

Impact on Learning when introducing Electronic Video Games in a elements in a Constructivist Learning Environment

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Abstract

It is estimated that our children, before they leave college, will spend 10000 hours playing video games. Their popularity is due to the immersive environments of 3-D and the element of challenging play and the freedom to create and act in collaborative environment that provide instantaneous feedback. The potential of these games for education is the subject of much debate amongst both educationalists and technologists. One of the key questions is whether “play and act” on-line can lead to the sort of purposeful and serious learning expected in post secondary education. This project will explore how video games can be used to support learning using the rich environments that virtual worlds offer and opportunities such as creating dynamic avatars that change with the learners’ actions. Environments like 2nd Life will be used in conjunction with the innovative PBL One-Day, One-Problem pedagogy at Republic Polytechnic (RP) to explore the impacts on learning when elements of EVGs are introduced to a segment of the first year students. This paper will seek to provide a brief description of the project that has just started and that will continue till 2010.

Objectives

This research seeks to:

- i. Explore and investigate the impact on learning (students’ engagement and deep vs surface learning) in a constructivist environment, when elements of Electronic Video Games (EVGs) are introduced in the pedagogy. The elements are introduced via two phases of the project.
 - Phase 1: Virtual Scaffolding in 2nd Life
 - Phase 2: e-Subbie (Distributed Intelligence)
- ii. Ascertain the design features of EVGs (from these 2 phases) introduced within the post-secondary education sector that enhances students’ engagement and deep learning and hence informing future research in this area for the Singapore education context, specifically, and the world, generally.
- iii. Design, Develop and Pilot an EVG in the virtual world of 2nd Life and create another with 3D Animation tools, in a constructivist learning environment of RP for the purpose(s) above.

Key Issues and Significance:

An important issue that this project will address is how to enhance the engagement of students in Singapore and many parts of the developed world, in a new way. Although there are many factors that contribute to student’s engagement, such as an active learning approach, as per RP’s One-Day, One-ProblemTM pedagogy, (Alwis & O’Grady, 2002) many of the factors that are considered important to students’ engagement do not focus on the potential of current technologies beyond its capacity to deliver information and encourage discussion on-line.

Prensky (2001) has argued that the complaints of teachers and educators that students have short attention spans (as a manifestation of a low engagement) nowadays may be misconstruing the fact that these students are actually having short attention spans for the old way of teaching and learning and does not take into account how students now receive and process information and how much of that are influenced by their exposure to EVGs and MTV. As Singapore's Prime Minister recently highlighted ("Transcript of PM Lee Hsien Loong's National Day Rally 20 August 2006," 2006), kids today are digital natives. They are twitch-speed kids and we have to try to educate them in ways that they communicate and socialize amongst themselves out of school. We feel that by allowing students nowadays to learn using mediums that they are familiar with, such as EVGs, will allow them to tap into their Self-System (Marzano, 2001) better, increasing the learning's perceived importance and also increasing the learner's probability of success, which could lead to a higher intrinsic motivation to learn*. Also, this issue of engagement has significant outcomes in students' learning in so much as enhanced engagement will facilitate deep or active, critical learning² (Gee, 2003) as opposed to surface learning. Learning that is more than mere regurgitation but that will allow learners to be producers of learning and not just passive receivers.

However, for the past decade or so many attempts at introducing EVGs or the likes in education has met with little or mixed success. (Mayer 2005) The key problem lies with the approach of trying to change and sacrificed the learning approaches or pedagogy to suit the technology or not enough attention being paid to the instructional goals and learning needs of that particular context that they are trying to enhance. Hence, **the significance of this project is not only to address the issue of engagement (and hence active, critical learning) by using EVGs but also better understand how EVGs can be used appropriately, for that particular purpose.**

Background and Approach

The Project will be divided into two key phases. Each phase will aim to introduce different elements of EVGs, evident from best-selling EVGs in the market and that has strong links with how they can help enhance engagement of learners and bring about deeper learning.

Before showing an approach framework that shows our whole methodology and processes, let's move on to some theories underpinning our project and a background of the learning environment in which we are going to conduct our project, as they will highlight certain important reasons why we are introducing the elements, in the phases, in those certain ways.

