World Maritime University

The Maritime Commons: Digital Repository of the World Maritime University

World Maritime University Dissertations | Dissertations

2012

# Virtual MET Institution : assessing the potentials and challenges of applying multi-user virtual environment in maritime education and training

Trong Hieu Pham
*World Maritime University*

Follow this and additional works at: https://commons.wmu.se/all_dissertations

 Part of the Educational Methods Commons

This Dissertation is brought to you courtesy of Maritime Commons. Open Access items may be downloaded for non-commercial, fair use academic purposes. No items may be hosted on another server or web site without express written permission from the World Maritime University. For more information, please contact library@wmu.se.

**WORLD MARITIME UNIVERSITY**

Malmö, Sweden

# Dissertation

## Virtual MET Institution: Assessing the potentials and Challenges of Applying Multi-User Virtual Environment in Maritime Education and Training

By

**PHAM TRONG HIEU**

**Vietnam**

A dissertation submitted to the World Maritime University in partial Fulfillment of the requirements for the award of the degree of

**MASTER OF SCIENCE**

**In**

**MARITIME AFFAIRS**

**MARITIME EDUCATION AND TRAINING**

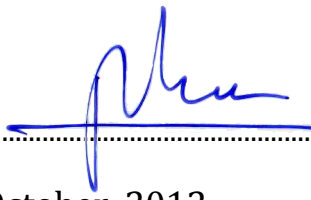
**2012**

Copyright Pham Trong Hieu, 2012

# Declaration

I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents in this dissertation reflect my own personal views, and are not necessarily endorsed by the university

(Signature): 

(Date): 22nd October, 2012

**Supervised by:**

**Takeshi Nakazawa**
**World Maritime University**

**Johan Bolmsten**
**World Maritime University**

**Yvonne Dittrich**
**IT University of Copenhagen**

**Assessor: Daniel Moon**
**Institution organization: World Maritime University**

**Co-assessor: Harro Kucharzewski**
**Institution organization: MarineSoft Entwicklungs- und Logistikgesellschaft mbH**

# Acknowledgements

I wish to express my deepest appreciation to Professor Takeshi Nakazawa, Professor Yvonne Dittrich, and Lecturer Johan Bolmsten, whose tremendous support, insight and guidance help me to walk through the difficulties. Without their persistent help this dissertation would not have been possible.

My special thanks to Mr. Johan Bolmsten for all the guidance, feedback and advice that he has given to me. He had spent enormous time and effort to give me the greatest detail of valuable feedback and recommendations.

It gives me great pleasure in acknowledging the support from Ms. Inger Sund Battista for her language supervision feedback and corrections.

I would like to thank my family, dear friends and all the members of MET class 2012 for all the support and encouragement they have given me during my studies and this dissertation.

Malmö, Sweden, October 2012

**Pham Trong Hieu,**

# Abstract


Title of Dissertation: **Virtual MET Institution: Assessing the potentials and Challenges of Applying Multi-User Virtual Environment in Maritime Education and Training**

Degree: **MSc**

The dissertation is a study to assess the potentials and challenges in the use of Multi-User Virtual Environment (MUVE) in Maritime Education and Training (MET) context. Virtual technology is growing at fast pace. The applications of MUVE are being utilized by numerous institutions across many educational professions. However, the area of utilizing MUVE in MET is still very limited.

At the time being, it is indicated that there is possibility to take advantages of MUVE to create: (1) an enhance learning environment, (2) collaboration tools to support the distributed knowledge community, and (3) new modes of distance learning.

METs are facing with several contemporary issues. There are necessities to foster the learning experience of future seafarers, to promote expertise exchange, and to continuously support its community of practice from distance. The investigation of MUVE's characteristics and its applications suggests chances to tackle the such issues. Obviously, assessing the potentials and challenges of applying MUVE in MET become critical.

The assessment tasks are conducted by examining the potentials that an institution can benefit as well as challenges that it would face. Then it is repositioned into MET contexts by taking into account the reality of MET's culture and practices.

The outcomes of the assessments indicate the affordance of MUVE for educational activities in MET institutions. Being aware of the limitations of the research itself, a number of recommendations are made concerning the need for further investigation in the subject.



**KEYWORDS:** Virtual world, MUVE, Community of practice, Second life, virtual classroom,


- "…enhance learning environment…"
- "…assessing the use of MUVE in MET…"
- "…support distributed knowledge community…"

# Table of contents

## Glossary

| | |
|---|---|
| Flickr | A photo sharing service: http://flickr.com |
| In-world | Inside the virtual world |
| Massive Multiplayer Online Game | Persistent online game environment in which hundreds to millions of players can create their own avatars, interact and engage in game play within a shared game plot or quest structure. |
| MOODLE | Moodle is an Open Source Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). More information: https://moodle.org/about/ |
| Resident | A user of a virtual world |
| Scripting | Programming inside virtual world. This is to defined or assign functionalities to an object |
| Second Life | A virtual world hosted by Linden Research Inc.© |
| SLOODLE | SLOODLE (Simulation Linked Object Oriented Dynamic Learning Environment) is an Open Source project which integrates the multi-user virtual environment of Second Life® with the Moodle® learning-management system. |
| SLURL | Second Life Uniform Resource Locator. A web link that leads to a particular Second Life location |
| Teleport | Instantly changing the locations of an avatar |
| Virtual world | An environment that is synchronous, persistent network of people, represented by avatars and facilitated by networked of computers. |

# Chapter 1

## Introduction



*This chapter is to provide basic information about this dissertation paper. The background section helps the readers to understand the need to conduct this research.*

*In section 1.2, the research question and its guided objectives are defined. it also describes briefly approaches that the research will use to achieve these objectives .*

*Section 1.3 provides readers a complete snapshot of the structure of this paper and the coverage of each subsection.*

*Section 1.4 presents the research methodology approach of this research. the supportive information of such approach is given. In addition, the information about the research design, construction, empirical works, and the data collection processes will be described in detail.*

## 1.1 Background

New Information Communication Technologies (ICT) open up more and more choices for new modes of learning in Maritime Education and Training (MET). The potential to deliver learning at a distance has led to a global revolution in education. Many educational institutions now provide a range of courses and programs to students outside the local campus. As Muirhead (2003) recognizes, in MET, ICT is opening up new opportunities to extend the learning and training environment to onboard the ship. The contemporary youth generation is showing a great potential in negotiating the use of new media. With the increasing of interactive and communication networks that connect peoples, organizations and data sources has completely changed the way people work, socialize, communicate, live and learn. Obviously, these changes are also reflected in both MET and its workplaces in general where new practices are introduced, so the knowledge and skills one has today, may be obsolete tomorrow. The fast rate of change in the development of ICT puts students vulnerable to the increasingly complexity and uncertainty in reality of work.

Within the Maritime Education and training (MET) context, such changes are bringing-in challenges as well as opportunities for the industry to better support their workforces, so as for MET to provide innovative teaching and learning tools, to create an enhanced learning environment that can go beyond the limitation of traditional system. It also provides opportunities for the MET communities to collaborate and to facilitate the utilization of the intellectual resources. This also helps to promote two ways knowledge contribution between the industry and the educational process.

The importance of lifelong support for seafarers and the extending of education beyond the traditional systems have been long recognized. In a paper about the role of maritime universities in empowering the seafarers, Solanki and Nakazawa (2007) emphasize the need of continuously supporting quality education for the seafarers. It is recognized that most shipping journals, magazines, conferences and seminars highlight the shortage of well educated and trained manpower on board ships, whereas 90% of seafarers sailing and ashore feel the need for higher education. It is suggested that empowering seafarers through higher integrated education and multiple skill development makes the career at sea more attractive by opening up a multitude of career options through the sea career path. By implication, a MET institution should not only create educational programs that are less expensive in time and money, cheaper, and more flexible, but also making best uses of both class teaching and

online learning that promote independent learning and reduce the class seat time (Granham & Keletta, 2002).

There are also other challenges that the effect of globalization makes the maritime industry becoming a very much multicultural working environment and increases its workforce mobility. Such changes in the working environment also impact the educational sector. Horck (2004) predicted that one day MET institutions might be faced with a student body of cultural mix that they are not trained to handle.

Not only that, being influenced by many factors such as technology innovation, the dynamic change in international laws and regulations, and the changing in industry culture, the future seafarers need to be equipped with interdisciplinary skills and knowledge to handle the dynamic and uncertainty of working reality. That means the faculty member of MET institutions should also find ways to upgrade, and exchange the knowledge and expertise with their students and their peers. Actually, the calling for the utilization of collaboration tools to address the immediate needs of the campus has been strongly emphasized. In expertise exchange, whether it is a maritime expert or a faculty who is from other professional, there are always challenges of understanding and embracing the pedagogical and scholarly demands associated with a dynamic balance of theoretical and experiential education (Zingale, 2007). That can be a maritime vocational instructor moving from shipboard operations to an academy simulation laboratory, or a linguistic teacher moving from other university setting to the maritime campus setting. Depending on the individual institutions, such needs are probably ranging from introducing newer educators to the basics of contemporary pedagogy and scholarship, strengthening the maritime resources network and comprehensive university campuses.

