

# Exploring the Potential of Virtual Worlds for Enquiry-Based Learning

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**Abstract.** Nowadays academic institutions seek to equip students with interpersonal and project management skills by enhancing their learning experience through the use of new collaborative technologies. This paper presents an enquiry based learning initiative at Manchester Business School. A virtual world environment was introduced to facilitate group project work. The setting was the B.Sc. Information Technology Management for Business (ITMB) programme, a new degree designed to meet the needs of major employers in the business-led IT sector. This paper discusses how the project acted as a vehicle for increasing the involvement of employers in the programme and achieving the objectives of greater student creativity, productivity, engagement, participation and productivity in team work.

**Keywords:** Virtual worlds, Second Life, EBL, team work.

## 1 Introduction

Virtual worlds are 3D environments that combine game-based graphical capabilities with social interaction systems [5]. They allow educators to organize pedagogical events and explore new innovative methods for teaching and learning [12]. They provide a sophisticated environment where users can interact, socialize and collaborate [17].

It has been shown (see for example [10] and [16]) that enquiry based learning (EBL) approaches increase creativity and participation in student teams by encouraging students to 'learn by doing'. In this paper, we describe an EBL based project where students are encouraged to be creative through the use of 'Second Life', one of the most well known virtual worlds. In such a virtual world, learners' collaborative interactions can occur across distance using avatars (i.e. users' computer representations). Interpersonal dynamics amongst avatars facilitate learning activities in a manner rather different than typical face-to-face collaborative meetings [8]. It should be noted however, that virtual worlds are not limited in supporting distance education but they can also be used to enhance classroom activities [9].

Apart from academic institutes, businesses are increasingly deploying virtual worlds for business collaboration and seek to build a virtual presence for themselves.

Recent research suggests that “slowly, companies are leaving the physical world behind to cut costs, improve communication, and find new ways to collaborate” [20].

ITMB (IT Management for Business) is a UK undergraduate programme that was designed by leading IT employers such as Accenture, BBC, BT, Capgemini, Cisco, Deloitte, Logica, HP, IBM, Morgan Stanley, Procter & Gamble and Unilever. It seeks to equip students not only with IT management but also with interpersonal and project management skills (more details about ITMB can be found at [www.e-skills.com/itmb](http://www.e-skills.com/itmb)). Manchester Business School runs an ITMB programme that involves employers through events, guest lectures, guru lectures delivered via video conferencing, and a mentoring scheme. Employers contribute to the curriculum by offering business problems and case studies and by organizing career and onsite events for the students.

This work discusses an EBL based project involving employers, tutors and ITMB students at Manchester Business School. The paper starts with an overview of the key concepts associated with virtual worlds and EBL. This is followed by a description of the EBL based project. The outcomes of the project are discussed and assessed through the perspectives of the main three stakeholders: employers, students and tutors. Group performance results are presented. The paper concludes with a summary of the work.

## 2 Virtual Worlds

Virtual worlds are computer programs which allow users to connect and interact with each other in real time in a shared visual space. They possess key features of interactivity, physicality, and persistence [2] that enable the creation of a feeling of being with others. They are essentially 3D graphical environments, which were originally developed from the field of computer games, and can be accessed over the Internet [29]. They allow a large number of users to interact synchronously. Such environments have evolved into stimulating, dynamic and collaborative settings [29]. Apart from education communities considering the use of virtual worlds, commercial enterprises such as IBM are also exploring the use of these spaces for improving leadership and strategic thinking skills [11].

As Salt et al [29] point out, Second Life is a popular virtual world that allows users to create complex environments and objects. It is a 3D immersive world with chat facilities and social spaces where users can reconstruct the virtual space. It provides sophisticated graphics and has a relatively low cost of entry. It has not been specifically designed as a pedagogical instrument for supporting teaching and learning processes. Its creator Philip Rosedale, launched Second Life as an objective-orientated game back in 2003. Later on, the concept evolved into a user-created environment, in which the in world residents are creators of their own environments [2].

