

# “You and the Media”: Play and Code to Learn

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## **ABSTRACT**

A School, as a space for developing skills and creating knowledge, should seek to be attentive to the world around it.

The “Student’s Profile at the end of Compulsory Schooling”, published by the Directorate-General for Education (Portuguese Ministry of Education) in 2017, assumes itself as an educational reference document providing an image of what is considered to be the student and citizen of the 21st century; it refers to the need to promote student’s skills in the areas of Information and Communication, Reasoning and Problem Solving, and Critical and Creative Thinking.

Technology-mediated learning enables students not only to use the tools of their time (access to the Internet, computers, mobile devices, etc.) but also in doing so, developing their digital literacy, ie the efficient use of media around them; and do so with increasing critical thinking.

Given that the treatment of citizenship issues implies the treatment of diverse topics that are transversal to society, their insertion in the curriculum requires a transversal approach both in the disciplinary areas involved, as well as in activities and projects. In the project that will be described in this article two needs will be presented: that of educating the digital citizen and of accomplishing knowledge integration with interdisciplinary work.

According to the “Media Education Guidance” document, media are not only content and technologies that transmit it, but also the understanding that media implies looking beyond the physical media (screens or other) by analyzing their impact on the lives of people and communities, something that only very practical activities can provide. Among the areas that the Guidance privileges, it proposes the progressive treatment of several themes. For this work, topic 4 “ICTs and screens” was selected because it is pertinent to lead students to a meta-analysis of the uses they make of the media they have at their disposal, that is, what the media are and what are they used for, how to learn through media, what to learn, healthy behaviors when using media, will be knowledge that students are expected to master after using the game.

The game “You and the Media” consists of a playful and pedagogical videogame to work, in a first moment, the content already mentioned and, in a second moment, to be reused, using “remix” option in the context of work in various subjects (Portuguese language and Mathematics). It is developed within a interdisciplinary articulation assumption using project based learning methodology.

The game presents a narrative that includes a situation where the main character explores a maze; as you walk through the labyrinth, the character encounters obstacles; finding each obstacle reveals a prompt with a question about the chosen subject. After answering the questions, in the first level, students are invited to build other levels of play adapting the game itself to fit learning purposes and allowing students to reflect about a series of behaviors, attitudes and experiences with media.

## Introduction

21<sup>st</sup> century School is, more than ever, the place for the development of skills and creation of knowledge. But first, it must be an organism attentive to the world that surrounds it and that uses the tools of its time. An official document issued by the Portuguese Ministry of Education, “Students Profile at the end of Compulsory Schooling”, provides an image of what is considered to be the student and the citizen of the 21<sup>st</sup> century. Among other specifications, this Profile refers to the need to promote in student’s competences in the areas of information and communication, problem solving and critical/creative thinking

Technology-mediated learning allows students not only to use the tools of their time (Internet access, computer, mobile devices) but also to develop digital literacy, providing a more efficient use of the media around them; and do so with increasing critical thinking. It is therefore important to develop media literacy among students of all ages.

The various dimensions of Education for Citizenship are nowadays being addressed in many schools, either with the help of cross-curricular projects, or through specific curricular offerings or even projects that are implemented in schools according to their needs. Given that the treatment of citizenship issues implies the treatment of diverse topics that are transversal to society, their insertion in the curriculum requires a transversal approach both in the disciplinary areas and disciplines involved, as well as in activities and projects.

In Portugal, in 2017, the Ministry of Education launched the Curriculum Flexibility and Autonomy Project, providing the two hundred enrolled schools the opportunity to present and revitalize curricular flexibility projects in which interdisciplinary work and citizenship education must assume a central role.

In school context, in particular with regard to Education for Citizenship, Media Education can be an added value because of the multiplicity of themes it can

cover and also because it allows the use of strategies and tools that are somehow familiar to young people.

