Athens State University

ESCAPE FROM THE PYTHON'S DEN

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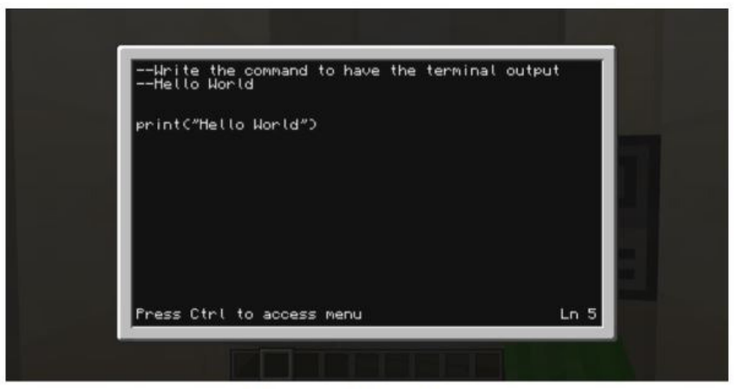
INTRODUCTION

The primary focus is to encourage and challenge younger students to explore the educational aspects of technology. Early exposure to STEM fields such as Computer Science is important because "having early expectations for a career increases the chances of completing a degree in that field."[4]

Our objective is to determine improved curricula and teaching methods to best educate and interest as many students as possible. In doing so, we hope to introduce students to novice topics that are required for a stable foundation in computer science education, while also laying the groundwork for these less complex topics to be seamlessly interwoven with more complex ones as the students advance.



(a) Simple "Hello World" example.

(b) Computer and disk drive in Minecraft.

(c) Example practice problem.

(d) The wall the map pieces are to be placed on.

RESULTS & DISCUSSION

Utilizing Minecraft and altering the curricula as necessary could provide adequate data to support the need for DGBL (digital game-based learning) and alternative curricula, in agreement with numerous existing studies.

Individual differences of students are constantly increasing, and education systems must predict and prepare in order to best serve future students.

Much of computer science is understanding the abstract concepts that are difficult to visualize. Minecraft and other software, such as Alice, could offer methods for visualizing the entire process, including the more obvious front end functions.

CONSIDER

How to obtain a better idea of students' needs by the types of methods and curricula utilized.

Minecraft meets target age demographic.

51%

of children age 9-11 play Minecraft [5]

RESEARCH

A comparison of DGBL and another form of web-based learning found an increase in student retention [3].

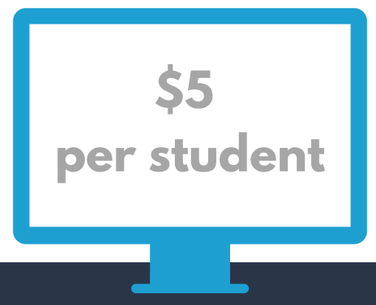
Cohorts are based on age and level of exposure to programming. Multiple groups would be exposed to different teaching methods: top down vs. bottom up, collaboration vs. independent work, and use of different languages [2].

FUTURE WORKS

Kluthe's studies have shown that EEG's can be utilized to better decide which order to introduce certain topics [1].

Plans are also in the works with a non-profit, Huntsville STEAM Works, to introduce this game as a course offering in their catalog.

Minecraft has a low-cost implementation at $5 per student.



REFERENCES

[1] Crk, I., Kluthe, T. and Stefik, A. (2016). Understanding Programming Expertise: An Empirical Study of Phasic Brain Wave Changes. [online] Digital Scholarship@UNLV. Available at: https://digitalscholarship.unlv.edu/compsci_fac_articles/32/ [Accessed 2 Mar. 2019].
[2]A. Lewis, V. Miller, M. Marrazzo and I. Kane, "A systematic literature review of the cognitive models of the behavior of novice software developers.", Journal of Computing Sciences in Colleges, vol. 34, no. 2, pp. 208-214, 2018. [Accessed 2 April 2019].
[3]M. Papastergiou, "Digital Game-Based Learning in high school Computer Science education: Impact on educational effectiveness and student motivation", Computers & Education, vol. 52, no. 1, pp. 1-12, 2009. Available: 10.1016/j.compedu.2008.06.004.
[4]"The importance of early exposure to STEM fields", DeseretNews.com, 2019. [Online]. Available: https://www.deseretnews.com/article/865641034/Preparing-for-jobs-in-STEM-fields-should-begin-as-early-as-elementrary-school.html. [Accessed: 02- Apr- 2019].
[5]"Minecraft Franchise Fact Sheet", News.xbox.com, 2019. [Online]. Available: https://news.xbox.com/en-us/wp-content/uploads/Minecraft-Franchise-Fact-Sheet_Updated_1-19-18-1.docx. [Accessed: 02- Apr- 2019].

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