Kay and Fitzgerald [19] suggest that 3D virtual worlds allow for rich experiences, experiential learning activities, role-play and simulation. They are platforms for data visualisation and offer collaborative opportunities. Kay and Fitzgerald also explain that Second Life is used to support educational needs and suggest a list of educational activities that can take place including: self-paced tutorials, displays and exhibits, data visualisations and simulations, historical re-creations and re-enactments, living and immersive archaeology, machine construction, treasure hunts and quests, language and cultural immersion and creative writing. Most of these activities can be used to encourage experiential learning. Discipline areas represented in Second Life include

computer programming and artificial intelligence, literature studies, theatre and performance art, language teaching and practice, politics, commerce, architectural design and modelling and urban planning.

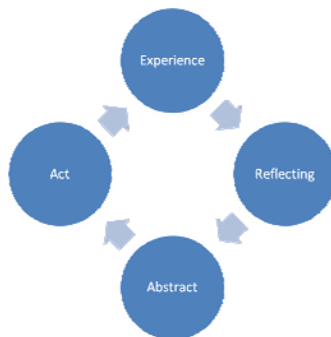
A large number of educational institutions around the world, including Manchester Business School, are now investigating and using Second Life as an educational platform. As the following statistics by the Gronstedt Group [13] suggest, an increasing number of individuals, communities and businesses are now using Second Life:

- 80 percent of Internet users will be active in non-gaming virtual worlds such as Second Life by the end of 2011.
- IBM is investing in a number of Second Life islands, and other major companies are following suite e.g. Sun, Dell, Intel, Adidas, and Toyota.
- Hundreds of universities, including Harvard and INSEAD, have set up classes in Second Life.

### 3 Enquiry-Based Learning (EBL)

EBL is described as an environment in which learning processes are approached by learners' enquiries. In such environments generated knowledge is easily retained as it was previously experienced by the learner. EBL paves the way for learners to be problem solvers and knowledge creators in their future working environments [10]. The theory of experiential learning specifies that "knowledge is created through the transformation of experience" [21] – see the four modes of learning in Fig. 1. Experiential learning, can be conversational, whereby, "learners construct meaning and transform experiences into knowledge through conversations" [3]. These conversations could be held electronically through the use of virtual worlds.

"Without the opportunity for experiential learning of some sort, management education programmes will continue to produce students unprepared for the realities of organizational life" [15]. The ITMB programme at Manchester Business School aims to equip students with academic as well as interpersonal and project management skills, by engaging students in project group activities and involving employers. In this paper, one example of engaging students in experiential work is presented.



**Fig. 1.** Experiential Learning Model (source: Kolb [21])

## 4 An EBL Project

This section discusses the task, team arrangement, and structure of the EBL project that was undertaken at Manchester Business School. The setting was the Business Team Project course unit, whose main learning objective was to practice an EBL project with a business problem set by an industry client. E-skills UK, a not-for profit organization whose aim is to advance technology skills in the UK, and IBM provided the problem. The task was to create a virtual world environment where ITMB students, prospective employers, school teachers and university academics could meet for purposeful activity. The deliverable was to identify stakeholders and requirements, design a proof of concept ITMB environment and organize a virtual world event. As Manchester Business School had a presence in Second Life, it was decided that Second Life would be the preferred virtual world environment.

The students had access to a wide range of rooms and facilities available on the Manchester Business School island (i.e. virtual space). Thirty eight second year undergraduate students were divided into seven teams of five or six. Each team had to identify the needs of ITMB stakeholders e.g. students, employers, and tutors and organize an event in Second Life to address some of their requirements. The taught part of the Business Team Project involved a one-hour lecture and a two-hour tutorial session each week throughout the academic year (20 weeks of teaching). Discussion boards on Blackboard were set up in the second semester to provide technical support.

