Default Mode

A tool for educators and learners that assesses Scratch projects, providing scores across various dimensions of computational thinking and identifying coding practices to enhance quality.



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Introduction

In Scratch programming, evaluating individual projects is essential for understanding the development of computational thinking skills.

For this reason, we developed the **Default Mode** in Dr. Scratch, which allows both educators and students to track progress and identify areas for improvement in computational thinking and programming practices.

Goals

With this mode we aim to achieve the following goals:

- **Provide Detailed Project Evaluation:** The Default Mode is designed to offer a comprehensive analysis of Scratch projects, highlighting strengths and weaknesses across key dimensions of computational thinking. This helps users identify areas of improvement in their projects and promotes better coding practices.
- Support Multiple Evaluation Frameworks: By offering both *Vanilla Mode* (0-3 points across 7 dimensions) and *Extended Mode* (0-4 points across 9 dimensions), this tool allows for flexible project evaluations that cater to different levels of detail and rigor.
- Facilitate Progress Tracking: Through consistent evaluation, the Default Mode enables users to track their progress over time, helping educators and learners alike understand how their computational thinking skills evolve with each project iteration.

How it works

Upload of the Scratch Projects

The first step in the process is the upload of the Scratch project, which can be done by two different ways:

- Adding the Project URL: Users can simply include the URL of their Scratch project which is a very easy and quick method in order to analyze a project.
- Uploading the .sb3 Project File: Users can upload the .sb3 file of their Scratch project, which can be useful when the users prefers to evaluate a specific version of the project.

Visualization of the Results

Once the project is uploaded, this mode processes the files and generates a detailed analysis, which is presented as follows:

Vanilla Mode

In the Vanilla Mode of Dr. Scratch, you will be able to see the following information:

- Dimension Scores (0-3): Each project is evaluated across seven core dimensions of computational thinking:
 - Abstraction: This dimension evaluates the use of procedures and modularization in the project.
 - **Parallelism:** Parallelism measures the ability to execute multiple tasks simultaneously.
 - Logic: This dimension assesses the use of logical operators (AND, OR, NOT, etc.) and conditions in the project.
 - Synchronization: Synchronization measures how well different scripts or sprites coordinate their actions.
 - Flow Control: This dimension evaluates the use of control structures like loops (e.g., repeat, repeat until, forever).

- User Interactivity: This dimension looks at how the project responds to user input, such as key presses, mouse clicks, or other forms of interaction.
- Data Representation: Data representation assesses how variables, lists, and other data structures are used to store and manipulate information.
- **Bad Habits:** The tool also detects and reports potential coding issues known as *Bad Habits*, which can hinder the quality and efficiency of a project. These Bad Habits are highlighted to encourage better coding practices:
 - **Duplicated Scripts:** This issue occurs when similar blocks of code are repeated unnecessarily within a project, leading to inefficiency and making the project harder to maintain.
 - Sprite Naming: Each sprite in a Scratch project should have a meaningful name. Projects that use default names like "Sprite1" or "Sprite2" are flagged, as poor naming conventions make the code harder to understand and manage.
 - **Backdrop Naming:** Similar to sprites, backdrops should also be meaningfully named. Using default names for backdrops (e.g., "backdrop1") is considered a bad habit, as it reduces the readability and organization of the project.
 - **Dead Code:** Dead code refers to scripts or blocks of code that are not executed during the project's runtime, so it is recommended to remove or rework dead code to keep the project clean and efficient.
- **Project Certificate:** Upon completion of the evaluation, a certificate is generated that summarizes the project's overall performance. This certificate can serve as a reflection of the user's progress and achievements in developing computational thinking skills.
- Upload Zone for Comparison Mode: Users are also provided with an option to upload another Scratch project, which can be compared to the current one using the Comparison Mode.
- Recommender Assistant Zone: Users are also provided with an option to access the Recommender Assistant by clicking the Image of the animal (Cat, Monkey or Ferret) of the Dashboard.