Obviously, in the current era of constant technology innovation , many educational assisted tools like simulation, video conferencing, online learning tool, so as with teaching and learning concept such as e-learning, blended learning and ideas like open educational resources are constantly developing and gaining more and more attention.

There is an emerging trend of utilizing the 3D virtual world of Online Multi-User Virtual Environments (MUVE) for educational activities. They are getting more attention and increasingly being examined by researchers. The term MUVE is currently used to describe a persistent 3D graphical environment which can be accessed over the internet and allow a

large number of simultaneous users to interact and communicate synchronously (Salt, Atkins & Balckall 2008).

The implementation of the “Virtual Institution” concept, which is a utilization of progressive development of MUVE platforms, have been introduced and is under experimental process by the industries and by many highly reputable universities. The examples are Harvard, MIT, Yale, Princeton, Lund University, IBM, Microsoft, and a long list of many more. Additionally, there is a considerable amount of research that has focused on evaluating and reporting about experiences of using the virtual worlds in education.

Under the concept of virtual institution", all the actors (i.e. teachers, students, and other experts) can create the graphical representation of themselves as ‘avatars’. These avatars move around the campus as a person would do, interact and socialize with each other by voice, instant text message, and other nonverbal communication tools. Within such immersive environment, the learners are able to experience the sense of presence – the sense of being there – as well as a higher level of interaction between actors than the current E-learning (Bailenson & Yee, 2008). The social interaction in itself can also support the learners by allowing rich-interactive collaboration which is absence in traditional e-learning tools.

However, in MET, less attention has been paid to the area of applying MUVE in educational activities. Having realized the challenges and the foreseen of future development in MET as well as taking into account the potential and capabilities of MUVE, it is possible for MET institutions to tackle such challenges by developing a learning environment that could provide and facilitate:

a) an enhanced learning environment,
b) lifelong learning opportunities for the maritime society and
c) a mechanism that effectively enables a contribution to knowledge expansion, production, and collaboration back from the maritime society

Although, many advocacy works and research from other professions have reported the educational possibilities of MUVE, these claims need to be verified particularly in the Maritime Education and Training context.

## 1.2 Overall research aim, focus and individual objectives

This research is to explore the educational potential of Muti-User Virtual environment in the Maritime Education and Training (MET) context. The research aims are to find the possibilities, challenges, barriers of whether the concept of virtual institution (VI) can be applied. The pedagogical, technological and practical aspects of how such virtual platform can potentially benefit MET and its communities are examined. Thereby, the research is guided by the following overall research question

*"Would it be possible to apply the concept of virtual institution into Maritime Education and Training context ?"*

The research objectives pursued in order to answer the research question are to:

**R01:** Investigate the potentials and challenges of applying MUVE into education, focusing on the use of virtual world in Second Life.

**R02:** Examine how the virtual institution concept which is an embodiment of MUVE can contribute to the educational activities of a MET institution.

**R03:** Assess the challenges that a MET institution might encounter during the implementation process

To accomplish the research objectives, the virtual institution concept of MUVE will be investigated from pedagogical, technical and practical viewpoints.

The research objective R01 is archived by investigating the MUVE from pedagogical perspective.The research will look at how virtual environments can help educators to provide a learning environment that engages students in more meaningful ways than those that are typically seen in the classroom (Lesser, 2005), or an environment in which engagement and higher-order thinking skills combine in a challenging, learner-centered instructional setting (Shaffer, Squire, Halverson & Gee, 2004). In addition, pedagogical theories that lie underneath the educational applications of MUVE will be examined.

The research objective R02 is achieved by examining technical considerations of the applications of MUVE. The research will examine a selection of virtual platforms available on the market. Predominately, the virtual world of Second Life™ from Linden Lab Inc. is investigated. In addition, literature case studies of other empirical research that are conducted by other universities or educational institutions across other professional fields will be

analyzed. Such examinations provide this research with information about the advantages, promises, and limitations of a new learning environment, as well as the lesson learned from difficulties and challenges in the implementation process.

In order to accomplish the research objective R03, the practicality aspects of applying MUVE in the MET will be considered. In this sense, various opinions, insights from authors of articles and journals in the area of the virtual learning environment, and from MET's experts will be discussed. To support the assessment tasks, the empirical data is gathered through the interview of MET experts – conducting at the International Maritime Lecturer Association Conference 20$^{th}$ in the Netherlands. The insights and opinions from the MET professionals are used to identify the potentials, challenges, and barriers that MET may encounter in applying MUVE.

## 1.3 Structure of the paper

This paper consists of five chapters. In chapter 1, the first section is the introduction which is trying to highlight the need to carry out the research work. The research objectives are defined, the research methodology and the research design are clearly described.

In chapter 2, the concept of virtual world and its revolution history are introduced. At the same time, some related definitions are defined. The section 2.2 of "Revolution history of virtual world" help readers to understand virtual world's originality, its transformation throughout decades of technological innovation, and its relationship with the gaming area.

However, to avoid misinterpretation while this paper is using terms such as game, simulation, and simulation game, the section 2.3 of "what is game, simulation, and simulation game" is expected to add more comprehensiveness. It is also to inform the uniformity in the usage of such terms throughout this entire research paper.

Additionally, the section 2.4 of "the use of Second Life in this research" will acknowledge the readers that although there are many MUVE platforms that are available in the market, most of the reflection and studied literature are mostly related with the Second Life virtual world platform. This is because Second Life is currently the dominated platform for many educational experimentations.

In chapter 3, theoretical frameworks that lie beneath the educational purposes of MUVE will be examined. The applications of MUVE in education are investigated, synthesized and

modeled into a comprehensive model so called an application components model of MUVE. After that, the case studies data and the virtual world interview data will be analyzed. The representation of the findings helps the readers to understand the reality of implementing and conducting educational activities inside the virtual worlds. Chapter 3 also helps the readers to realize the situation of applying MUVE into education, and to identify its possibilities, and challenges in other field of profession.

Chapter 4 will assess the use of MUVE in MET. The section 4.1 of "Survey data analysis – Situation of applying MUVE in MET" describes the empirical findings about the use of MUVE in MET as well as extracting the insights and foreseen from the MET's experts regarding the applications of MUVE. In section 4.2, the analysis of the MET interview data with opinions, insights from MET experts about the implementation of MUVE into MET practices will be presented. It serves the purpose to realize the reality of using MUVE in the educational activities from other fields of professions, as well as taking into account the reality of MET practices.

Chapter 5 provides the discussion about the potentials and challenges of utilizing MUVE in MET, which helps the research to answer the research question.

Finally, chapter 6 will come up with the conclusions, while mentioning the limitations of this research itself, the recommendations and suggestions for the future research will be provided.

## 1.4 Research methodology and design

### 1.4.1 Research methodology

This research was conducted using a flexible design approach, which involve the combination of quantitative data and also qualitative data during the process of data collection and analysis (Robson, 2002, p.164).

In this research, the literature review process indicate that applying the concept of virtual world in MET educational activities is still very limited. There is also the need to understand how the teaching and learning in virtual setting can take place in MET's culture. Such situation informs the need to conduct the quantitative survey targeted at MET lecturer community. In addition, the qualitative interview data with MET experts is also needed to further understand how teaching and learning in MUVE can fit into MET culture and its educational practices.

When the subject matter needs to be more clearly understood or defined, the flexible approach design based on qualitative research is justified. In this sense, as Ritchie and Lewis (2003) indicate, qualitative research is sometime used as prelude to statistical enquiry and measurements. They state that there can also be other circumstances where qualitative research is needed to provide greater understanding of the nature of an issue or phenomena, but the statistical measurements of its extents is not of interest.

Within a qualitative flexible research approach, a mixture of methods can also be used. In this research, the combination of documentary analysis and individual interviews are used. More than one qualitative method can be used in the investigation since it brings a particular kind of insight to a study (Ritchie, Lewis, 2003, p. 38). In this case, such combination is helpful in a sense that the individual interviews provide opportunities for detail investigation of people's personal perspectives, concerns and their insights within the research contexts located, which shows MET experts' perspectives on the use of MUVE in the MET. It is also helpful to illuminate the deeper meanings of subject matters, situations or events that cannot be investigated by direct observation or questioning, which is the exploration from literatures that help to understand how and in what way the learning occur under the virtual setting (Hammersley and Atkinson, 1995).

Although, there is still debate in social research about whether qualitative and quantitative approaches should, or even can, be combined. Some argues that the two approaches are so different in their philosophical and methodological origins that they cannot be effectively blended. However, others suggest that there can be value in bringing the two together (Ritchie, Lewis, 2003, p. 38). With multiple methods, the researcher has to confront the tensions between different theoretical perspectives while at the same time considering the relationship between the data sets produced by the different methods (Brannen, 1992, p.33).

Bryman (1988, 2001), Hammersley (1996), Morgan (1998) and Ritchie and Lewis (2003) have provided useful framework for reference and suggest that "there can be benefit in harnessing qualitative and statistically enquiry, provided that the two methods and the data they generate can be clearly delineated. It is because each of them could provide a distinctive kind of evidence and if they are used together, they can offer a powerful resource to inform and illuminate meaningful understanding of the phenomena.

