

Abstract

Video games have always been a diverse and expansive experience ever since their inception. From the simple games of Tennis and Tetris to the more modern and popular gaming franchises of Grand Theft Auto and Call of Duty, games have been ever evolving as time has progressed. In today's current technological environment, even menial life tasks can be given a better sense of engagement from people if those tasks were to be created through a game engine. Video games not only promote engagement from the player but can also be used to tell compelling stories and give the player the option to insert themselves into a fantastical world of wonder and enjoyment. There have even been entire games made based on the education of young children. With this topic, the aim is to explore methods of how gaming conventions such as those could be implemented into the college level, primarily within the curriculum of some Computer Science courses. The implementation of this topic would include the building of algorithms that would support the specific classification of a student that is taking the undergraduate course curriculum, a system that is adjustable in its difficulty based on prior knowledge that a student may have with a specific topic within the curriculum, and the tracking of progression that a student may have with the curriculum. The results would yield an improved understanding of basic programming as well as the understanding of how computers are able to transfer and manipulate data.

Introduction

Video games have been an extraordinary way to bring the monotony of learning from the education system to a more vibrant and colorful context. The children of today usually must be more active in the learning process, otherwise they are prone to forget about a particular lesson. The same can go for some adults even at the college level. The results of this study show how the perfect implications of video game development in an educational environment could have a immensely positive impact on the education system, as well as promote the development of said video games. This study should be conducted because past data suggests that those who play a game about learning a specific topic tend to remember the topic more in depth, or at the very least have a based and grounded understanding of said topic. Applying this logic to college level CS courses, this would show students the more intricate parts of Computer Science and let students become more knowledgeable within the field. Most students do not want to take the time to sit down and read through large books of information. Going with this approach also allows for more active learning within the classrooms, which can offer better retention of lessons.

Background of the Study

In the article “Using Video Games in Education” developed by Meghan Arias of George Mason University, it is discussed that video games can have a major impact on education by allowing the players to immerse themselves within a world that can have the potential to build from what the students can be learning within the classrooms. There are many subjects that the research goes through including geography, social studies, and mathematics. The study shows that students who participated in the video games not only have a higher retention rate, but also have a deeper understanding of the topic that is discussed in the classroom. In some cases, the students

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would go out of their way to further research the discussed topic to provide greater insight into their learning experiences as well as come up with strategies to solve problems that may have come up during gameplay. Teaching subjects by using video games can be beneficial not only to the students, but the professors as well. Instead of professors being unsure that students can digest the information, they can clearly see by the results of a game what topics need to be brought up or touched upon again. This in turn can make the classroom a more fun and immersive experience that students can look forward to instead of dreading. Although the study covers a range of subjects that are common within the American Education System, it only covers subjects that are relevant to at least a high school level. Having said this information, this study will focus particularly on the college level of CS courses, and how video games can serve as a gateway to the greater understanding of topics that are discussed within said courses. This study aims to highlight problems within the curriculum of CS and provide solutions to them by using the implementation of the video game structure to enable students' interest within the field, as well as encourage those students to conduct research for a deeper understanding of subject matters that are taught within the classroom.

Purpose of the Study

The purpose of this study is to show how the perfect implications of video game development in an educational environment could have an immensely positive impact on the education system, as well as promote the development of said video games. It aims to highlight problems within the curriculum of CS and provide solutions to them by using the implementation of the video game structure to enable students' interest within the field, as well as encourage those students to conduct research for a deeper understanding of subject matters that are taught within the classroom.

Research Questions

1. How can the implementation of a gaming structure affect the learning process of a student that isn't fully versed in coding?
2. How could the gaming structure improve understanding of how computers function?
3. Should this gaming structure become the primary source of education within the CS curriculum?

Methodology

The purpose of this study is to show how the perfect implications of video game development in an educational environment could have a positive impact on the education of college students who are in CS programs, as well as promote the development of said video games. It aims to highlight problems within the curriculum of CS and develop solutions to them by using the implementation of the video game structure to enable students' interest within the field and encourage those students to conduct research for a deeper understanding of subject matters that are taught within the classroom. A question that this study can discuss is how can the implementation of a gaming structure affect the learning process of a student that isn't fully versed in coding?

Research Design and Data Collection Procedures

To create this game, one must develop an algorithm that can allow users to be able to progress based on how well they do within a portion of the video game. Progression can be defined by the correctness of a user's response to a problem and how well they are able to develop a solution for said problem. For instance, if a user were given the task of

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creating a program that can switch two values within an array, the way that they go about providing a solution to the task will be pivotal to how the algorithm would respond.

Factors that can help this algorithm decide the correctness of the user's response would include the memory usage of the developed program, the O-notation of the program in terms of the time that's taken to process the code and the comments that the user will be required to make in a separate section of the interface. The algorithm would create a solution to the task that was given and will analyze the user's response to identify any similarities. If there are any errors within the user's code, this algorithm will fetch an error before running it. Once the user's code is run, the algorithm will provide feedback on how the code could be improved upon. In the case that there is nothing the algorithm can provide, it will provide a similar but slightly more difficult task. If the user can keep a streak going with the tasks assigned to them, they will proceed into a higher-level course within the video game to give them a more difficult challenge. However, in the case that the user is struggling with a specific problem. The algorithm will give them the option to reveal the solution, skip the task entirely, and give the user some resources to look at to assist them in completing the task. Regardless of the result this algorithm will give the user points. These points are necessary to unlock other topics that the game can cover. User's can also go back to previous sections that they have completed to either look over their code to see how it can be improved upon or try another example to challenge themselves again with the topic, although performing the task again will not net the user any points.

Discussions and Conclusions

The CS curriculum is full of challenges that test your knowledge on the intricacies of computing technology, as well as how those very technologies communicate with each other and come together to create the foundation of computing in general. Due to these challenges, the implementation of a video game structure would not only encourage research into the topics of CS but will also have an immersive classroom experience that can open a student's willingness to participate in CS programs. The video game that was constructed allowed users to be quizzed on topics that are discussed within the program, based on their current classification. Users would then be placed within a points-based system where they could see what topics they needed to touch up on.

Discussion

The implementation of this study would show promising results to both students and professors. Students will have a better grasp on what topics they should invest more time into, which can give the students a sense of accomplishment when they fully understand a topic. They can play the game again to see where they have improved with their topic and can move onto the next topic. This will allow the student to reach higher and more advanced levels of the curriculum, which in turn would give them more confidence within the technological field and allow them to perform a task for a company in which they may choose to work for. For the professors, this study can allow them to see where all students may be struggling, and dedicate class time to review a certain topic, or play through the game again to see any improvement within the classroom. This study has the capability to bring forth excitement within the students of the CS curriculum, and encourage communication and collaboration between themselves, to come up

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with better and more cost-effective solutions to problems that they encounter when they first play with the video game structure.

Conclusion

The inclusion of the video game structure within the practices of the education system of college level CS programs, can become an immense benefit to both education in general and the drive for scholars to create a video game of their own. Having seen the benefits of the video game structure between students and professors, this study can be used to implement this structure into other curriculums that colleges may offer. This immersion of topics can bring satisfaction and joy to those that wish to participate in it.

References

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Arias, M. (2014). Using Video Games in Education. *Journal of Mason Graduate Research*, 1(2), 49–69. <https://doi.org/10.13021/G8jmgr.v1i2.416>