In this paper, we intend to pay special attention to the use of digital media tools that draw so many students attention and to which educational action cannot remain indifferent. On the other hand, the learning of digital language formats is becoming a new requirement to life in modern society. According to the “Media Education Guidance”, published by the Directorate-General for Education in 2014, “learning [to understand digital tools] is necessary not only for the formation of critical, enlightened and reflective citizens, but also for the demands of everyday life, in terms of health, work, finances or relationships with public services “(Pereira, Pinto, Madureira, Pombo & Guedes, 2014).

Media Education aims to encourage students to use and decipher the means of communication, namely access and use of information and communication technologies, seeking the adoption of appropriate behaviors and attitudes towards a critical and safe use of the Internet and social networks. The implementation of Media Education will give children and young people the ability to appropriate instruments that will enable them to use the potential of the media, as well as the dangers through which they can be exposed (Pereira et al., 2014). Educating for media use presupposes promoting the ability to understand (read critically if we prefer) - the media and the social and cultural processes through which images and representations of the world in which we live are presented, using different languages. As a privileged means we have, of course, the press, music, photography, comics, radio, television, advertising, cinema, video, videogames, in both analog and digital formats, but also for digital platforms and networks, for mobile devices and other forms of message circulation and dissemination.

According to the benchmark proposed by the Ministry of Education, media not only respect the content and technologies that allow their transmission but also the understanding that media imply looking beyond the physical media (screens or other) seeing, on the one hand, professionals, organizations, logics and editorial strategies, laws and, on the other, users and consumers, what they do with the media and what is their impact on the lives of people and communities, something that only very practical activities can provide.

92 Among the areas that the "Media Education Guidance" privileges, it's proposed the progressive treatment of areas such as some of the following: 1. Communicate and inform; 2. Understand the present world; 3. Types of media; 4. ICT and screens; 5. Digital networks; 9. The media as social construction and 12. We and the media. Each of these encompasses sub-themes and objectives. For each area, from pre-school to secondary education, several performance descriptors are presented integrating a set of knowledge, skills, attitudes / values and behaviors necessary to achieve the intended learning.

For this work, topic 4 "ICTs and screens" was selected; we considered pertinent to lead the students to a meta-analysis of the daily uses they make of media they have at their disposal, that is, what we need to learn, healthy behaviors about media use, what media are and what they serve, how to learn through the media, will be knowledge that students are expected to master after using a game and after making themselves the remix of the game to work on small segments of disciplinary areas like Portuguese language and Mathematics.

In the scope of the different areas of education and teaching, the operationalization of this proposal also integrates the work of / with the school library, extending the time and place of learning outside the classroom and inducing new pedagogical practices. School libraries are a fundamental support for access to the world of information and teaching literacy, stimulating research, creating original works, respect for copyright, intellectual freedom and ethical and responsible use of information and average. We can say that, in this field, school libraries have a greater responsibility in their contribution to the development of skills that foster new ways of learning, interacting and communicating through the media.

One other official document, this one published within the Portuguese Ministry of Education, by the School Libraries Network, "Learning with the School Library", also dedicates some attention and concern to media literacy. It has as main objective to contribute for the critical analysis and understanding of the nature of the different media and products, communication techniques and messages used by them, as well as of their impact on individuals and society, providing students with critical and informed use as consumers and media producers. The activity proposed and explored here constitutes a strategy for the operationalization of this framework.

What are, after all, the assumptions of the work that fits this article? Digital citizenship is a transversal area that must be worked in a school context; the library is a privileged space of curricular articulation; digital media, in particular gaming tools, represent numerous educational assets; the use of gaming elements and techniques in educational activities can represent significant gains in terms of motivation for learning; guided by teachers, students can become content producers, through the media and the exploration of computational environments, builders of their own knowledge; collaborative work between teachers and students contributes to the professional development of teachers and to the realization of effective learning.

### **Context, Purpose and Public of the Resource**

The game “You and the Media”, for students aged 10-12, consists of a narrative that includes a situation of exploring a maze. As the player walk through the labyrinth, the character encounters obstacles which returns a prompt with a question about the chosen subject to teach from the “Media Education Guidance” document, “ICTs and screens”.