Background 1: Theories underpinning the project:

These are principles or theories put forth by various researches on the rationales why games in education would enhance learning. In addition to the idea of Digital Natives (Prensky 2001) and its link to Intrinsic Motivation (Marzano 2001) described in the section above, the other key theories are:

- i. Situated Cognition (Lave, 1988; Stein, 1998) – learning is grounded in the actions of everyday situations and that it is acquired situationally and transfers into similar contexts. An argument can then be made that EVGs with virtual worlds that mimics the real world can foster greater engagement and deeper learning than hypothetical or text based scenarios.
- ii. Flow (Csikzentmihalyi, 1990) – Immediate Feedback; Multiple Approaches, Probe-Hypothesize Cycle (Gee, 2003) – In a state of flow, learners lose all aspects of their ego and are “lost” in the activity, in this case learning. The project will examine the potential of EVGs to keep learners in a state of flow due to learners being constantly challenged at the edge of their competence and while continuing to probe and re-probe and in effect, producing active, critical learning.
- iii. Learning and Identity (Gee, 1997) – Gee suggests that learner's personal connectedness or identity with the content that they are studying is an important aspect in learning. EVGs that have avatars (virtual personas or identities) that learners can assume helps them to take the role of a professional or another member of a community of practice relevant to the content. This persona can help the learner to be more “committed” to the learning.

- iv. Social Learning Theory (Bandura, 1977) – This is a key theory underpinning a constructivist approach to learning, namely that learning and knowledge are socially constructed. It can be argued that EVGs which foster learning within communities of practice where more capable peers and facilitators help novice learners to negotiate meaning together seem to have enormous, positive potential for enhancing the opportunities for socially constructing knowledge.

Background 2: RP’s One-Day, One-Problem PBL Pedagogy™

RP’s Problem-Based learning approach (Alwis & O’Grady, 2002) is an approach that embraces the philosophy of PBL where problems are the triggers for learning building upon learners’ prior knowledge, where learning are occurring in groups and is socially constructed, that educators acts as facilitators of learning and in which students take ownership of the learning process and that critical reflection is an important part of learning. What’s unique about it is that instead one a problem given to a student to solve over a week or even a few days, each day starts with a new problem that a student (together with his group of 5 students) gets to tackle and solve for that day from 8.30 am to 4pm. Typically in a day, the following takes place:

<p>1. First Meeting: 8.30am to 9.30 am</p>	<p>In this meeting, facilitators will present a problem trigger for the day, which will be the impetus for students to start discussing, in their own groups (groups of 5 in class of 25), tapping into their own prior knowledge and then trying to define the problem so that at the end of this meeting, they have some kind of idea on some options of how they can go about solving the problem. The facilitator here will encourage divergence and exploration.</p>
<p>2. Breakout 1: 9.30 am to 10.30 am</p>	<p>A time for students, without the facilitator being present, to start their own research and data gathering to clarify the points they discussed earlier. Self-directed learning and collaborative learning behaviors are encouraged here. Worksheets are also given at the start of this stage to help scaffold the learning.</p>
<p>3. 2nd Meeting: 10.30am to 11.30 am</p>	<p>At this stage, facilitators are back to check on the progress of the students by getting students to clarify and articulate what they have found out. Challenging their assumptions and getting to discover their misconceptions if any, helping them overcome learning obstacles, scaffolding their learning by having teacher-student discourse are amongst some of the things happening here. Students should leave this meeting having a clearer idea about further research and/or depth they have to look in certain areas for them to solve the problem.</p>
<p>4. Breakout 2: 11.30 am to 1.30 pm</p>	<p>Another stage where students are left on their own, they would be gathering further data and research and start to see how they can present and articulate their solutions. Again, self-directed and collaborative learning behaviors are expected.</p>
<p>5. 3rd Meeting: 1.30 pm to 4 pm</p>	<p>At this stage, consolidation of learning takes place. Each team of 5 gets to present their solutions, and at the same time, a discourse between different teams, defense of points are encouraged and negotiated meaning between all are encouraged. Facilitators also present a 6th Presentation to allow students to see how, if an expert were given the same problem, how they would approach it. Encouragement of gaps in their learning and even in the expert’s way is encouraged. Students end their learning by doing a peer and self-evaluation, a short online quiz and doing a reflection journal, usually by midnight the same day to encourage them to reflect back on their own learning. A holistic, formative-feedback is given to each of them by the facilitator along with a daily grade that looks at their learning approaches, the process skills they shown, their teamwork, their articulation, their reasoning and analytical skills and their reflection journal entries.</p>

The theories above, coupled with the purposes of our One-Day, One-Problem™ pedagogy helps shaped what elements of EVGs and how we are introducing them for our aims of enhancing engagement and hence, promoting active, critical learning. For example, the instructional needs of the First Meeting, within the One-Day, One-Problem™ process where we expect divergence of thinking and a more open-ended process of questioning between facilitators and students alike, needs to be carried on in the EVGs introduced. Another example would be that the structure of the One-Day, One-Problem™ with its three meetings and two breakout sessions within a day has to come into play when deciding on the duration and design of the EVG. The whole approach and methodology is summarized below for a quick snapshot before we go into the details of the two phases.

