

Untraceable: Teaching Programming Concepts Through Games

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LE EECS 4700: Capstone

Motivation

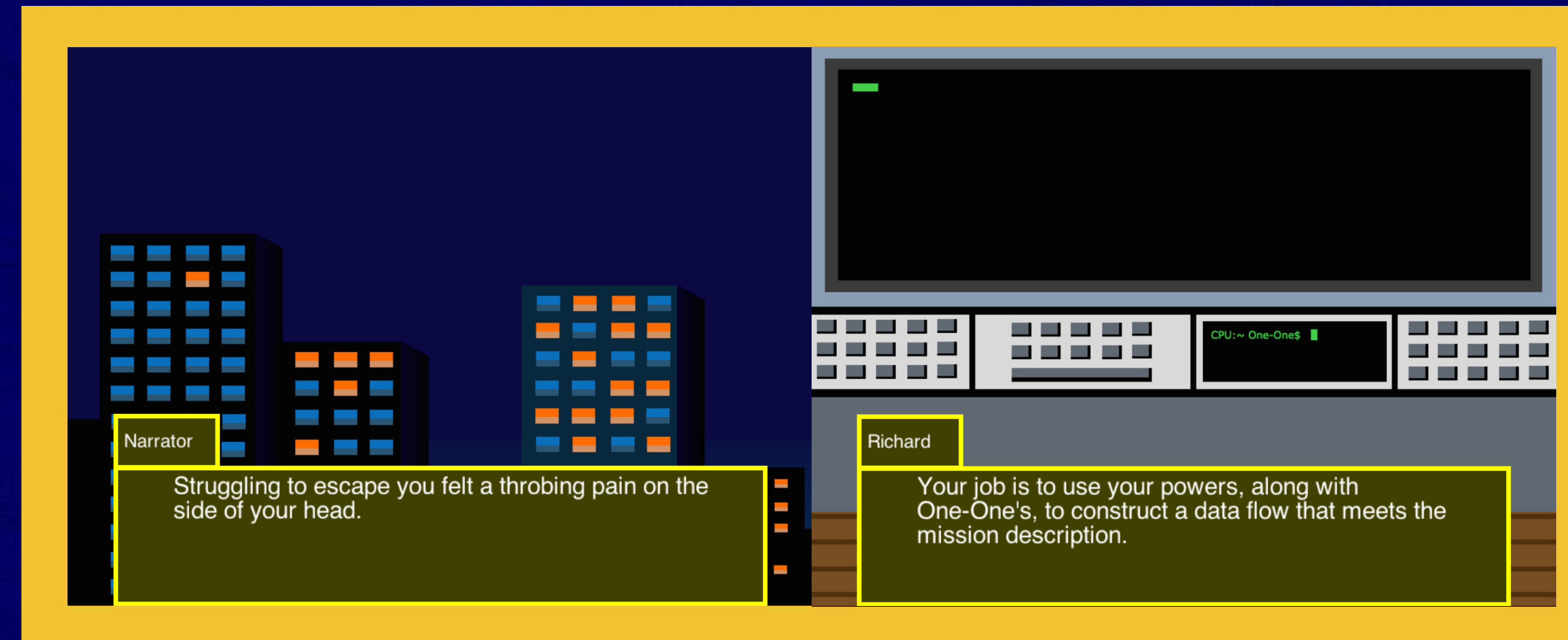
The evolution of technology has led to its inclusion in the classroom as a medium for cognitive development.^{[1][2]} The proper inclusion of technology has been shown to lead to an increase by half a letter grade.^[3] An increase in technology means that teachers require new software to work as the tools that encourage and help facilitate learning for their students.

Goal

To add to the resources available to teachers and to explore how video games can be used effectively as a teaching tool, we are creating a video game designed to teach students the terms and concepts of high school computer science.



Example of a level in execution mode



Stills from the narrative of the game. Users advance by clicking their mouse

Methodology

Using the Ontario high school curriculum as an outline, we separated our game into two distinct sections: the narrative, and the puzzles themselves. The puzzles are used to teach the programming concepts, terms, and flow of programs, while the narrative is used to tie these levels together and provide more complex overall themes of computing such as data security.

The narrative takes place in the near future where some people have developed psychic powers. Seeing the advantage of using these people, the government captures them, using their powers to spy on their citizens.

The game revolves around a young psychic who gets captured, and attempts to escape back to their family with the help of another psychic.

The game uses a 2D grid of functions that allow the player to control a series of incoming data packets to complete missions assigned to them by their captors. The player uses programming-esque functions to evaluate, delete, replicate, and replace data to complete increasingly more complex tasks from their superiors.

Findings

In March and April, this game will be tested in an Ontario high school with grade 11 students beginning to learn computer science. They will be evaluating the efficacy of the game as a whole and the individual elements that comprise it such as sound, narrative, and design.

These findings will be compiled into a report describing the perceived best practices of game development for education as well as a report on how games can be used effectively to teach in the field of computer science.

Conclusion

It is our hope to continue to work on this project and present our findings about how video games can be better used in education and how students can learn programming by playing games.

[1] Youngkyun Baek, Jaeyeob Jung, and Bokyeong Kim. 2008. What makes teachers use technology in the classroom? Exploring the factors affecting facilitation of technology with a Korean sample. *Computers and Education*, 50. <http://www.sciencedirect.com.ezproxy.library.yorku.ca/science/article/pii/S036013150600100X#>

[2] Carol Robinson, and Judy Sebba. 2010. Personalizing learning through the use of technology. *Computers and Education*, 54. <http://www.sciencedirect.com.ezproxy.library.yorku.ca/science/article/pii/S0360131509002619#>

[3] Álvaro Fernández-López et al. 2012. Mobile learning technology based on iOS devices to support students with special needs. *Computers and Education*, 61. <http://www.sciencedirect.com.ezproxy.library.yorku.ca/science/article/pii/S0360131512002199>