This work project consists of a simple playful and pedagogical video game (using programming language Scratch) to work, at first, a content of Media Education and, secondly, to be reused, through the option “remix” in the context of the disciplinary work, based on a game-project designed to teach the scratch language and to promote students reflection on habits and uses of the media. It results on a project thought by the Classroom Council (Portuguese, Math and ICT teachers) in articulation with the teacher who runs the school library. The game was design obeying the specific objectives of game construction and the subject which starts the game is topic 4, from the “Media Education Guidance” document, “ICTs and screens”. By choosing this subject, teachers intended their students to learn and understand the different uses of ICT in different contexts and for different purposes, and the potential of ICT to research and learn.

It is expected that this project could be developed over three months, six 45 minutes lessons, distributed as follows:

- A Citizenship lesson, to take place in the school library, for project presentation and exploration of the game;
- A Portuguese language lesson in order to allow students to create a continuity narrative from the game they've already explored, and their oral reading for correction and improvement;
- A Maths less for exploring concepts of negative numbers and Cartesian referential, simplified approach to Boolean and variable concepts;
- Three ICT lessons for exploration of the game code, improvement of the narrative created in Portuguese and consolidation, in context, of the mathematical concepts approached in the Mathematics class, and for programming the next level(s) of the game.

Several games served as inspiration and example for the production of this work, namely those found in the galleries linked to the EduScratch project and available from <http://eduscratch.dge.mec.pt/>

### **Media, Curriculum and School Libraries**

According to the Program and Curricular Targets for Portuguese, Mathematics and Information and Communications Technologies (ICT), the reference document for Education for Citizenship *Media Education Guidance* and the document from School Libraries Network (SLN) *Learning with the School Library* are thereafter listed the associated learning which is expected for each of these curricular areas.

#### ***Citizenship/Education for the Media:***

- Discover and start getting used to a digital environment;
- Get to know the conventional means of information and communication;
- Be sensitive to the risks that may arise from the Internet;
- Be aware of the screen user requirements;
- Identify and understand the opportunities, risks and potentialities of the Internet usages;
- Determine the different ways of the impact of the technologies, in their lives, their friends', the families' and of the society in general;
- Share and reflect on the ways of being online and the use of digital means: websites and most visited and favourite videogames.

**School Library:**

The Guidance is structured in three areas – A. Literacy in reading; B. Media literacy; C. Information literacy; where learning is structured, considering knowledge/skills, capacity and attitudes/values.

**(Reading Literacy area)**

- To show curiosity
- To show interest and pleasure for reading.
- To take part in the exchange and the debate of ideas
- To manifest critical spirit.
- To respect different opinions.

**(Media Literacy area)**

- To be conscious of the role of the media and its social impacts (positive and negative) according to the way they are used.
- To use the media and the environments online so as to use messages, interact and communicate with a definite intent.
- To apply basic procedures of safety associated to the use of the media and online communication (protection of personal data and privacy).
- To use the school library in order to achieve a greater dominium in the use of the media, digital tools and the possibilities given by the new social environments of learning.
- To reveal creativity in the use of the media.
- To act in a civic way and committed within the media content where they are participating.

**(Information Literacy area)**

- To identify main ideas, infer and elaborate conclusions on the information selected.
- To work collaboratively with their partners, presenting and defending their points of view.
- To comply with associated standards of copyright.
- To share learnings performed in a traditional environment or uses, with some autonomy, online environments suggested by the teacher for that effect.

- To assess the research process and product, reflecting on improvements to introduce.
- To use the school library, in an orientated way or with some autonomy, in order to use the information.
- To respect copyright and corresponding
- To demonstrate initiative and creativity in problem solving.

**Portuguese:**

(In the Literary Education area, Context: Narrative text: characters – main and secondary – narrator, temporal and spatial contexts, action, relationships between characters and literary Genre events: tale)

- To use procedures to record and retain information.

