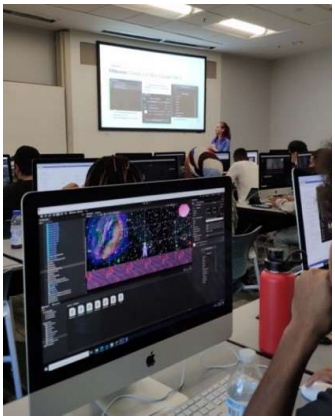
BOOLARIO:
TEACHING LOGIC STATEMENTS AND GAME DEVELOPMENT CONCEPTS

Khamilah Nixon, Anya Solodky, Austin Mathews
Dr. Cengiz Gunay & Dr. Rahaf Barakat
Georgia Gwinnett College

Abstract
Boolario is a 2D platformer game, in which the player traverses the stage to collect coins that hold the Boolean values of "true" and "false." With Boolario, our team hopes that students will gain a motivation and an appreciation for programming and game development by completing a video game designed in the style of the 1990s game, Mario. Our team developed Boolario as a platform to educate students about frequently used game development and programming concepts in C#.

Introduction
The Technology Ambassador Program (TAP) is a project and research-based course at Georgia Gwinnett College, which aims to provide student-driven technological support for GGC outreach initiatives and introductory STEM courses as well as students to broaden their horizons in IT. TAP is not an exclusive course for Information Technology students; this program welcomes individuals from all backgrounds. Our objective is to train all university students and children at young ages in a hands-on learning experience to teach them about the fundamental IT concepts used in games.

Methods
The completed game, found on our website, serves as a basis for comparison, and the incomplete workshop version provides a platform for students to learn about programming and game development concepts.



Through these workshops, attendees discover that the main character, Boolario, can neither jump high enough to reach elevated platforms, nor land on platforms without falling through. The user's goal is subsequently to attempt to correct these errors by utilizing the Unity interface and modifying code in one of our scripts. Once they create a hitbox using Unity's Box Collider 2D and increase Boolario's jump height by changing the relative y-axis velocity when they press the space key, attendees will be able to complete the level in the game.

Once completed, the students will have the option to play the game using "and" and "or" logical statements. If they choose the "And" mode, they will receive a point if and only if they collect two designated true coins. If students choose the "Or" game mode, the player will collect a point if only they collect one true coin. Collecting a false coin will not regress the score; however, it does function as a limiter to collecting a point. If, while playing, the user touches a spike or falls off the map, the character will die, a game-over screen will display, and their progress in the game will reset.

Results

Seventy-seven percent of students in our workshops did not have any prior programming knowledge; only a total of 23% of students in all three workshops had little or some knowledge in programming.

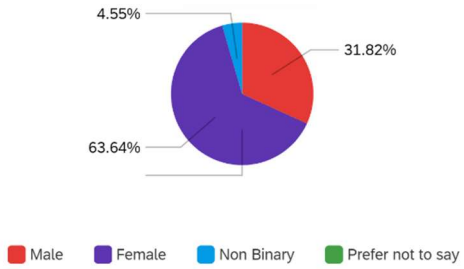


Figure 1: Participation by Gender

After our workshop, we had a significant increase in the number of students who at least understood the programming language used in Unity. We also found an increase in the number of students who believed the answer was HTML; this could be a result of our team not reiterating C# as the correct name of the programming language enough or a result of lack of student participation.

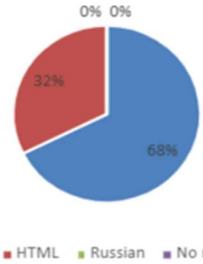


Figure 2: Which language is used in Unity? (Pre-survey)

Figure 3: Which language is used in Unity? (Post-survey)

Based on the results, we were overall successful in our ability to teach the desired programming and game development concepts to students. Although we did not have enough participants and experienced issues with discipline in taking the pre and post surveys, we were able to analyze of the effectiveness of our workshop with students from all three workshops. Some possible solutions to this problem would be reinforcing the importance of the pre and post surveys by means of the instructor as well as taking the pre-survey prior to attending the workshop.

Acknowledgements

Thanks to the STARS Computing Corps, the Georgia Gwinnett College Technology Ambassador Program committee, and the school of Science and Technology for providing the resources for our team to design this outreach project for all Georgia Gwinnett College students and children of 18 years of age or younger.

Special thanks to Dr. Rahaf Barakat and Dr. Cengiz Gunay who served as our professors and mentors throughout the entire development of Boolario, supported us in our endeavors with our project, and enhanced our teamwork, communication, presentation, and technical skills.

References

[1] Microsoft. "Visual Studio Code - Code Editing. Redefined." *RSS*, Microsoft, 3 Nov. 2021, https://code.visualstudio.com/.

[2] "Qualtrics." *Qualtrics XM*, 15 June 2021, https://www.qualtrics.com/support/survey-platform/data-and-analysis-module/data-and-analysis-overview/.

[3] Technologies, Unity. "Welcome to the Unity Scripting Reference!" *Unity*, https://docs.unity3d.com/ScriptReference/.