### 1.4.2 Research design

This research is conducted using flexible qualitative approach. The empirical work has five parts: (1) Raw data collection through the Second Life educational directory, (2) the quantitative survey within MET community, (3) the interviews of MET's experts, (4) literature case study of the two educational projects that had conducted in virtual world of SL, and (5) the interviews of educator and student in virtual world of SL.

In addition, the literature syntheses are used in combination with the empirical work. The literature review helps the research to realize that there are considerable amount of studies in the area of applying MUVE as educational tools.

The literature review helps the research to recognize the preliminary contents that are critical for this study including the need to systematically define the concept of virtual world, the revolution history of the virtual world and the need to remind readers about the use of terms like game, simulation and simulation-game. Most importantly, it helps to identify range of factors that affect the teaching and learning in MUVE such as educational purpose of game and the community of inquiry model. The synthesis of the related work help the research to formulate and create the application components model of MUVE presented in section 3.2.

During the literature searching process, it was apparent that the application of the concept of virtual world in educational and training activities is still very limited within the MET area. Such tendency highlights the need to perform a survey targeted at the MET community. The survey was conducted at the 20$^{th}$ International Maritime Lecturer Association conference. It will examine:

- The situation of applying MUVE in teaching and learning activities
- The future trend of distance education which is possibly one of the applications of MUVE

In addition, open-ended individual interviews of MET experts were carried out. These interviews helped the research to understand the pedagogical aspect and criteria concerning teaching and learning activities in the MET environment.

Regarding the interviews that are conducted entirely in a virtual world, the researcher has to participate in a training session, which is planned to equip the researcher sufficient skills to manipulate the virtual world setting. The training session contain total of 12 hours in three week with the distribution of 4 hours a week. The training period is expected to cover:

- Register the Second Life service, create an avatar.
- Manipulating the navigation of the avatar inside the virtual world, interacting with the various basic object. For example, moving the avatar, flying, teleporting to desired destination, sitting down on a chair and change the sitting gestures.
- Handling 3D grammar, visual proximity and physical proximity such as adjusting the POV camera, using the mini-map and regional map.
- Managing communication features: getting to know how to use voice chat in public channel and private channel, instant messages, group message, IM to email, and managing groups, contacts.

Next, details about conducting the empirical work are described.

- **Research Materials**

  These include:

  - Articles, and journals needed for literature review work,
  - Raw data from Second Life educational directory,
  - survey questionnaire template,
  - question packs for open-ended MET's expert interview
  - Question template of semi-structure interviews for conducting in virtual world using the SL, which had different versions for lecturers and students,
  - reports for the literature case study: (1) final report from DELVE project about Design of Learning Spaces in 3D Multi-user Virtual Environments, conducted by the Open University (OU) and Nottingham University (NU). (2) Report from research exercise which investigate foreign language learning in Second Life, conducted by Arcadia Fellowship Programe at Cambridge University Library.

- **Data collection techniques**

  The research was conducted using five data collection and data analysis techniques:

  a) **Raw data from Second Life education directory:** The data consist of a list of academic institutions that have registered themselves under the educational directory in Linden Lab website. The data source is available at: "http://wiki.secondlife.com/wiki/Second_Life_Education_Directory". The raw

data contains basic information about the institutions such as name, country origin, types of institution. The analysis of this data set provide the research the overview about the situation of utilizing MUVE around the world.

b) **MET lecturers survey - survey data:** The survey was conducted after the primarily literature review at the early stage of the research using face to face interviewing survey technique. The survey contains five-point scale Likert items, open-ended items and yes/no alike items (the full template is available in Appendix A). The survey results were summarized as descriptive statistics. This data set helps the research to realize the situation of using the virtual world concept in teaching within MET lecturer community. It also provides information about the willingness, and the attitude of the MET community toward the utilizing of MUVE as educational tools. The survey helps the research to determine the future trend in distance education which is considered as one of the application of MUVE. There have been 12 valid applications responded.

c) **MET experts interview – MET interview data:** The open-ended interviews with MET experts were carried out during the International Maritime Lecturer Association Conference 20th conference in the Netherlands (IMLA). The majority of participants are MET educators, professionals and experts in the MET field who have been attended the IMLA and visiting professors at World Maritime University. Eight interview sessions had been conducted. The analysis of the interview help the research to assess the potential and challenges of MUVE and its applications in MET. This also helps to understand how the virtual institution concept can contribute to the educational activities of MET. In that sense, this empirical work contribute the accomplishment of the research objectives R02 and R03.

d) **Content analysis, literature case study from the two empirical projects – case study data:** In this part, the research used the two reports from:

   i. Design of Learning Spaces in 3D Multi-user Virtual Environments, conducted by the Open University and Nottingham University (Minocha & Mount, 2009), and

   ii. Foreign language learning in Second Life and implication for resources provision in academic library – from Cambridge University, UK (Hundsberger, 2009).

The data analysis is to help the research to understand the reality of conducting educational activities in the virtual worlds. Therefore it supports the research to assess the potentials and challenges of applying MUVE into education that has been described in research objectives R02 and R03

e) **In-world interviews of participant of virtual classes – virtual world interview data:** The participants are lecturers and students that have experience themselves with the teaching and learning practices in the virtual environment. These participants are contacted via Second Life educators networks and the interviews are conducted entirely within the virtual world through avatars. These are semi-structured interviews which follow the questionnaire templates. There are different templates for student and teacher (the questionnaire templates is available in Appendix B). The interviews were performed entirely in a virtual world using avatars. One teacher and one student were interviewed. This empirical work offers opportunities for understanding difference aspect of actual teaching/learning practices in the virtual environment. this piece of empirical work contribute to the accomplishment of objectives R02 and R03.

   Regarding the applicability of carrying out a social qualitative research methodology that is conducted entirely in a virtual world, there has been a great deal of research to study whether the virtual world behavior maps onto "true" human behavior, and it is still an open debate. However, Ross, Castronova and Wagner (2012) concluded that the virtual worlds are a valid location for empirical research and many methods from the "real" world are suitable for deployment.

The analysis process was guided by the objectives to examine the actual practice of participating in a virtual class from both teacher and student standpoints, and to identify the advantages, challenges that one may encounter during the implementation and development process.

# Chapter 2

## What is virtual world?

### 2.1 Today Definition of virtual world

### 2.2 Revolution history of virtual world

### 2.3 What is Game, Simulation and Simulation game?

### 2.4 The use of Second Life in this research

*Chapter 2 serves an important purpose of providing readers essential information to understand the subjects presented in the next chapter 3 and 4.*

*Section 2.1 describes in detail of what it meant by the term "virtual world". It is essential in a sense that it presents key elements for an environment to be called a virtual world, a concept that the research objectives are targeting at. Relevant key terms are also defined.*

*Section 2.2 describes the revolution history of virtual worlds under the development of ICT.* It shows that *the virtual worlds have their roots in the gaming world from the early days of Multi-user Dungeons to the Massive Multiplayer Online Games of today*

*Section 2.3 explains the use of terms and scope of its interpretation in this paper, these terms are Game, Simulation and Simulation-games. The term "simulation" should be interpreted generally in wider scales and contexts. It does not specifically mean the strictly requirement Marine Simulation as in the MET field.*

*Section 2.4 explains why this research paper use the Second Life virtual world as an sample to perform the investigation process. It is because there are many virtual world platform available in the market. Second Life represents the most mature of the social virtual world platforms, and the high figures compared with other competing platforms reflect this dominance within the educational world.*

## 2.1 Today's definition of Virtual World?

In the pass, many scholars have been trying to sketch out a definition of what virtual world is, but it seems there was hardly have a completed one. According to Bell (2011), from the 1970s and 1980s when Richard Bartle, a creator of text-based virtual world, defined the "world" part of "virtual world" as "a world is an environment that its inhabitants regard as being self contained". This does not necessarily mean an entire planet: It can be used as "the Roman world" or "the world of finance". This definition did define the notion of world but did not address what make the world "virtual" (Bell, 2008). Raph Koster, an experienced developer of virtual world in 1990s, argues that " a virtual world is a spatially based depiction of a persistent virtual environment, which can be experienced by numerous participants at once, who are represented within the space by avatars" (Koster, 2004). Via this, Koster has sketched out some of the basic elements of a virtual world (e.g. persistence, numerous participants). What is still missing is the link with the technology that brings these environments into existence. Another virtual-world researcher, Edward Castronova defined it as: "crafted place inside computers that are designed to accommodate large numbers of people" (Castronova, 2004). Such definition did bring the technology elements into the stage, but is still missing the "persistence", "synchronous communication" and "social" elements. These definitions refer to a shared space; they do not explicitly identify the people and their social network which might be an essential element. Without users, a virtual world would be an empty data warehouse (Bell, 2008).

Virtual world has a long history of revolution and its definitions are also revolutionized along the way – which is further discussed in the next section 2.2. Virtual world exists in many forms, where the scope of this research focuses merely on the modern computer based era. The term "Virtual World" used throughout this paper refer to a world where it has the following characteristics: synchronous communication, persistent network of people, represented by avatars, and facilitated by network computers (Bell, 2008).