1. To fill in recording grids.
2. To take notes
3. To ask for information or complementary explanations.

- To plan the writing of texts.

1. To record ideas related to the theme, directing them and articulating them appropriately.

- To write narrative texts.

1. To write small texts, integrating the elements who, when, where, what, how, why and respecting a sequence that contemplates: present the scenery (time and place) and characters; occurrence triggering the plot; action); conclusion; emotions or feelings caused by the narrative outcome.

- To review written texts

1. To check if the text respects the proposed theme.
2. To check if the text obeys with the category or indicated genre.
3. To check if the text contains ideas foreseen in the planning. (...)
7. To check the linguistic correction.

- To read and interpret literary texts.

1. To read and listen to literature texts for children and youths, of popular tradition, and classic adaptations. (...)

8. To realize the paths used in the constructions of the literary texts (figurative language; expressive resources – onomatopoeia, enumeration, personification, comparison) and justifying its usage.

9. To distinguish, from data criteria, the following genre: tale

### **Mathematics:**

In the program of Mathematics its three main purposes are highlighted; of these, we will address especially two, purposes 1 and 3:

1. The structuring of thought - The apprehension and hierarchy of mathematical concepts, the systematic study of their properties, and the clear and precise argumentation proper to this discipline play a primordial role in the organization of thought, constituting itself as a basic grammar of reasoning hypothetical-deductive. The work of this grammar contributes to the ability to produce objective, coherent and communicable analyzes. It also contributes to improving the ability to argue, to adequately justify a given position, and to detect false fallacies and reasoning in general.

3. The Interpretation of Society - Although the applicability of mathematics to students' daily lives is largely concentrated in simple uses of the four operations, proportionality, and sporadically in the calculation of some measures of magnitude (length, area, volume, capacity, ...) associated in general with elementary geometric figures, the mathematical method is an instrument of choice for the analysis and understanding of the functioning of society. It is indispensable for the study of several areas of human activity, such as the mechanisms of the global economy or demographic evolution, electoral systems that govern Democracy, or even campaigns for the sale and promotion of consumer products. The teaching of Mathematics thus contributes to the exercise of a full, informed and responsible citizenship.

For the construction of the game, and in addition to all the advantages that we consider transversal to the whole teaching of mathematics, due to the opportunities it

98 creates in the development of problem solving strategies, we consider that for its graphical questions this can also be very important in learning related to Cartesian graphs. Cartesian graphs are presented in the following domains of fifth grade.

### **Organization and processing of data - Cartesian graphics**

1. To construct Cartesian Charts

1. To identify a 'Cartesian referential' as a pair of non-coincident numerical lines intersecting their respective origins, one of which is fixed as 'abscissa axis' and the other as 'ordinate axis' (the 'coordinate axes'), to designate the Cartesian referential as 'orthogonal' when the axes are perpendicular and 'monometric' when the unit length is the same for both axes.

2. To identify, given a plan with a Cartesian reference, the "abscissa" (respectively "ordinate") of a point in the plane as the number represented by the intersection with the axis of the abscissa (respectively ordered) of the line parallel to the axis of the ordinates (respectively abscissas) that goes by and designate the abscissa and the ordinate by "coordinates" of.

3. To construct, in a plan with an orthogonal Cartesian reference, the "Cartesian graph" referring to two sets of numbers such that the whole element of the first is associated with a single element of the second, representing in that plane the points whose abscissa are equal to the values of first set and the ordinates respectively equal to the values associated to the abscissa in the second set.

We also emphasize the importance, already mentioned, of problem solving. Thus,

"on the whole, and in an integrated way, these performances must compete, from the most elementary level of schooling, for the acquisition of knowledge of facts and procedures, for the construction and development of mathematical reasoning, for communication (oral and written) appropriate to Mathematics, to solve problems in various contexts and to a view of Mathematics as an articulated and coherent whole" (Portugal. Ministério da Educação. Direção-Geral da Educação. Programas e Metas curriculares).