The lectures covered a range of topics including project management, research methodologies, stakeholder analysis, facilitation techniques, business report writing, organization of events and presentation skills. Guest lectures with speakers from companies on topics such as teamworking skills were arranged. The aim of the tutorials was to enable students to acquire technical skills (administration of virtual spaces) and encourage them to adopt an EBL approach. During the first semester students met with tutors during the tutorial hours to discuss ideas, define the scope of the project, identify requirements, and set up a plan. In the second semester, students undertook Second Life tutorials to familiarize themselves with the environment and design

**Table 1.** Second Life events organised on the MBS island

Team no.	Event description	Employers involved
1	ITMB careers event	HP
2	Collaborative meetings in Second Life	Deloitte, e-skills UK
3	ITMB troubleshooting session offering advice	--
4	Presentations by employers and Second Life tutorials	P&G, e-skills UK
5	Facilitation of group activities	--
6	Mock interviews with employers	Careers Service
7	Informal networking bar & lecture facilities	Accenture, e-skills UK

suitable areas for their event. Most of the teams invited employers and organized mock events. All of them used specialized software to video their actual events. Table 1 provides descriptions of the events organized. All groups produced video clips to describe their efforts and some of them were posted on YouTube:

[www.youtube.com/watch?v=bzvRTByVeAw](http://www.youtube.com/watch?v=bzvRTByVeAw)

[www.youtube.com/watch?v=kYXiMZUxFGc](http://www.youtube.com/watch?v=kYXiMZUxFGc)

## 5 Results

In order to assess the EBL project, we applied a collaborative learning framework that consists of the following five concepts [24]:

- *Participation*: level of teamwork, participation in discussions
- *Productivity*: level of achievement, quality of outcome
- *Creativity*: level of contribution of ideas, novelty
- *Engagement*: level of motivation, passion for their work, enthusiasm
- *Understanding*: level of understanding of the problem, and application of theory to practice

The above key concepts have been found to be important by a number of studies on teamwork: participation ([1], [14], [16], [18], [25], [27]), productivity ([4], [18], [25], [27]), creativity ([10], [16]), engagement ([7], [10], [18], [22], [26]), and understanding ([6], [16], [23]).

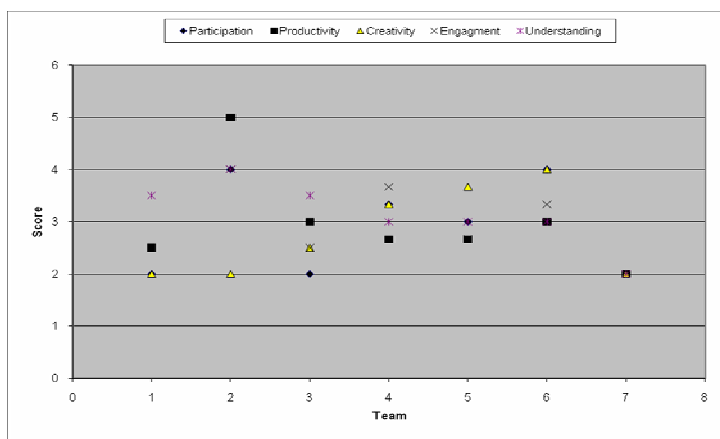
The students' team work was assessed from three different perspectives (i.e. students, employers and module tutors) taking into account the above criteria. In the case of the students, we adapted the framework to establish whether Second Life improved their performance (students' perspective).

### 5.1 The Students' Perspective

In order to establish the students' attitudes towards the project, a questionnaire was administered. The aim of the questionnaire was to collect feedback on the use of Second Life and to establish the attitudes of the students towards the virtual world environment and rate their overall experience. A total of 17 responses were received. The analysis of the findings in terms of level of participation, creativity, productivity, engagement and level of understanding are shown in Fig. 2.

The results show that in terms of participation in Second Life events (i.e. equal contributions from teams' members, honest opinions on ideas and questioning of ideas) 50% of the students rated their participation as "weak", 6% as "average" and 44% as "very good". In terms of productivity i.e. whether the use of Second Life reduced social loafing and production blocking, 56% of the students reported productivity as "satisfactory", 13% as "good", 25% as "very good" and only 6% as "excellent". In terms of generating new ideas and knowledge (creativity), 38% of the students rated Second Life as a "very good" environment, 31% as a "good" environment, 25% as "satisfactory" and only 6% rated the environment as "poor". In terms of engagement i.e. whether team members applied more effort to the task when engaged in Second Life activities, 44% stated that engagement was "satisfactory", 19% stated it was "good" and 38% stated it

was “very good”. In terms of understanding (i.e. whether Second Life guided the students into a deeper level of understanding of theory such as IT development, project management and group theory through practice) 6% reported that understanding was “poor”, 25% reported a “superficial understanding”, 25% reported “average”, and 44% reported the environment to lead into a “deep understanding”.