**a. Synchronous communication**

Shared activities necessitate synchronous communication. A notion of "common time" allows for mass group activities and other coordinated social activities. Virtual worlds also offer an awareness of space, distance and co-existence of other participants found in real life spaces giving a sense of environment. The sense of geography and terrain, the concept of near or far are presence within the world. A

webpage such as Facebook, Google +, where users hardly have the feeling of the space, near or far even if it is shared, they do not constitute a navigable landscape, but rather a walled finite space.

**b. Persistence**

A virtual world cannot be paused. It continues to exist and function after a participant has left. A persistence characteristic does separate virtual worlds from simulation exercises and 3D video games such as Pac-Man or Galaga. A single member or small group of participants cannot be the center part of the world but the whole dynamic community and evolving economy of participants are. A participant has a sense the systems in the space (environment, ecology, economy) exist with or without a participant's presence.

**c. Network of people**

People are the central of virtual worlds. Participants communicate and interact with each other and with the environment. Participants can form short term or long term social groups (Williams, Ducheneaut, Xiong, Zhang, Yee, & Nickell, 2006), but it is not needed to still be an active part of the ecosystem. For instance, a user can go into the virtual world and not speak to anyone but still interact with the environment. Therefore these solitary actions affect the world for every other participant.

d. **Represented by avatars:**

An avatar is any digital representation (graphical or textual), beyond a simple label or name that has agency (an ability to perform actions) and is controlled by a human agent in real time. Avatars function like user-controlled puppets. Users command the actions of the avatar, but it is the avatar itself that performs the action. Even in forms of communication that comes more directly from the user, such as voice chat, are presented as actions taken by the avatar (Bell, 2008). Having said that, a textual description of a character in "Second-life" or a game such as "Age of Conan" is an avatar. However, an avatar photo in a Facebook profile page is not really mean an avatar in the virtual world context because it does not have an agency beyond its creator. Therefore, the human agent cannot transfer the action to his/her agency (avatar). For example, one can say "My avatar rides a bike and go to school", in contrast, one cannot say "My Facebook profile sent you a message"

e. **Facilitation by networked computers:**

This allows the data management of all the objects, environments, interactions and transactions which are only made possible through the network computers. People can instantly communicate across national and geographical boundaries and computers help to keep track of all the conversations, social connections and networks of people.

Such definitions differentiate the virtual world of Multi-User Virtual Environment (MUVE) with other video games and social network sites. There are some 3D virtual environments that are not virtual worlds. For example, there are some online 3D games that a huge amount of peoples can join, but the environment of the game is reset after every new session or when the game objectives have been accomplished. In these types of virtual environment, there can be synchronous communication or synchronous actions, there can be the representation of avatars, and it is facilitated by networks of computers or people, but the environment is not persistent. Additionally, social network, such as Facebook, Google plus are not virtual worlds. These networks do have persistence, but do not provide senses of synchronous communication, environment and sense of space. There are no avatar characters to represent the human agent, only description of agents.

Therefore, the concept of "Virtual Institution" that follows would refer to the organizational environment which is facilitated within and inherits all the characteristics of virtual world. Next, this paper will go through several important terms that is related to the virtual world concept.

**Multi – Users Virtual Environment (MUVE):** In this paper, the term MUVE is used to describe a higher level of generalization which includes but is not limited to the definition of the virtual world. Multi-users is the key. Standalone video game – a game that can only be installed and played on a single PC, is not included in this definition. MUVE does include the LAN connected multiplayer game, Massive Multiplayer Online Games (whether these games are a virtual world or not).

**Virtual Environment:** in this paper, the use of this term is to describe the highest level of generalization, which includes any virtual spaces graphically generated by computer(s). For example: PC 2D/3D games, Multiplayer game, Online game, 3D graphic simulation, MMOGs, and virtual world.

**Computer games**, **Video games** and **Games**: These terms are used interchangeably to cover the array of educational electronic sound games. Otherwise, the specific detail for identification will be given to or the term "traditional game" will be used in case of no electronic game.

S**imulation**: this term should be interpreted generally in wider scales and contexts. It does not particularly mean strictly requirement Marine Simulation as in the MET field. For more explanation, see the section 2.3 of "what is Game, Simulation and simulation game?".

## 2.2 Revolution history of Virtual World?

Surprisingly, the concept of virtual world was established early in history. Early in 1671, there has been imagination world generated devices, though these devices are in different forms that can be imagined today. "It was simply a place described by words or projected through pictures which create a space in the imagination real enough that you can feel you are inside of it" (Damer, 2007).


**1671 – Lanterna Magika** **1894 - Edison Kinetoscope** **Projection, Lumiere, Edison - 1895**

**Figure 1: Early imagination space**

Influenced by the fast development of ICT, the business models of service providers are different as well as there are many player categorizations, the development of virtual world has existed in many different forms and followed different revolution tracks. Thereby, describing the history of virtual worlds in detail is out of scope of this particular research

paper. Instead, only key points will be provided where the release or the introduction of products or concepts that had major impact on the development of virtual world.

**1978:** Early text-based online world MUD (Multi-User Dungeons). This game can still be played online at *http://www.british-legends.com/*. Also, the use of such virtual world in education was noted when Alan Klietz, wrote a game called Milieu on CDC Cyber, which was used by high school students for educational purposes.

**1987-1990:** The release of HABITAT, TinyMUD, players could see, speak, interact with each other in avatar form. The environment in these games were completely open. the only limitation was the underlying software. Players eventually self-governed their world. However, they were basically Multi-player games hooked up via telephone-line dial-up connection

**1993:** The release of DOOM proves that real-time 3D could achieve high performance on consumer PCs. This period of time was an internet-bloom era. The WWW changed it all. People were suddenly excited by the concept of "online." (Bartle, 2004)

**1994-1996:** Along with the explosion of the web, there was an explosion of social virtual world platforms. For example, in 1995, AlphaWorld was the first Active-World run from an internet browser. Fujitsu “WorldsAway Dreamscape” also went online the same year with additional feature such as virtual currencies, prices, and the concept of private stuffs. (Damer, 2007)

During this period, most of the virtual world went graphical. With the massive expansion of internet, the advancement in graphical processing technology, the upcoming year had experienced the invasion of Massive Multi-player Online Game.

**1997:** Origin Systems (OS) released “Ultima Online”, a popular Massive Multi-Player Online Role Playing Game. It lays foundation for the development of such game genre. The success of “Ultima Online” pioneer the road for the development of many new massive multiplayer games to follow. (from http://www.dipity.com/xantherus/Virtual_Worlds/; Bartle, 2004)

**1999:** Sony Online Entertainment released EVERQUEST, the first truly 3D Massive Multiplayer Online Role Playing Game (MMORPG). Thousands of players could be online at once and participating in shared quests. There are two playing modes: player vs. player (PVP) combat, and player vs. environment (PVE/exploring). The key turn here is that EVERQUEST

was launched with the current generation of Massive Multiplayer Online Games(MMOs) platform and including the virtual world platform (Damer, 2007).

Virtual Worlds differ from MMO's because they are open platforms, often allowing the players to shape the world content. There are no quests, no specific goals or story line, but they provide various degrees of user control over the environment. These worlds are usually built around social interactions, commerce, and collaborative activities (Damer, 2007). What marks a significant difference between Multiuser Virtual Environment (virtual world, or MUVE) and MMOs is the lack of predetermined narrative or plot-driven storyline (Warburton, 2009).

**2003:** Linden Research, Inc (commonly referred to as Linden Lab) released Second Life. Its entire virtual world is created created by "residents" who are the players of the game. Rich feature 3D tools were built into the client software to create in-world objects. In addition, full scripting language is made available to support intelligent behavior and animation, multimedia, video, and audio.

As it can be seen, the virtual worlds have its root in the gaming world from the early days of multi-user dungeons to the massively multiplayer online games of today. In accordance to the definition of virtual world, there are some Massive Multiplayer Online Games that can be considered as virtual world, for example MUD-1, NeverWinter Nights, Second-life, World of Warcraft, Hello Kitty Online. Presently, there are many other virtual independent platforms on the market offering from both open source projects and proprietary vendors; these include KANEVA Beta (2007), 3B Villages (2007). OpenSim (2008), Croquet Consortium, ActiveWorld, Project Wonderland, THERE, Olive, to name but a few.

There are number of ways to categorize the virtual world of Multiuser Virtual Environment (MUVE). The categorization depends on type of platforms, targeted audience, purpose, profit model. The boundaries between these categories are soft and reflect the flexibility of some virtual worlds that can provide more than one form of use (Warburton, 2009; Bartle, 2004). For example, second life is often defined as a 3-D virtual social networking space, but it also supports role-playing game and cooperative workflow by using some of the in-world tools and objects that have been created by its residents (users).

## 2.3 What is Game? Game and Simulation, how is it difference?

The terms “Game”, “Simulation”, Simulation-Game” have been used and will be mentioned more and more throughout this research. In addition, it is easy to observe that such terms are used interchangeably all over academic papers, or even in the gaming industry. There are many games that are labeled “simulation”. For example, Microsoft ™ Flight Simulator, VSTEP™ Ship Simulator 2008, EA SimCity™ to name but a few. These games cost from several up to around 100 US dollar. On the Electronic Arts website alone, if searching for the genre “simulation”, at least 122 games will be listed (EA game, 2012).