***Information and Communication Technologies (ICT):***

In the Portuguese curriculum, Information and Communication Technologies discipline (ICT) intends “to promote the development of knowledge and skills in the use of information and communication technologies that allow widespread digital literacy (...). Students should be encouraged to critically analyze the role and power of information and communication technologies and to develop in them the ability to research, process, produce and communicate information through technologies, alongside research capacity in traditional formats (books, magazines, encyclopedias, newspapers and other information media) (...) and to advance to the domain of the development of the students’ analytical capacities, through the exploration of computational environments appropriate to their age”(Horta, Mendonça and Nascimento, 2012)

ICT will be extended from the 5<sup>th</sup> to the 9<sup>th</sup> grades as of the 2018/2019 school year. Given that the essential learning for the future discipline is not yet in the public domain, we take as reference the curricular goals previewed for the 7<sup>th</sup> and 8<sup>th</sup> grades. It is true that by reading the official curricular documents, it is clear that the areas of computational thinking and programming will be included throughout all the years with a deepening progressive level.

To create an original product in a collaborative way with a defined theme, using tools and computer environments appropriate to the age and stage of cognitive development of students, installed locally or available on the Internet, one must somehow develop a computational way of thinking, centered on the description and problem solving and in the logical organization of ideas. Therefore, in that area. the aims are:

1. To identify a problem to solve or design a project developing interdisciplinary perspectives and contributing to the application of knowledge and computational thinking in other disciplinary areas (languages, sciences, history, mathematics, etc.);
2. To analyze the problem and break it down into parts;
3. To explore structural components of programming (variables, decision and repetition structures, or others that respond to project needs) available in the programming environment;

4. To implement a logical sequence of problem solving, based on the fundamentals associated with programming logic and using structural components of programming;
5. To integrate content (text, image, sound and video) based on the objectives established in the project, stimulating the creativity of students in the creation of products (games, animations, interactive stories, simulations, etc.);
6. To respect the copyright and intellectual property of the information used;
7. To analyze and reflect on the solution found and its applicability and, if necessary, reformulate the logical sequence of solving the problem in a collaborative way;
8. To share the product produced on the Internet.

### **Structure and Narrative of the Game**

The game "You and the Media" occurs in the context of a narrative, consisting of a maze with two levels, each level includes 3 obstacles, and each corresponds to a question.

The initial character of the game is Giga (you can find a walking version of this scratch character by clicking in [https://test.scratch-wiki.info/w/images/thumb/d/db/Giga\\_Walking.gif/90px-Giga\\_Walking.gif](https://test.scratch-wiki.info/w/images/thumb/d/db/Giga_Walking.gif/90px-Giga_Walking.gif))



Figure 1. A game character

The game starts by students clicking on the green flag on the screen. The story takes place: on the first day of school, for the first time alone in a huge one, Giga is lost ... Shall we help Giga to find the first classroom? This is the main question presented to students to introduce the game.

The narrative continues. Students visualize Giga entering the polyvalent space and finding a wallpaper. From this first event, the story takes place during the exploration.

### **First Level:**

Question 1 - This is the school wall newspaper and is it important for Giga to get to know it because ...?

- for get to knowing the activities related to the school: 2 points
- to know which the last movie premiere in the cinema is: 0 points (message: the school wall newspaper addresses activities related to school and the community).

Question 2 - Here Giga can read an interesting news about the reception to the students, who will have written it?

- a journalist: 2 points
- the photographer: 0 points (message: photographic reporters shoot photos about ongoing events)

Question 3 - What kind of Media does that photo have?

- static (image, text): 2 points
- dynamic (audio, video and animation): 0 points

Question 4 - Giga read a story about an activity on the computers of the school library, and she was thinking "can I go to Facebook there?". Can she?

