PTAS Project Report (for SMALL PROJECT GRANTS)

Project Title: Building Biological Models in Minecraft

Principal Investigator : Dr Melanie Stefan
School / Department : Deanery of Biomedical Sciences

Team members : Mr Richard Fitzpatrick

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Grant recipients are expected to submit a brief report at the conclusion of their project which outlines briefly the following : nature of work completed; outcomes; benefits to student learning/student experience; dissemination activity (where relevant – actual and planned) and how the activity could inform future work or be transferred to other subject areas in the University. The brief report will be published on the IAD web pages.

Brief Report (maximum 500 words)

What did you do?
We worked with four biomedical science undergraduate students to explore how the sandbox game Minecraft might enhance the ability to understand complex biological concepts. Molecular biology education in particular tends to deemphasise the mechanistic principles of activity that may aid in a learner's grasping of the overall concept. We asked our students to find out information about a specific protein (CaMKII) and to construct a Minecraft model about it. We gave them very little guidance, so as not to steer them in any particular direction. We then gave them 2 weeks to complete a model, with a further 2 weeks afterwards to either continue developing the model or construct a new one on a different biomedical topic.

What did you find out?
All the students found that using Minecraft enabled them to explore biological concepts in a novel and inspiring way. The models they came up with were very different, exploring different aspect of CaMKII function and structure. All the students found that in order to build the model they wanted to, they had to do a lot of in-depth research. Importantly, this was not seen as an imposition, and left them with a much deeper understanding of the underlying concepts than they feel they would form just research with no application in mind. The level of prior experience with Minecraft did play a role in the scope of the final model but did not link with the success in building one.

Not all students found the task easy, and some found that erasing failed models hindered their ability to construct new ones and leaving them with nothing to show for their work. There was also sometimes a frustration between knowing what they wanted to build but lacking in the knowledge of how to do that within the constraints of the software.

How did you disseminate your findings?
We are presenting the work carried out to the BMTO Teaching Network in 2020, and at the FENS2020 conference. We have also adapted the idea into a successful public outreach venture (neuronsafari.com) using some of the models designed during the project. We are also in the

process of finalising a paper submission of the project based upon reflective reports of the experience of each student.

What have been the benefits to student learning?
We see a definite way forward in exploring further the use of Minecraft within biomedical teaching. Not only do students learn well when tasked with a project, they do so with minimal guidance and with enthusiasm. We find that students can benefit both from interacting with existing models (e.g. as a video/playthrough in a lecture), as well as from actively constructing models (e.g. in-course assessment, revision, pre-practicals).

How could these benefits be extended to other parts of the university?
The idea of using this software already comes from its successful use in the Digital Education MSc over the past few years. We believe there is plenty of scope in its use in other disciplines (we are currently exploring this with members of the School of Engineering). The key take-home message is that use of the software can strike a balance between creativity and intellectual rigour within learning environments.

Who can be contacted for further details?

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Financial statement (please delete as appropriate):

This project has utilised the funding awarded to it by the PTAS adjudication committee and the Principal Investigator or School Administrator appropriate can provide financial statements showing the funding usage as and when required by the UoE Development Trusts who may require it for auditing purposes.

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