In contrast, in the MET field, the term “simulation” refers to a serious platform that has a strong integration between hardware and software, with strictly requirement in realism and interaction aspects. Such system normally costs hundred thousands or millions of dollars to purchase and implement,

The purpose of this section is not to redefine or to compare between game/simulation-game in general and MET Simulation, but rather to make the reader aware of the domain to avoid misinterpretation. Across profession field of study, there are some terms that their individualized usage or symbols and words that are clearly recognizable only to members of the affinity group of that field, which may lead to mismatch in mental image formation and thereby misinterpretation.

Clark Abt (1968), an early pioneer of simulations and games had defined game as “any contest among adversaries (players) operating under constraints (rules) for an objective (winning, victory or pay-off)”. However, according to Laughlin and Marchuk (2005), it does not distinguish between contests for fun and contests of a more serious nature, so they have constructively modified the definition to add a clause noting that both educational games and recreation games are low-stake contests.

Harold Guetzkow (1963, pp.25), who is widely recognized as one of the founders of social science simulation studies, defines simulation as “an operating representation of a central feature of reality”. By Guetzkow’s definition, operation is a key element of simulation. A three-dimensional image of a human body is not a simulation, but such a model that allows a viewer to manipulate or drive biological functions would be a simulation. A simulation is an operational model that is based on something real (Laughlin, Marchuk, 2005). From that point, widening the interpretation a bit more, it could be argued that a game that represents the operational procedures or processes of a particular activity in real life could be considered as simulation – a simulation game. For instance, TheSIMS$^3$ ™ game from EA™ simulates

daily life activities where the players has a chance to control an in-game character to sleep, go to work, build a house, making friends and participate in parties. The rule of this game is to maintain the balance between work, leisure, career and social activities to keep lifetime–happiness point so called of their character as highest as possible.

In addition, related to MET, Reeve (1984) comments that a cruel aspect of effective simulation is that it represents task demands rather than reproducing exactly the real situation. In the maritime simulation respect, in the paper of Det Norske Veritas (DNV) – Standard for Certification No.2.14, October 2007 said:

"*Marine simulator: A creation of certain condition by means of a model, to simulate situations within maritime operation*" which associated strictly requirements such as

*"Physical realism: to what degree the simulator looks and feels like real equipment. The realism shall include capabilities, limitation and possible errors of such equipment"* or

*"Behavioural realism: to what degree the simulator resembles real equipment in order to allow a learner to exhibit the appropriate skill…*", and much more.

Obviously, the term simulation itself can be interpreted in various ways depending on the requirements of different expertise or field of studies. Throughout the review of definitions of game and simulation, "each can stand alone but in some cases, there is a sizeable field of games that are simulations, or perhaps some simulations that are games. It is easy to interchange the terms '*game*' and '*simulation*' when discussing educational uses of computers, because so often the two terms overlap" (Ellington, 1981; Laughlin & Marchuk, 2005). The figure below illustrates the relationship between games and simulations.

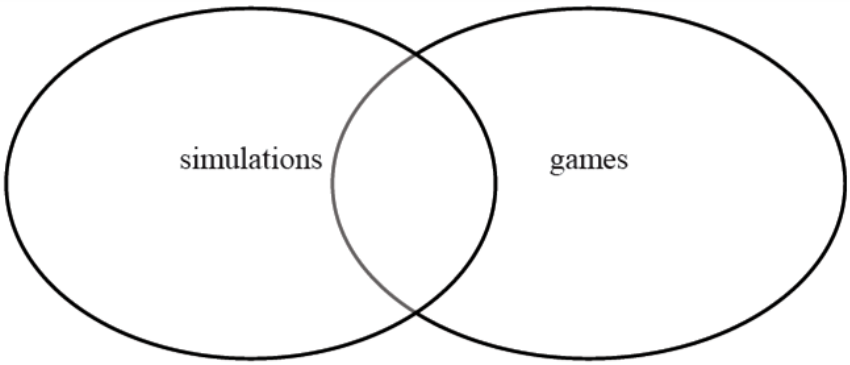



**Figure 2 - Games and simulations overlap (Ellington, 1981).**

There has been much discussion about games, and the realization of game as an educational tool, but what is meant by games?

According to Laughlin and Marchuk (2005),

> the term computer games is being used to cover the entire realm of computer and video games as if there were some convenient way to make all computer games equivalent to allow a simple black and white assessment. Lumping all computer and video games together in one category is a simple assumption. It is similar to lumping carryout restaurant menus, textbooks and the collected works of Shakespeare into the category of "printed text" and asking the research question, "what is the impact of printed text on education?"

Therefore, in this paper, the term "computer games", "video games", and "game" are used interchangeably to cover the array of educational electronic sound games. Otherwise the specific detail will be given to identify game platform (E.g. Nintendo, consol, mobile, PC, etc.) or the term "traditional game" will be used in case of no electronic game.

The term "simulation" should be interpreted generally in wider scales and contexts. It does not specifically mean the strictly requirement Marine Simulation as in the MET field.

## 2.4 The use of Second life in this research (SL)?

There are a variety of virtual platform options available in the market. However, the Second Life (SL) from Linden Research Inc. will be used to investigate the case due to the following reasons.

a) Many educational purpose experimental activities are associated with this platform. Based on the SL education directory, Over 150 educational institutions registered themselves as participating in SL. (Data retrieved on September 03 2012, from *http://wiki.secondlife.com/wiki/Second_Life_Education_Directory*)
b) SL represents the most mature of the social virtual world platforms, and the high figures compared with other competing platforms reflect this dominance within the educational world (Warburton, 2009).

**What is Second Life?** This is a virtual world owned and managed by the company Linden Research, Inc. (*http://secondlife.com/*). To enter the virtual world, users need to download a free program provided by SL called "Second Life Viewer" (SL-Viewer). With a free account registered from the SL homepage, one can then get access to the virtual world via a computer with internet connection. While a player is in-world, there are variety of ways to communicate with others. Verbally, the user can use text, voice chat or an embedded email program, which can help the user to send an email to other directly through the SL-viewer. The program also support certain non-verbal communications such as body gestures, animation, and visual appearance. The virtual world of SL is so large that walking from place to place is impossible. However, the virtual world of SL offers some functions that support the travelling purposes. Moving from place to place in SL is easy with instant teleport function, to participate in event such as discussions, conferences, classes, user just select the grid-address and the avatar will teleport to the destination. The user can locate the other online people in the vicinity area through a mini-map. Instantly, user can also search for the on-going events via search filtering option, which provide detail information about upcoming events and activities inside the virtual world. For example, in the research of this dissertation, the author could search for the educational events organized by UK Open University with detail of information like who can participate, time in GMT or in Linden-time/Virtual World time, what the topic is about, and the grid-address of the place.

**Activities in SL**:

The virtual world of SL supports many activities ranging from business, virtual social network, collaboration, leisure, simulation, education and marketing. Gartner, Inc. (2007), a technology-related research and consulting firm, who estimates that by 2012, 80% of active Internet users, including the Fortune 500 enterprises, will have an ''other life" in some form of 3-D virtual world environment. Even though there are many kind of activities that one can perform in SL, this research just introduces the two of which can be considered as target areas – third parties Business activities and Educational activities.

**Business activities** - Today, in the 2012, in the SL platform alone, many highly reputable firms have already established their virtual facility or at least involved some of their activities inside the virtual world. These include some major players in various business areas ranging from Information Technology to Food, Fashion, Automation, and Telecommunication

industry. Some examples are CNET, Sun Microsystems, Reuters, Microsoft, IBM, Cisco, Nissan, Toyota, Coca-Cola, Dell, NASA, Intel, and Adidas to name but a few.


