Edutainment (Education + Entertainment) Enhances Learning Of STEM Subjects In HE (0065)

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Abstract

This paper describes creation of a model of edutainment (education + entertainment) to aid learning of STEM-type subject skills by HE students. This has become an important issue for most nations [5] requiring the search for new methods of teaching. Although many see the way forward as being application of technology to the teaching process, the so-called technology-fix, it must be appreciated that learning is essentially a human experience, with teaching a predominantly human to human experience, and that perhaps a psychology-fix of some kind might be useful. A model of edutainment is currently under development for teaching cyber security to postgraduate students. Cyber security embodies all the STEM-type skill sets and so is a useful area for this research. Overall, it has been found that by combining entertainment purposefully with education using the psychological principles that are common to both, student outcomes for the taught curriculum are improved.

1. Need for New Teaching Methods in STEM

STEM graduates and postgraduates are reported to be in high demand by both STEM and non-STEM employers for their analytical thinking, problem solving skills, logic and numeracy as well as for their technical skills or subject specific skills. A CBI report, *Mapping the route to growth*, found that 41% of recruiters preferred to recruit STEM graduates and estimated that 80% of new jobs required high-tech graduates. Forecasts for industries in science, technology and engineering alone showed a great demand for STEM-trained skilled staff by 2017 and, according to the CBI, the number of STEM-trained graduates "must increase by over 40% on current levels if this demand is to be met" [5]. One of those STEM areas, and currently of immense concern socially, commercially and politically [4], is cybersecurity. This area is becoming increasingly popular at both masters and undergraduate level as well as with established professionals requiring new skills such as anti-terrorist police officers who may have been away from academia for some time but be bringing substantial experience to the body of knowledge. Various approaches have been tried to improve the learning of STEM subjects such as cybersecurity and to encompass the diversity of learners but with mixed usefulness. This research suggests that what might be required are novel methods of teaching that can emphasise three important aspects of any learning environment: (attentive) the ability to capture and retain student attention, (affective) the ability to raise the emotional involvement of students during their learning experience and lastly, (cognitive) the ability to provide learning 'scaffolding' [6] for complicated logical, numerate and technical topics .

1. What Is Edutainment?

Edutainment is a merging of the words '*education*' and '*entertainment*'. The LNCS (Lecture Notes In Computer Science) website says "*Edutainment,… educational entertainment or entertainment-education, … designed to educate as well as to provide fun"* [1] explicitly uses the word 'fun'. Resnick at the MIT (Massachusetts Institute of Technology) Media Laboratory [3] actually goes so far as to say **"***Edutainment? No thanks – I prefer Playful Learning"* . Both these definitions suggest fun and play are important learning approaches and previous research has shown that use of humour certainly has an effect in improving learning. However, pedagogically speaking, a preferred definition might be "*edutainment: a blend of education and entertainment that synergistically deliver a deeper learning experience*" [2]. The notion of synergy is important as it implies that combining education with fun and play might actually enhance the learning experience overall and the notion of promoting 'deeper learning', as opposed to shallow learning, has always been of interest to educators. It is this last definition that has been used to underpin the research reported herein.

2. Building an Edutainment Model

This paper describes a piece of research looking at theories of edutainment, the analysis of six case studies in actual use in the real world, the creation of a practical model for teaching use, and finalizes with a review of it's own classroom based experiments in which edutainment materials derived from theory and practice were used in teaching cyber security techniques at postgraduate level. The research paradigm is that of Action Research and uses triangulation of several data collection methods of student feedback four sources: student questionnaire, student interviews, official university student feedback and official assessment statistics. The paper begins with the common themes of entertainment: humour (jokes, word-play), story-telling (narrative, anecdotes), theatre (role-playing, characterisation), game-playing (riddles, problem-solving, puzzles) and shows how elements of these can be combined to enhance the effects of normal teaching. In addition the role of the common psychological principles underlying both education and entertainment are explored such as: Von Restorff Effect, Zeigarnick Effect, Generation Effects as well as the importance of Eidetic imagery. This research analyses six edutainment case studies, devised a practical model and trialled some experimental designs of classroom materials. The examples reported in the paper are specific to cyber security teaching, and show how some of the difficult topics of logic and numeracy can be explained in more 'learner-friendly' ways. The paper finalises with a look at student feedback on the use of these edutainment materials and discusses what the student cohort thought of the edutainment approach especially that female students marginally liked it more than male (unexpected – it was thought they would be the same) and that overseas students liked it as much as home students (very unexpected – it was thought they would object to it).

3. References

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