- yes: 1 point (message - Facebook usage is only allowed from 13 years onwards)
- no: 2 points

### **Second Level**

This level is not contemplated in the scratch version presented in which, at the end of a first level, the students are challenged of being the ones who build the next level, based on the issues presented in the context of the Education for the Media, in Portuguese or Math classes, or in another subject of the curriculum.

Other question possibilities: Giga is tired. The day before, she was very enthusiastic about school start and she was chatting in WhatsApp with Nano. When she logged off it was already passed midnight. Was she right? Yes - two points;

No - zero points (message: you should try to sleep the right number of hours of sleep regarding your age; electronic devices should be off by 6 PM. Giga is doing a school task and sends it to the teacher by email. Pico wants to use Giga's email and asks for her password; what should Giga do? Give the password - zero points (message: only you and an adult you trust should know your password); not giving the password - two points.

### Game Play and Storyboard

When starting the game, the user is faced with a narrative that contextualizes him in the game situation that will be challenged. Once the narrative is finished, the player must go through a maze, along which he encounters some obstacles. At each stop, to overcome the obstacle, a question is presented which the student must answer in order to be able to continue until the end of the maze. As he answers the questions, the student reflects on some usage of media essential to a healthy use of the media. The mechanics of the game are accessible to students so that they can then retrieve it for other purposes to learn other content.

The narrative is divided in two parts: a first one, more contextualized, in which students are introduced to the character who arrives at a new school, and a second one in which the adventure is entrapped by the labyrinth.



