning to use the Scratch programming

The children’s experiencing with poetry and the support given by the Scratch programming created the basis conditions for children to be guided by the investigator who started them in the Scratch learning process. At a later stage, children played and created in Scratch without the investigator support, developing the knowledge acquired during the intervention-training-experiencing.

Through programming and animation, children constructed and created new narratives in Scratch, and at the end of all intervention-training-experiencing sessions, the projects were shared among all. Fig. 4 shows a picture of an animation that illustrates the poetry narrative created by a child.



**Fig. 4 – Example of a set of sixteen Scratch projects created by the kindergarten children**

## 6 FINAL NOTES

Today, computing devices dominate the daily routines of children in different contexts, whether at school, home or leisure. New media and the communication and ludicity artifacts are part of children lives and are changing the children ways of think, interact and learn.

The study accomplished at Cooperativa A Torre in Lisbon, with children, parents and educators, aims to understand how children interact and express themselves using new technologies. Thus, through the acquired knowledge during the experiencing with Scratch programming application, it is intend to propose new methodologies in order to teach media literacy, to maintain the creative flow, ludic, critic and alternatives creator, and finally, to practice metacomunication among preschool children.

In this context, the spontaneous social play is enhanced, because that it is the process privileged of co-production of learning social exercise of inter-beings sociability, giving the child the opportunity to assert its autonomy from the daily diary.

Thus, this research contribute to innovation of Scratch programming aiming it towards children and, secondly, promote spontaneous social playing on digital platforms, as well as encourage the active participation of children with suggestions for improving the application and the programming concepts for this age group.

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