**Fig. 2.** Students’ attitudes towards Second Life

The students also provided qualitative feedback. Some of their concerns regarding SL are highlighted in the following statements:

“I think we still prefer more face-to-face meeting than doing it in SL. Because in SL, people who are SL active users might tend to be distracted from participating and less interested people are not keen to do anything in SL.”

“People do not take meetings seriously in SL it is treated like a game.”

“People are unsure of its uses, so don’t know how creative they can be.”

## 5.2 The Employers’ Perspective

The employers’ assessment of the students’ work was carried out at an ITMB employers’ event. Such events are regularly organized at Manchester Business School to help ITMB students develop their presentation skills. They have been shown to increase the students’ confidence and their ability to converse with business representatives, which will hopefully increase their performance at job interviews. During the ITMB event, all the groups were given the opportunity to demonstrate their work using posters and video clips. Several employers from a range of companies such as IBM, Accenture, Deloitte, e-Skills UK, P&G, Unilever, BT and Informed Solutions, visited the stands of the groups and assessed their project work by completing a feedback form.

Fig. 3 shows the employers’ assessment results based on the level of participation, productivity, creativity, engagement and understanding of the groups. In terms of level of teamwork and participation in discussion, two out of the seven student teams

were considered as “average”, and five of them were considered “very good”. In terms of level of achievement and quality of solutions, two out of the seven teams were regarded as “average” while the rest were rated as “very productive”. In terms of level of contribution of own ideas and novelty, five of the teams were rated as “very creative” while the rest as “average”. In terms of level of motivation, passion for their work and enthusiasm, five of the teams were thought of having a “very good” level of engagement. In terms of level of understanding of the problem, and application of theory to practice, the results showed that all of the teams were regarded as having a “deep understanding” of the problem.

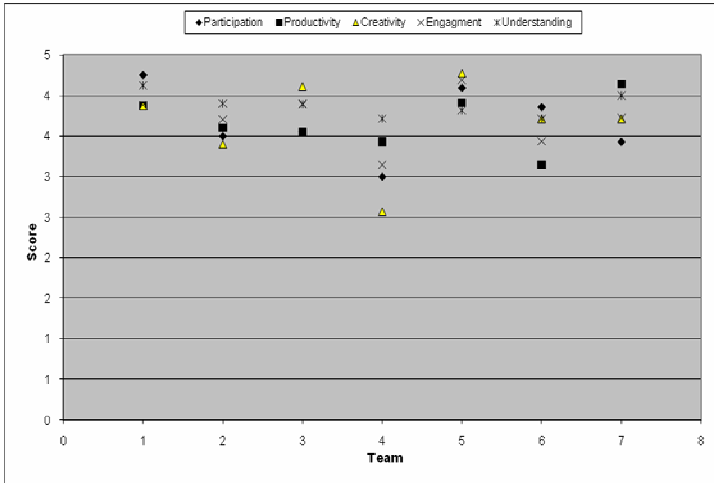


Fig. 3. Employers' assessment results

The employers also provided qualitative feedback to the groups. The following comments highlight the employers' priorities regarding the group project work:

- "clearly defined roles, team worked together plus supported one another"
- "highly innovative idea which given more time is likely to become something impressive"
- "good understanding of content plus needs of employers"

Employers gave higher marks to those groups who were able to articulate the business problem well and provide a solution that addressed the needs of several stakeholders. They were also looking for high quality solutions. For example, group 1 had thoroughly explored the business problem and had a contingency plan in place (in case their Second Life event was not successful), group 2 conducted several trial events and group 5 developed a technically superior solution.

Those employers who participated in Second Life events and engaged in activities found these quite stimulating. They felt that their Second Life experience was more satisfactory to that of a teleconference meeting. They also stated that the current financial crisis, which has imposed a strain over commercial travel budgets, has made Second Life events an attractive alternative to more traditional settings.

