**Educational games for improving the teaching-learning process of a CLIL subject: Physics and Chemistry in Secondary Education**

Students of the 21st century undoubtedly are different learners than the students that preceded them. In an era where there is constant and immediate access to instant messaging, internet, computer games, etc., there is more importance given to playing as a tool for learning, specifically in the case of Chemistry and Physics. In place of hard, traditional, repetitive practice in the classroom setting, the same concepts can also be taught through gaming. Gaming in fact stimulates creative and deep thinking and is closely connected to enjoyment and pleasure. However, many schools have failed to implement gaming into learning platforms because of lack of access to such software. In addition, many platform have not been developed for Spanish-speaking students. Games, dating back to the time of the ancient Greeks, have proved to be effective also in knowledge retention.

In his 1938 book Homo Ludens, Johan Huizinga argued that play is essential for work and reflection and is a necessary condition of the generation of culture. A. Bandura also details that games create various possible scenarios in which to learn the concepts and also, allow for repeatability, which can add to retention. Vygotsky discusses the constructivist approach to gaming which posits that a user has both an actual developmental level, and potential developmental level. Other intellectuals have furthered Vygotsky’s ideas, and have concluded that the idea of ‘levels’ in gaming, allows for a student to repeat a concept until they have gained mastership over the concept independently.

In the study, an effective gaming system was developed in order to teach concepts. In order to develop a proper game, specific game traits needed to be found that would cater to a diverse array of student users. The study used Hot Potatoes, which is a free educational software that allows teachers to create different activities for students regardless whether or not the user has a heavy programming background or not. Hot Potatoes is not open-source. The study created 5 different assessment activities that tested knowledge of lab safety and protocol, that can be finished in 30 minutes. In addition, a platform known as What2Learn was used to create games that would allow for revision of material. Again, a game that tested knowledge of safety attire was developed. Other software used were: Scratch, Notebook 11 Software, Microsoft Excel, and Microsoft PowerPoint (both in conjunction with Visual Basic Programming Software).

The games that were created as a result of this study were created in order to originate challenge, set goals, and provide feedback to learners. The elements that contribute to create playing experiences are: game mechanics, game story, game aesthetics, and game technology.

Furthermore, it is evident that there is demand for gaming especially with regards to learning Chemistry and Physics. While this particular study doesn’t address the use of gaming for molecular learning, it still discusses its potential application.

Citation:

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**Open Source Molecular Modeling**

This article begins by explaining that free open source software is software this is both considered free software and open source. Open source software gives users the ability to use, modify, and distribute software without a lot of regulations. Open source include: Python, Apache, BSD, and MIT.

Interestingly, the article goes on to talk about the controversy behind open source software for molecular modeling. Some critics of open source software claim that the development involved with closed source software allows it to be superior for molecular modeling when compared with open source software. Another ability of open source software, is that those who modify code can redistribute it. Thus, improvements can be made to software, instead of reinventing the same software for the same purpose every time it is needed.

In order to test this hypothesis about the advantages of open source software, several open source software were surveyed from websites like SourceForge, GitHub, OpenHub and Click2Drug that have vast directories of open source software. First, the development activity of each software were tracked: any substantial developments, evidence of bug fixes, and evidence of development. Next, the usage activity was also observed among all these software. Within 18 months, it was found that there were more than 20 downloads a month from SourceForge, 20 stars on GitHub, and more than 10 citations a year.

In addition, over 200 open-source packages for molecular modeling were observed and studied. Most users used the copleft GNU Public License. A lot of the packages cataloged were under active development and had significant usage. 56% of the packages constantly and consistently updated every 18 months, which kept the software up to date.

Molecular Modeling software such as PyMOL are open-source and often times difficult to sue. For example, software like Python Molecule Viewer has very poor documentation with respect to its ability to be imported into a Python script. In addition, often times, it is difficult to understand how to use the software and where it might be useful. Often times, the software itself is difficult to download, and isn’t easily trustworthy from sources like sourceforge. However, when studies like this are done that verify the validity and usage of open-source software, it makes it easier and more readily usable by consumers who wish to use molecular modeling.

In addition, when trying to develop an extension of the interface of a molecular modeling software – as is the goal of Simulations of the Origins of Life – it is important that software be easily written over and easily changed. Thus, the software can be manipulated to best develop interactive teaching tools.

Citation:

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