Extended Mode

In the **Extended Mode** of Dr. Scratch, you will find the same information as in the *Vanilla Mode*, but with some new features:

- Dimension Scores (0-4): Each project is evaluated across several core dimensions of computational thinking, with scores ranging from 0 to 4, instead of 0 to 3 as evaluated in the *Vanilla Mode*.
- Two New Dimensions: There are two new dimensions that are evaluated:
 - Math Operators: This dimension evaluates the use of mathematical operations (e.g., addition, subtraction, multiplication, division) within the project to perform calculations or modify values.
 - Motion Operators: This dimension measures how effectively the project utilizes motionrelated blocks (e.g., move steps, point in direction) to manipulate sprite movement and positioning.

Usage Examples

Access from Main Page

In order to be able to use this mode, one of the options you can choose to do is to find the section in Dr.Scratch Main Page (Figure 1) and click the button of *Analyze by URL* or the button of *Analyze my Project*.

	Share (,)	See Project Page	
	This is a Beta version	There are two options to analyze your Scratch project now!	
	We are still working on it. If you have any comments or ideas please contact us here.	1. Introduce the uri of your Scratch project, you don't have to download it:	
		http://scratch.mit.edu/projects/your_n	
	Welcome to the Dr. Scratch website, an analytical tool that evaluates your Scratch projects in a variety of computational areas. This analyzer is a helpful tool evaluate your own projects, or those of your Scratch students.	2. If you have your project downloaded in the computer you can analyze it here: Droose Project	
zo sizo by 20			
Je 5128 by 50			

Figure 1: Default Mode Section in Dr.Scratch Main Page

Once you click on any of the previous buttons you will be redirect to the Dashboard with your Project Analyzed with the *Vanilla Mode* (Figure 2).

-	Pr.Scratch	8
Vanilla	a Mode Extended Mode	
Score: 12 / 21 🕬	Level up $_{\odot}$	Level 🔊
3-5	🔆 Abstraction	1/3
The level of your project is DEVELOPING!	* Parallelism	1/3
You're doing a great job. Keep it up!!!	🕺 🎊 Logic	0/3
©Come back to your Scratch project.	* Synchronization	3/3
Bad habits 🛛	 * Flow control 	τνε
0 duplicated scripts.	🔆 User interactivity	1/3
 7 sprite naming. 4 backdrop naming. 4 dead code. 	* Data representation	3/3
Project certificate ©	<u>.</u>	
https://scratch.mit.edu/projects/957967074/		
Download		
Compare project 🛛		
http:/scratch.mit.edu/projects/your_number		
Is the new project an update from the original?		
⊖ Yes O No		
COMPARE PROJECTS		

Figure 2: Vanilla Mode Section

If you want to switch to Extended Mode, you only need to click to the *Extended Mode*'s tab and you will see the following dashboard (Figure 3).

- já	Pr. Scratch Analyze your Scratch projects here!	۲
Vanilla	Mode Extended Mode	
Score: 14 / 36 🚥	Level up 💿	Level 🔊
The level of your project is	Abstraction	1/4
DEVELOPING! You're doing a great job. Keep it up!!!	≫ Paramensin	0/4
©Come back to your Scratch project.	* Synchronization	4/4
Bad habits 🛛	* Flow control	3/4
C 0 duplicated scripts.	🔆 User interactivity	1/4
 4 backdrop naming. 4 dead code. 	 Data representation 	4/4
	Math operators	0/4
Project certificate ®	X Motion operators	0/4
https://scratch.mit.edu/projects/957967074/ Download		
Compare project 🛛		
http:/scratch.mit.edu/projects/your_number		
Is the new project an update from the original?		
COMPARE PROJECTS		

Figure 3: Extended Mode Section

Access from Comparison Mode

Another way of using this tool is accessing when you have compared two projects. In the Main Section of the **Comparison Mode**'s Dashboard, the only thing you will need to do is to click in the phrase *Go to Vanilla Mode* (Figure 4) and you will be redirected to the **Default Mode**'s Dashboard in a new tab.

BEFORE	AFTER	
Score:	Score:	
12/21	12/21	
Blocks and Sprites Usage:	Blocks and Sprites Usage:	
E . .		
97 blocks 7 sprites	97 blocks 7 sprites	
Bad Smells:	Bad Smells:	
de de	🔹 💼	
O duplicated 4 dead blocks	O duplicated 4 dead blocks	
斄 💻 🕴		
7 sprites 4 backdrops	7 sprites 4 backdrops	
🏟 Go to Vanilla Mode.	IC Go to Vanilla Mode.	

Figure 4: Main Section of the Comparison Mode