**Figure 3 – Firms participating in SL,**
**Source: New Business Horizons Ltd., Retrieve from: http://www.nbhorizons.com/list.htm**

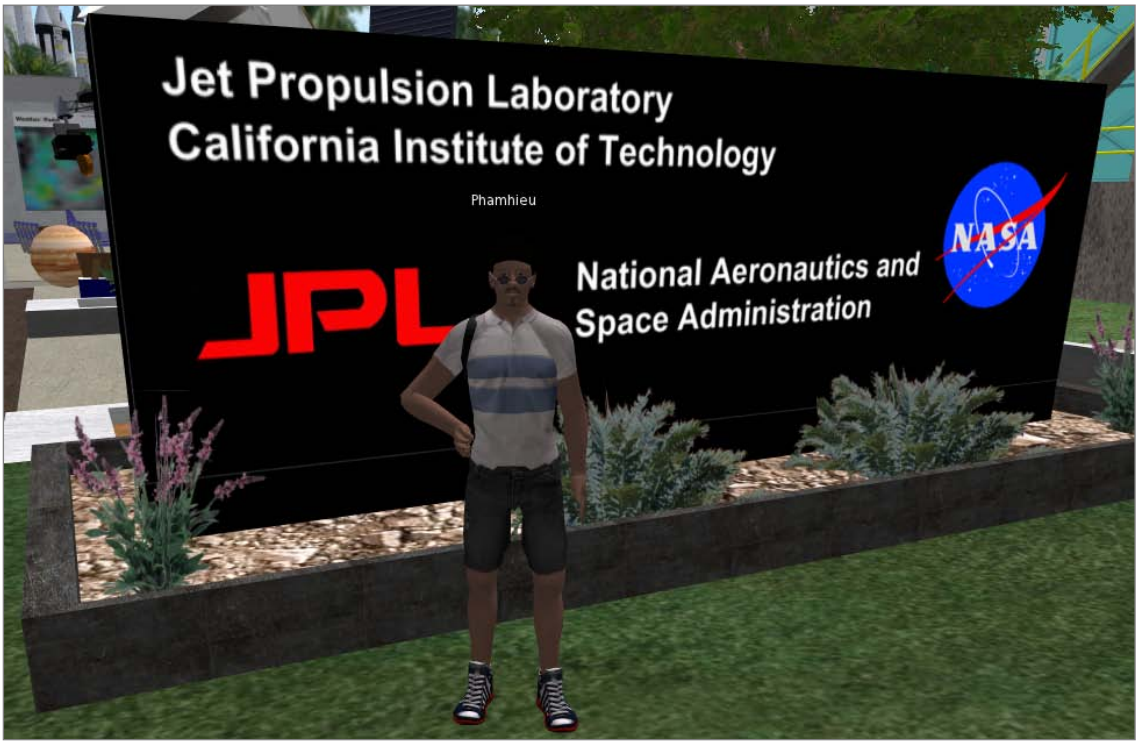



**Figure 4 – NASA's virtual facility with its Jet Propulsion Laboratory**

**Educational Activities** – The educational purpose of MUVE has been long recognized through the use of gaming platform. SL is not an exception as more than 150 institutions have registered themselves in the Educational directory of SL, and have officially established their virtual facilities. In other literature, the number is even higher. Michels (2008, p.4) indicated that at least 300 universities around the world teach courses or conduct research inside SL.

Educational organizations such as the New Media Consortium (NMC) and the International Society for Technology in Education (ISTE) have constructed infrastructure inside Second Life (Inman, Wright & Hartman, 2010).

The Figure 5 and 6 present the descriptive analysis of the raw data that is collected from the SL education directory, which is available online on Linden Lab's Website. The raw data is a list of institutions that have registered themselves as participating in educational activities with the SL platform. In figure 5, within 152 institutions represent for 21 country, North America with Canada and America dominant the case with 64% of all the region, whereas Europe and Australia come after with 21.1% and 9.2% respectively. The Figure 6 shows that most of these institutions are universities with 71.05% and community college with 11.18%. Surprisingly some K-12 level schools has been already taken initiative in the area of using MUVE into education activities.

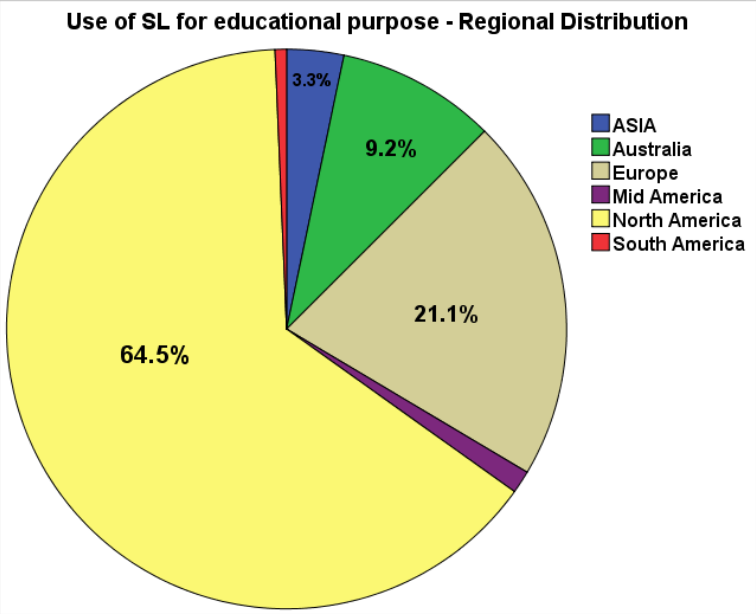



**Figure 5 – Utilizing Second Life in education, Regional distribution**
**source from http://wiki.secondlife.com/wiki/Second_Life_Education_Directory**

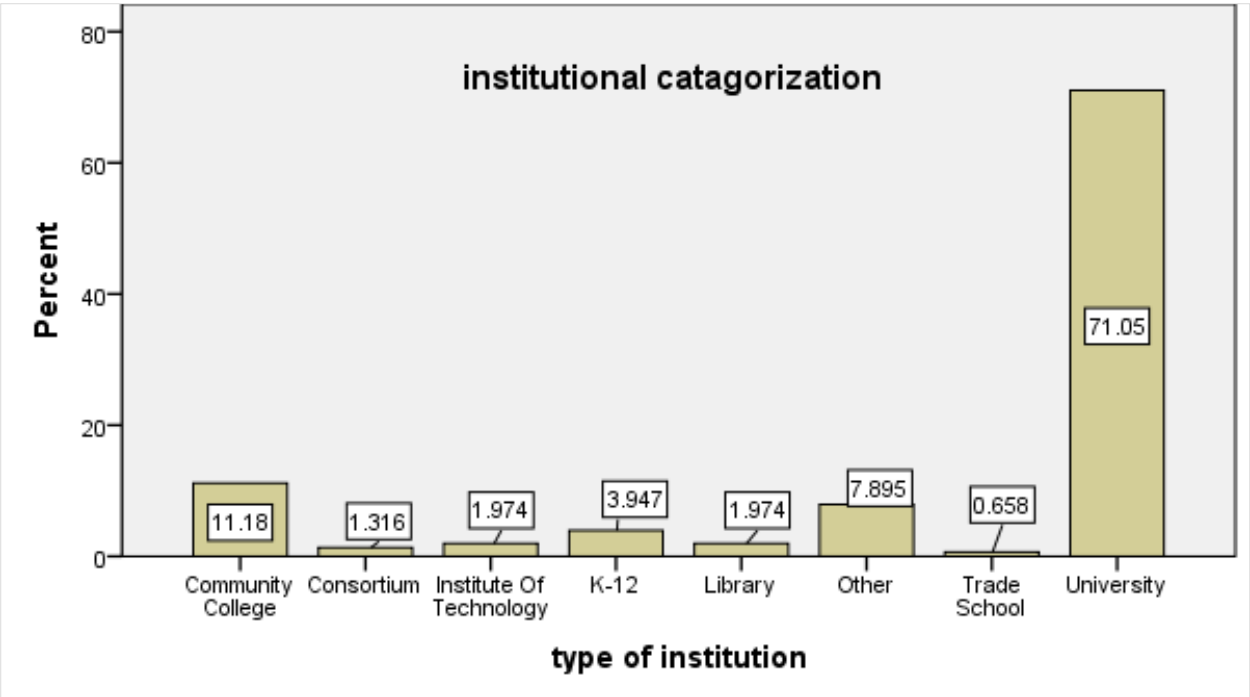



**Figure 6 – Types of institutions that are involving in educational activities in Second Life**

The virtual worlds have been increasingly used by educators to teach students, conducting classes, and to explore the opportunities that virtual worlds may present for teaching and learning (Inman, Wright, Hartman, 2010, p.46). There are a variety of subjects being taught in the SL environment ranging from programming, natural science, economics, laws, foreign language, and literature art. In addition, SL platform can also host a number of (often free) educational events such as conferences, lectures, interviews, discussions, and meetings.

# Chapter 3

## MUVE and its educational usage

### 3.1 Theoretical framework

### 3.2 Using MUVE as educational tools

### 3.3 Case study data and virtual world interview data

*Chapter 3 supports the research argumentation by providing the theoretical underpinning of the educational possibilities of MUVE. It also lay the foundation for assessing the educational potential of MUVE in education and therefore the possible use of MUVE in MET.*

*Section 3.1, theoretically, supports the research to realize the educational potentials of MUVE by presenting three theories of (1) epistemic frame, (2) learning theory and (3) community of inquiry. These theories are used to assist the three application components of MUVE, which will be presented in the section 3.2. After reading this part, the reader will understand why the three components are applicable in educational activities.*

*In section 3.2, the usage of MUVE is modeled as a comprehensive application model, which focuses on three core components. These three components together or separately can contribute to the learning process, and they are: (1) MUVE as a game-simulation platform, (2) MUVE as a social collaboration platform and (3) MUVE as a virtual delivering method. The boundaries between the three components are flexible in the sense that they can enable educators to mix them in a number of ways to foster educational activities locally or from a distance.*

*Section 3.3 presents the educational use of MUVE in action. The case study data analyzes reports from two empirical projects that have been conducted in the virtual world of Second Life (SL). In addition, the analyzing of the interview data of teachers and students, who have been participating in educational activities in SL will strengthen the understanding of reality of teaching and learning practices in virtual world. This section also reflects the outcomes of the analysis process to the three application components of MUVE and its relevant theories.*

## 3.1 Theoretical Framework

### 3.1.1 Epistemic Frame

The premise of learning by doing is widely recognized, especially in specialized education and training. In this sense, the learning activities should reflect the reality of work. Dewey argues that knowing and doing are tightly coupled (Dewey 1915, 1958). Learning happens in the context of an activity where a person is trying to accomplish some meaningful goals and has to overcome obstacles along the way.