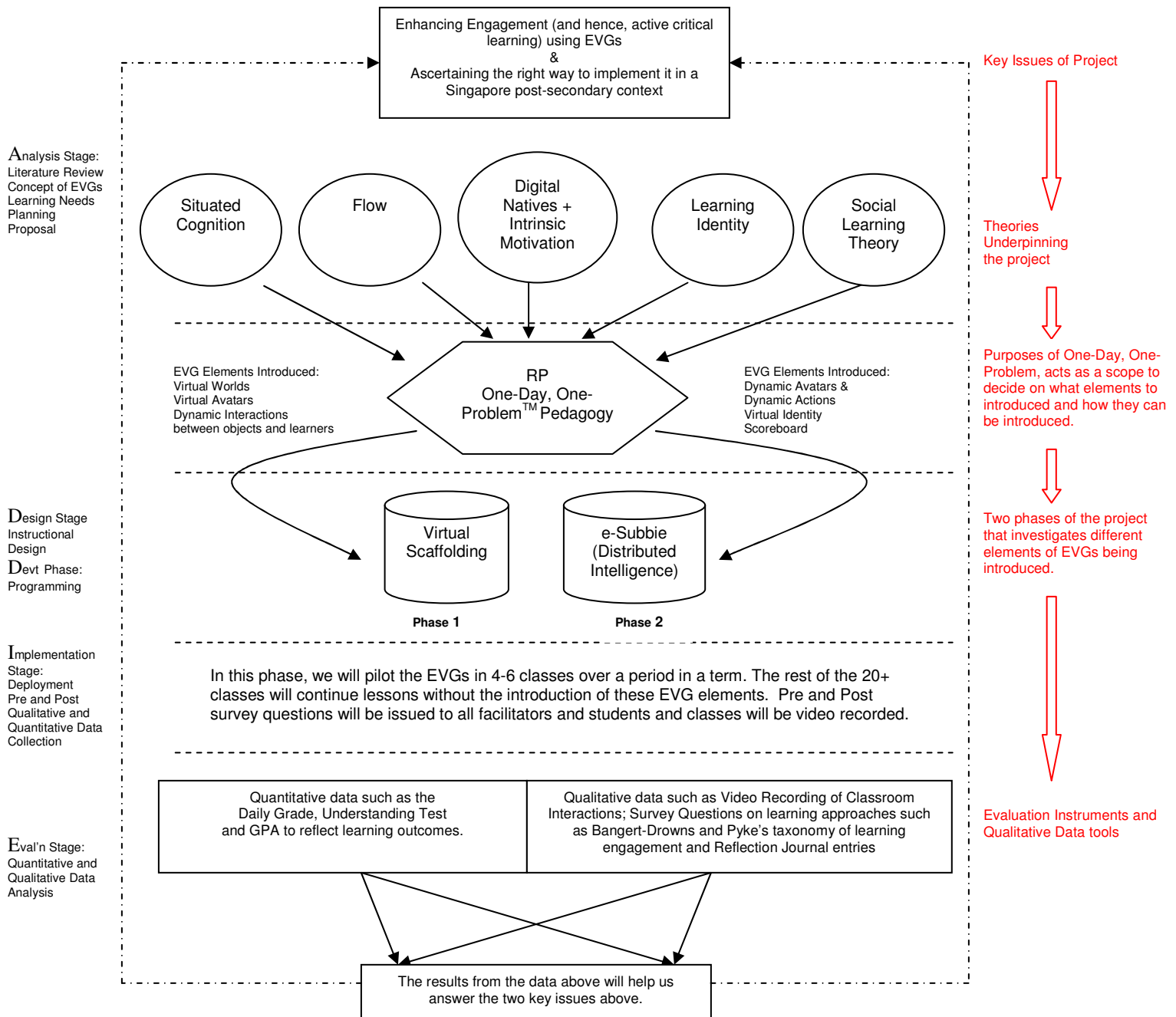


Figure 1: Approach Framework

The details of the two phases will be explained in the proper paper submitted later. Suffice to say that the first incorporates the idea of Virtual Worlds to help scaffold learning while the other revolves around the idea of how avatars can change based on a gamers' actions in normal EVGs and translating that into the education paradigm.

More details about the quantitative and qualitative data that we will be collecting will also be highlighted.

Conclusion

This paper seeks to describe a new project that is being launched in April 2007 to explore the impact on students' engagement and their learning, when elements of EVGs are introduced in a tertiary institution in Singapore that has a constructivist pedagogy. The objectives, the approach and the theoretical underpinnings have been described and it is hope by presenting in the conference, the sharing of ideas and insights by fellow educators and technologists may be forthcoming to improve the project at this early stage and also, hopefully, it can shed some insights to some of the delegates that are attending.

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