### 5.3 The Tutors' Perspective

The Second Life group project was rather intensive. Students had to work closely together in their groups. Their first task was to make sense of the business problem presented to them (i.e. organize an event in Second Life) and develop necessary skills so as to formulate solutions. As in many other group projects (see Rickards et al. [28]) they went through emotions of anxiety before optimizing their performance. It was therefore important that the level of participation in team work activities and discussions was equal from all members. Peer assessment results obtained twice during the academic year showed that the contributions of group members to the project were equal in most groups.

All the groups were productive. They performed very well and achieved very high marks. The opportunity to showcase their work in front of employers and academics boosted their confidence and made them have a sense of achievement at the end of the project. The project outcomes were all of high quality. Half of the projects were rated at distinction level with the remaining projects achieving a 'very good' mark.

The tutors were impressed by the level of creativity shown by the students. Each group came up with a different concept and solution to the problem. The EBL setting and the 'learning by doing' approach allowed the students to develop their own ideas and devise their own solutions based on their own creativity.

The interactions with employers and the incentive of three financial prizes by IBM, increased the level of engagement of the students and energized their work. A learner's motivation has been shown to have an impact on the quality of the learning experience [6]. All groups showed considerable enthusiasm and passion for their work during their presentations to employers and tutors.

The EBL setting encouraged the students to integrate different pieces of information from the course unit such as research methodologies and scripting in virtual worlds as well as other course units such as business application design and development, human computer interaction, database design and development and project management. This allowed students to arrive at a deeper understanding of theory through practice.

## 6 Conclusions

This paper discusses an EBL initiative that has been undertaken at Manchester Business School. Students of an IT Management for Business undergraduate programme were presented with a business problem and were encouraged to 'learn by doing in groups'. Each group generated different ideas and produced different solutions to the same problem. The solutions were developed in Second Life, a virtual world environment. The project outputs were presented to both employers and tutors. A framework of five concepts (participation, productivity, creativity, engagement and understanding) was applied to assess the overall experience of the students in the virtual world (students' perspective), as well as the outcomes of the project (employers and tutors' perspectives). The students had to integrate theory from different modules and develop new skills such as navigating, interacting and designing new spaces in a virtual world as well as interpersonal skills such as presentation, project management and teamwork



skills. The involvement of employers in the EBL project evidently stimulated active engagement and boosted students' self confidence. The group projects will continue next year with a different business problem presented to the students.

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## References

- [1] Aiken, M., Govindarajulu, C.D., Horgan, D.: Using a Group Decision Support System for School-based Decision Making. *Education* 115(3), 420–425 (1995)
- [2] Au, W.J.: *The Making of Second Life: Notes from the New World*. Collins Business, New York (2008)
- [3] Baker, A.C., Jenson, P.J., Kolb, D.: *Conversational Learning an Experiential approach to Knowledge creation*. Quorum Books, Connecticut (2002)
- [4] Carroll, J.: *HCI Models, Theories, and Frameworks*. Morgan Kaufmann, Elsevier Science (2003)
- [5] Castranova, E.: *Virtual Worlds: A First-Hand Account of Market and Society on The Cyberian Fronteir*. CESifo Working Paper Series No. 618 (2001), <http://ssrn.com/abstract=294828> (Retrieved April 27, 2009)
- [6] Cocea, M., Weibelzahl, S.: Can Log Files Analysis Estimate Learners' Level of Motivation? In: 14th Workshop on Adaptivity and User Modeling in Interactive Systems, Hildesheim, October 9-11 (2006)
- [7] Coch, L., French, J.: Overcoming Resistance to Change. *Human Relations* 1(4), 512–532 (1948)
- [8] Dede, C.: Emerging technologies and distributed learning. *American Journal of Distance Education* 10(2), 4–36 (1996)
- [9] Dillenbourg, P., Schneider, D., Synteta, P.: Virtual Learning Environments. In: *Proceedings of the 3rd Hellenic Conference on Information and Communication Technologies in Education*, pp. 3–18 (2002)
- [10] Edelson, D.C., Gordin, D.N., Pea, R.D.: Addressing the Challenges of Inquiry-Based Learning Through Technology and Curriculum Design. *The Journal of Learning Science* 8(3&4), 391–450 (1999)
- [11] GIO, *Virtual Worlds, Real Leaders* (2007), [http://domino.watson.ibm.com/comm/www\\_innovate.nsf/pages/world.gio.gaming.html](http://domino.watson.ibm.com/comm/www_innovate.nsf/pages/world.gio.gaming.html) (Retrieved April 6, 2009)
- [12] Good, J., Howland, K., Thackray, L.: Problem-based learning spanning real and virtual worlds: a case study in Second Life. *ALT-J, Research in Learning Technology* 16(3), 163–172 (2008)
- [13] Gronstedt, A.: *Welcome to Web 3-D!* (2007), <http://commons.iabc.com/branding/category/second-life/> (Retrieved April 5, 2009)