In addition, Wenger (2001, p.1) defines community of practice as "a group of people who share an interest in a domain of human endeavor and engage in a process of collective learning that creates bonds between them". Within a community of practice, the members interact and learn together by engaging in joint activities and discussions, helping each other, and sharing information. Through these interactions, they build relationships and form a community around the domain (Gray, 2004).

In other words, by doing something as part of a large community of people, one can learn to develop and replicate the ways of knowing, acting, being, and caring of that community of practice. Such ways of doing/being/caring/knowing is organized around a way of thinking. In this way, the actual practice, identity, interest, understanding, and epistemology are bound together into an epistemic frame (Shaffer, 2006). Different professions have different epistemic frames or different ideologies – ways of seeing, valuing, being in the world (Gee, 2005). For example, lawyers act like lawyers, identify themselves as lawyers, they are interested in legal issues, and know about the law. Such skills, habits, and understanding enable them to look at the world in a particular way – by thinking like a lawyer. It is the same for doctors and seafarers but with a different epistemic frame – a different way of thinking. Then reproducing the practices of the community are the means by which the new members develop such epistemic frame. In another words, by simulating the real practices, it is possible to provide an alternative educational model that help practitioners to develop their epistemic frames.

Shaffer (2006) argues that the connection between epistemology and practices that make up an epistemic frame are potentially powerful in the design of instructional games that reflect the thickly authentic learning context. Such learning context should replicate or adapt the reproductive practices which are valued by its communities of practice. He further suggests

that rather than constructing a curriculum based on the traditional sense of vocational education, educators can develop a replicated system in which students can learn to work and thus to think as doctors, lawyer, architecture and other valued reflective practitioners. By using new technology in education, it is possible to develop epistemic frames that provide student with opportunities to see the world in a variety of ways that are fundamentally grounded in meaningful activities and well align with the core skills, habit, and understanding of a post industrial society.

In reference to Shaffer's suggestion, the virtual world of MUVE with its powerful recreation and collaboration capabilities can complement the educational activities of different professions, resulting in the ability to simulate or create the real world attributes. For example lighting, gravity, interaction with objects and with the environment, communication with other people, visual and auditory experience. This set of attributes can enable the learners or trainees to immerse themselves in a virtual learning environment that represent the reproductive practices that are valued by its community. By participating and acting in such replication worlds, it is possible for the learners to develop the situated understandings, effective social practices, identities, and to recognize the shared values, and ways of thinking within the community of practice. (Shaffer, Squire, Halverson & Gee, 2005; Laughlin, Marchuk, 2005). Furthermore, Jarmon, Traphagan, Mayrath, and Trivedi (2009) state that

> Therapists, soldiers, pilots, lawyers, business doctors, nurses and teachers all engage in real life role play while learning the contexts and conditions particular to their professions during their days at the university or in training. Then Multi-User Virtual Environments (MUVEs) like Second Life are uniquely suited media for developing role playing scenarios to engage learning, if we provide the right mix of opportunity and structure. Indeed, role-playing in Second Life and other MUVEs may represent perhaps one of the single most compelling educational opportunities for adults in the 21st Century. (SL transcript, Special Speaker Series in Second Life, International Society for Technology and Education, March 27, 2007).

### 3.1.2 Learning theory – learning as products and the conceptions of learning

As with most educational and training specializations, there is an increasing focus on competency based learning activities. The learners are expected to use their knowledge, and understanding of subject matters, to perform some kinds of hand-on practices in order to demonstrate their competencies for the job. Then, the shifting in their performance from novice to professional can be seen as the outcome of the learning process. In order words, the learning process has affected the learners to change their behaviors both mentally and physically such as the ways of thinking, the cognitive processes, skills, performances. As a result, there is a shift from an incompetence or novice learner to a competence, or a professional. Such approach to learning highlight the "learning as products" view point, and emphasize on a crucial aspect of learning is to change.

However, according to Merriam and Caffarella (1991, p124), doing actual hands-on practices is not the only way that one could make learning happen. If the learning is perceived as the product of some process and resulting in changing behaviors, then there are other mechanisms that could make the learners to change their behaviors. In other words, there are other ways of learning that could improve the learner's skills and knowledge.

- Does a person need to perform in order for learning to have happened?
- Are there any other factors that may cause behavior to change (or cause the learning to happen)?

Smith (2003) mentions in his paper that Säljö (1979) has carried out a useful piece of research that suggests five main conceptions of learning – five ways that learning can happen which can cause the learners to change their behaviors:

[a]. Learning as a quantitative increase in knowledge. Learning is acquiring information or 'knowing a lot'.
[b]. Learning as memorizing. Learning is storing information that can be reproduced.
[c]. Learning as acquiring facts, skills, and methods that can be retained and used as necessary.
[d]. Learning as making sense or abstracting meaning. Learning involves relating parts of the subject matter to each other and to the real world.
[e]. Learning as interpreting and understanding reality in a different way. Learning involves comprehending the world by reinterpreting knowledge. (quoted in Ramsden 1992, p.26)

The conceptions [d] and [e] are qualitatively different from the first threes. Conceptions [a], [b], and [c] imply a less complex view of learning (Ramsden, 1992) and consider learning is something external to the learners. Conception [a] is likely to happen in the teacher centered paradigm where learning just happened or is done to students by the teacher, whereas the conception [b] sees learning as something upgradable, the more you get the more you possess and likely to happen in a sense of extensive reading. As with the conception [c], there is a growing emphasis on "knowing that" to "knowing how" where actual hands-on practices and reflections of learning context are the keys. The last two conceptions [d] and [e] look into the internal or personal aspect of learning and refer to learning that may happen by conceptualizing and synthesizing the knowledge gained to comprehend the world.

Based on this, it can be argued that in order for a learner to learn something – or to change their behaviors, they can also engage in other ways of learning. So a simulated world of an immersive 3D environment can support the learner to conceptualize the reality of work via its virtual setting so that the learning can happen at higher order thinking skills.

However, such arguments does not mean to diminish the importance of hands-on practices but rather to demonstrate that an immersive virtual world can support the learners to acquire soft-skills rather than physical skills.

### 3.1.3 COI Framework

Dewey argues that education and learning are social and interactive processes, and thus the school itself is a social institution, where all students should have the opportunity to take part in their own learning (Dewey, 1902, 1916). His insight highlights the need for social interaction – the interaction between students, students with teachers and the need for the involvement of students in the teaching-learning material – the cognitive matters.

The importance of that inter-social interactions and relationships has been outlined by Garrison, Anderson and Archer (2003) via their Community of Inquiry Model (COI). Repositioning COI into the education environment helps to identify the elements that are crucial prerequisites for a successful educational experience.

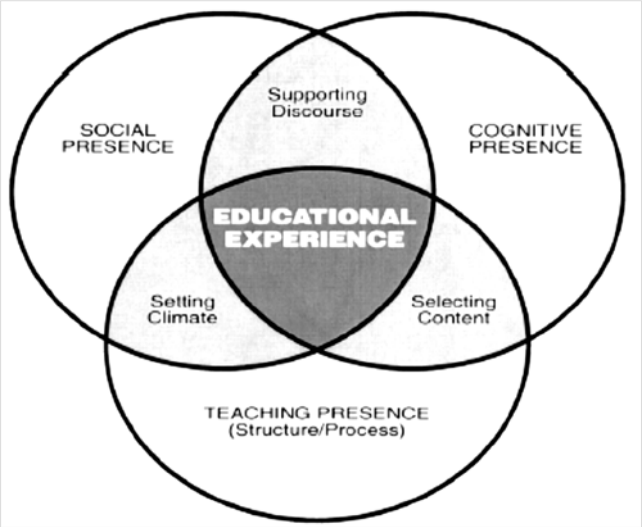



**Figure 7 - Community of Inquiry Model (Garrison, Anderson & Archer, 2003)**

According to the COI model, learning occurs within the community through the interaction of three core elements: the cognitive presence, social presence, and teaching presence (Garrison, Anderson & Archer, 2003). In the academic environment setting (a small scale community taking place in a classroom) the following is applied:

(1) The cognitive presence is the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse.

(2) The teaching presence is likely to be the responsibilities of the teacher that supposes to facilitate the function of designing the educational experience which include the selection, organization, presentation of the course content as well as the design and development of learning activities and assessments. The second function is to support and enhance social and cognitive presence for the purpose of realizing educational outcome.

(3) The social presence can be seen as the abilities of learners or teachers to participate themselves in the socio-emotional interaction within the classroom environment.

It is generally accepted that the social context greatly affects the nature of learning activities and outcomes (Resnick, 1991). Most importantly, some educational literatures focus upon the premise that a worthwhile learning experience must consider the learner's personal world (reflective and meaning-focused) as well as the shared world (collaborative and knowledge-focused) associated with a purposeful and structured educational environment (Garrison, Anderson, Archer, 2003).