Figure 2. Initial screens

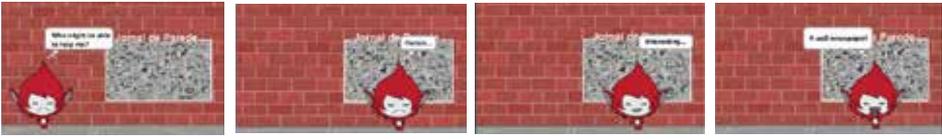


Figure 3. Narratives' first moment

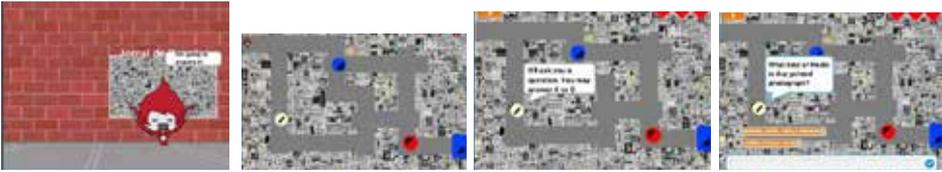


Figure 4. Labyrinth with example of question



Figure 5. Obstacle prompting a game question



Figure 6. Moment the player wins points

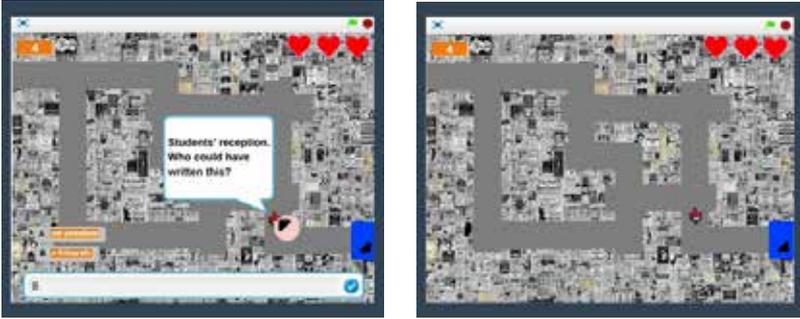


Figure 7. Moment the player loses points

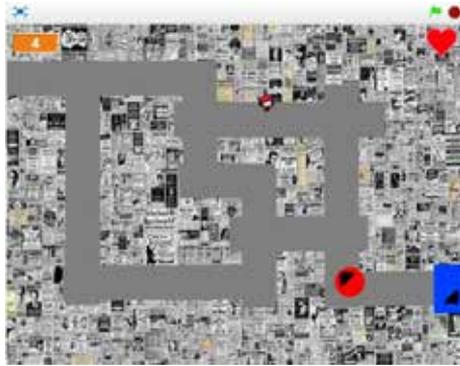


Figure 8. Moment the player loses lives

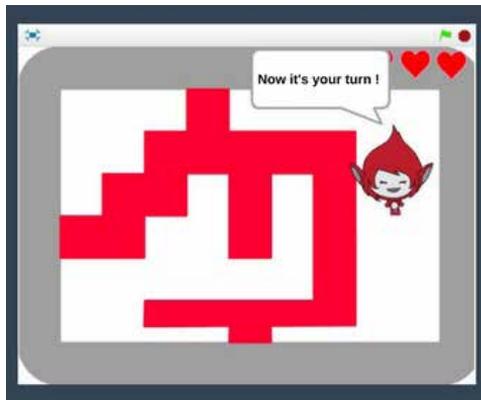


Figure 9. End of the game

The following diagram explains the different frameworks of the game and respective sequence.

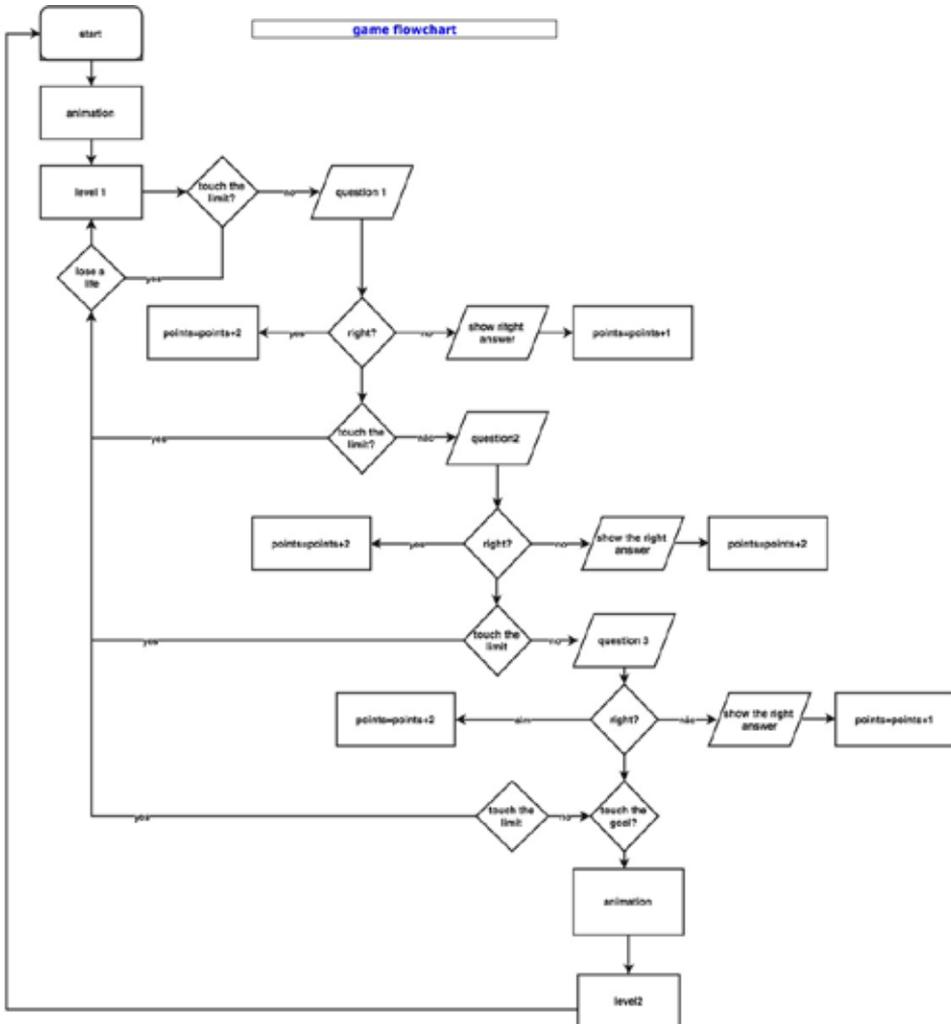


Figure 10. Game design flowchart

The main resources used to build the game and to be used with students in classes are Scratch (<https://scratch.mit.edu/>) and ColorADD® (<http://www.coloradd.net/>)