- [14] Guzzo, R., Dickson, M.W.: Teams in Organizations: Recent Research on Performance and Effectiveness. *Annual Review of Psychology* 47, 307–338 (1996)
- [15] Hyde, P.: Integrating experiential learning through ‘live’ projects: A psychodynamic account. In: Reynolds, M., Vince, R. (eds.) *Experiential Learning and Management Education*, pp. 291–308. Oxford University Press, Oxford (2007)
- [16] Kahn, P., O’Rourke, K.: Understanding Enquiry-based Learning (EBL), *Handbook of Enquiry & Problem Based Learning*. In: Barrett, T., Mac Labhrainn, I., Fallon, H. (eds.) pp. 1–12. CELT, Galway (2005), <http://www.nuigalway.ie/celt/pblbook/> (last accessed on February 17, 2009)
- [17] Kahai, S., Carroll, E., Jestice, R.: Team Collaboration in Virtual Worlds. *The DATA BASE in Advances in Information Systems* 38(4), 61–68 (2007)
- [18] Karau, S.J., Williams, K.D.: Social loafing: A meta-analytic review and theoretical integration. *Journal of Personality and Social Psychology* 65, 681–706 (1993)
- [19] Kay, J., FitzGerald, S.: Educational Uses of Second Life (2007), <http://sleducation.wikispaces.com/educationaluses> (Retrieved April 5, 2009)
- [20] King, R.J.: It’s a Virtual World (2009), <http://www.strategy-business.com/li/leadingideas/li00121> (Retrieved April 27, 2009)
- [21] Kolb, D.: *Experiential learning: Experience as the source of learning and development*. Prentice-Hall, Englewood Cliffs (1984)
- [22] Kravitz, D., Martin, B.: Ringelmann Rediscovered: The Original Article. *Journal of Personality and Social Psychology* 50, 936–941 (1986)
- [23] Lee, V.S., Greene, D.B., Odom, F., Schechter, E., Slatta, R.W.: What is Inquiry-Guided Learning? In: Lee, V.S. (ed.) *Teaching and Learning Through Inquiry: A Guidebook for Institutions and Instructors*. Stylus Publishing, Sterling (2004)
- [24] Macaulay, L.M., Tan, Y.L.: *Enhancing Creativity through Group Intelligence Software* (2009) (Working paper)
- [25] Manning, L.M., Riordan, C.A.: Using Groupware Software to Support Collaborative Learning in Economics. *Journal of Economic Education*, 244–252 (2000) (Summer)
- [26] Markus, M.L.: Power, Politics, and MIS Implementation. *Communication of the ACM* 26(6), 430–444 (1983)
- [27] Nunamaker, J., Briggs, R., Mittleman, D., Vogel, D., Balthazard, P.: Lessons from a Dozen Years of Group Support Systems Research: a Discussion of Lab and Field Findings. *Journal of Management Information Systems* 13(3), 163–207 (1996)
- [28] Rickards, T., Hyde, P.J., Papamichail, K.N.: The Manchester Method: A critical review of a learning experiment. In: Wankel, C., DeFillippi, R. (eds.) *Educating Managers through Real World Projects*, pp. 239–254. Information Age Publishing, Greenwich (2005)
- [29] Salt, B., Atkins, C., Blackall, L.: *Engaging with Second Life: Real Education in a Virtual World* (2008), <http://slenz.files.wordpress.com/2008/12/slliteraturereviewa1.pdf> (Retrieved June 20, 2009)