"You and the Media" it is intended to be an inclusive game so that the objects to be introduced will respect the Color Identification System for Daltons developed by ColorADD®, in the form of objects that, during the game, will be presented to the characters. ColorADD® is a monochrome graphic code created by the Portuguese designer Miguel Neiva that received, among other things, the Gold Medal commemorating the 50th anniversary of the Universal Declaration of Human Rights awarded by the Portuguese Parliament. The system is based on universal concepts of color interpretation and unfolding that facilitates the identification of color for the color-blind, thus contributing strongly to the full integration of a color-blind public. Color blindness is a disturbance of visual perception characterized by the inability to differentiate all or some colors, which affects 10% of the world's male population, and about 350 million individuals. Based on the three primary colors, represented by graphic symbols, the ColorADD® code is based on a process of logical association that allows the color-blind, through the concept of adding colors, to relate symbols and easily identify the entire color palette. White and Black appear to guide the colors to the light and dark tones. From this option is assumed a simple graphics and with some sound effects, which is familiar to the student, but different in its way of communicating ideas and with intentionality in the discourse.



Figure 11. ColorAdd schemes

## Using and Assessing the Game

The game "You and the media" was conceived to be presented to classes of 5<sup>th</sup>/6<sup>th</sup> grades within a media literacy project promoting collaboration between teachers and students. The first and second sessions should occur at a school library

which usually, in Portugal, have available a group of computers for students to use. The teachers (Portuguese, ICT or Math teacher and the school librarian) invite the students first to play the game and, after, to understand its mechanism. This activity will take up two classes of 45 minutes each. The students will be invited to use and adapt the game mechanism to the subject they're working on, building questionnaires and then remixing the game.

In an intermediate stage and at the end of the project, students will perform formative assessments according the following performance descriptors: interest and commitment when accomplishing activity tasks, collaboration, presented works quality.

It will also be both necessary and valuable to appreciate the impact of this work; this will be accomplished by an analysis of the student's commentaries on each other's projects, the number of views of each game in Scratch platform, the number of likes, times a game is chosen as favorite and games remixes.

The work development of this collaborative project, between teachers and students, will use a collaborative platform for e-learning (for example, Moodle, Sapo Campus, etc.). Collaboration between teachers will take place in a space created for this purpose; collaboration between groups of students as well.

The game will be presented to the students and then, from their exploration, students will be called to participate in writing, registering their views on the game; the quality of student interventions will be assessed through a rubric; students with higher quality entries will be offered to receive badges. Students will collaborate in assigning the badges to each other (gamification).

When researching for this game, several games were used as inspiration and example for the production of this work, namely those found in the galleries linked to the EduScratch project and available from <http://eduscratch.dge.mec.pt/>

You can reach the playable version of the game "You and the Media" by clicking in the link <https://scratch.mit.edu/projects/187504813/>



Figure 12. Game's first screen

## Conclusion

The analysis provided by this research provided the authors with some facts: schools, teachers and students, in the innovative school environment of the 21<sup>st</sup> century schools, can benefit from collaborative work giving students the center role in their learning process. Critical thinking and collaborative problem solving are competencies that must be developed in a parallel process within core competencies such as reading and arithmetics. Schools must now forget to educate the digital citizen so media literacy issues should be also discussed by students. programming activities using tools such as Scratch offer various possibilities. Video, gamification and game play should be used to provide new approaches to teaching and learning, benefiting from students' motivation and personal interests. Remixing the media is an approach that should be used to address both curricular and media education among school projects benefiting from collaboration.

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