The roles of these three elements depend on the level of education such as k-12, or higher education. Particularly, the social presence elements, the social interactions, are especially important and sometime essential in realizing worthwhile educational outcome under the collaborative learning regime. Social presence can also play a supportive role for other elements to be amplified. For example, the element of cognitive presence is considered to be easier to sustain when a significant degree of social presence has been established (Garison, 1997; Gunawardena, 1995).

However, is the situation going to be the same when repositioning the virtual classroom concept under the COI framework? So in order to obtain the meaningful educational purpose, the virtual classroom should present qualities that are equivalent or, at least, considerable to the three elements of the COI model.

First, the virtual world with its powerful modeling, recreation functionalities could be very much helpful for the teacher to design meaningful ways of content presentations and creative learning activities. Additionally, the various communication channels and tools of the in-world could help the teachers and learners to perform certain kinds of social communication which in turn can support the cognitive presence of the framework. In a virtual classroom setting, the social interactions are very much concerned as there is an additional intermediate layer in between the participant and the virtual world layer, where teachers and the learners communicate and interact via their avatar. Therefore, the viability of social behaviors and norms inside the virtual environments in comparison with the physical world become critical to ensure the meaningful educational experience.

Fortunately, there are related research studies on this matter. Yee, Bailenson, Urbanek, Chang and Merget (2007) in an observation study of SL, an embodiment of MUVE, have collected data from avatars to explore whether the social norms of genders, interpersonal distance, and eye gaze transfer into virtual environment even though the modality of movement is entirely difference (i.e., via keyboard, mouse as opposed to eyes and legs). Their findings support the hypothesis that the social interactions in online virtual environment, such as Second Life, are governed by the same social norms as social interaction in the physical world.

Regarding to the COI model, the immersive characteristic of the virtual world of SL offers both students and teachers the abilities to project themselves into the learning space, and which are key elements for successful learning transactions.

However, it should be noted that in the virtual setting, there are limitations with non-verbal communications. The avatars can show some facial expressions, but these expressions are not mapped on the user expression and do not provide sound evidence of students' attentiveness or boredom (Graves, 2008). In comparison, the traditional classroom setting provides a broader range of non-verbal communication Dickey (2005a).

Despite such limitations, the outcome from the research of Yee, Bailenson, Urbanek, Chang and Merget (2007) suggests that classroom activities can be authentically carried out inside the virtual world environment.

## 3.2 Using Multi-user Virtual Environment (MUVE) as educational tools

The use of MUVE as educational tools is getting more and more attention of educators. There are a variety of ways of utilizing MUVE across educational activities. Educators are looking to virtual worlds for their potential to foster experiential and constructivist learning (Inman, Wright, Hartman, 2010). Dede (1995) states that 3D virtual environments could potentially provide safe environments whereby students can learn by doing. Dickey (2003) found that although there are constraints, 3D virtual worlds do support constructivist learning because it enables the users to interact with each other and with the environment.

This part will look into application components of MUVE in education . They are: (1) MUVE as an game and simulation platform, (2) MUVE as the social collaboration platform where it can be used to facilitate the distributed knowledge communities, and (3) MUVE as an new way of educational delivering method and e-learning


**Figure 8 - Application components model of MUVE**

As discussed in the definition section (2.1), and throughout the history section (2.2), virtual worlds have their origin as text-based and video games that later on come to Massive

Multiplayer Online Games (MMOGs). Even if the main objective of this thesis does not focus on the application of game in education, it would be a big loss if omitting the role of video game in education as it has a strong relationship with the concept of virtual world.

To this end, before moving forward with the main part of the research, it is essential to look at how games have been involved in educational activities. And then how educators have started to adopt them as additional educational tools, which help to lay foundation to realize the potential of MUVE in education. Next, MUVE as a social collaboration tool is examined, and the relationships between social collaboration with the learning activities are discussed. Finally, the virtual delivering method, a new way of e-learning that can be use under such concept of MUVE will be described.

### 3.2.1 MUVE as Game and Simulation platform

Already from the early days of gaming history, when multiplayer or massively multiplayer games were not yet as popular as today, the virtual environment inside a video game has been utilized by educators to engage their learners into what is called an enhanced learning environment. In fact, pairing digital technologies with game theory in teaching is not a new idea (McLester, 2005). Games and simulations are accepted as legitimate educational tools by businesses, military, and by a growing number of academics and educators to help to promote greater knowledge retention than traditional forms of instruction (Shaffer, Squire, Halverson & Gee, 2005).

In the 1970s, it was theorized that superior retention is the result of more complex understanding of material (Laughlin, 2005). Furthermore, Dickerson (1975) studied to see if games induced higher levels of retention over traditional classroom activities. To this end, games were found to lead to greater retention than traditional instruction. According to Laughlin (2005), every one of the studies that examine retention found that students using simulation games had a statistically higher level of retention than students who covered the same material with traditional teaching methods. In several cases, students who had used simulations or games scored significantly higher in retention tests than in original post-tests (Karlin, 1971; Cohen, & Bradley, 1978; Lucas, Postma & Thompson, 1975).

Pierfy (1984) also found that simulation games were superior to traditional teaching in the area of changing student attitudes about the subject material. Mackerth (1998) argues that

playing games on the computer helps to foster confidence with the technology. Cassell and Jenkins (1998) believe that early engagement with computers through games can help students to develop strong computer literacy and prepare them for futures in technical careers.

Interestingly enough, even in the pre-computer-game era, there are also studies that show the consistent effect of game in education. Livingston (1970) for example, indicates that students preferred games to any of the alternatives offered at all grade levels, and other studies also indicate that games were particularly effective in motivating students who were typically disinterested in school work and not working to their potential (Apt, 1970).

The outcome of many studies are apparent to support the theory that games and simulations enable students to absorb complex mental models that facilitate further learning about the subject of the model. In contrast, traditional teaching methods tend to transmit knowledge as discrete bits of data without a framework to facilitate expansion of understanding (Laughlin & Marchuk, 2005).

However, the "marriage" between educators and gaming is not an easy contract. Among the biggest challenges, the stereotype perception in the society that "games are mere entertainment, associated with misbehavior, violence and so on" would be a noticeable one. For that reasons, Shaffer, Quire, Halverson and Gee (2005) in their article titled "Video games and the future of learning" argue that the first step toward understanding how video games can and will transform education is changing the widely shared perspective that games are "mere entertainment". Laughlin and Marchuk (2005) also commented on the aspect of association of games with violence that:

> The research on computer games leading to increased aggression is based on asking study participants if they feel more aggressive after playing video games. It is not based on actual cases of demonstrated aggression. While this is a typical method of research, it does not demonstrate a causal link between computer games and aggression.

Such suggestions mentioned above makes sense because the research has shown that established beliefs create a strong filtering system that tends to bias the assimilation of

new information (Lord, Ross & Lepper, 1978). Therefore, having stereotype perception about games will affect the realization of how games can and will transform education.

In addition, even having realized the educational purpose of games, the development of of games in education is limited due to several constraints:

- Predefined story line and inflexible narrative of a particular game limit the knowledge domains that an educator can utilize to teach the students. The learners are limited by predefined rules, and goals, or have to play a role with a predefined purpose by the game developers out of the box.
- Time allocation for the class session: Most games are designed for several hours of game play, which makes it difficult for educators to integrate into the 45 minutes or 90 minutes of the class time. This also makes it too complicated to integrate into the fixed curriculum (Laughlin & Marchuk, 2005).
- Maintenance and investment costs: Because a typical game can only support limited knowledge domain, it would be too costly to expand concepts and subjects that can be taught in games. This means an institution has to invest more on other game, or game types.

The development in ICT, gaming industry and user-centered virtual world opened up new opportunities for successful implementation of 3D immersive spaces in education. Virtual world features have the key characteristics of

- persistence, and a shared space allowing multiple users to participate simultaneously,
- real-time interaction between users with the objects of in-world environment and between users,
- and its similarities to the real world such as topography, movement and visual physics that provide the illustration of being there.

These features are compelling enough to attract more than 300 million registered users to spend part of their time within the commercial social and gaming virtual world (Hays, 2008; Warburton, 2009). Virtual worlds also feature an open-endedness combined with the ability to create content, and shape the virtual environment in an almost infinite number of ways. This has attracted educators to the possibility afforded by immersive 3D spaces (Warburton, 2009). So within virtual worlds, educators can develop in-world

objects such as concept illustrations, interactive objects, and game scenarios that can be fully customized to fit into the various educational subject matters. Importantly, these objects can be reused and shared across their community of practice. Some virtual worlds also support an in-world intellectual private properties function; which means an object can be fully protected and its owners can perform a permission control function over the objects. With the persistence features, it is no longer a problem for educators and learners with the unfinished multiplayer role-play scenario session because it can be continued at anytime without being restarted.

The acceptance of the idea that games have educational potential has become more widespread since the dawn of the new millennium (Laughlin and Marchuk, 2005). There is a growing body of published reports game usage in education, but few of those reports are based on rigorous testing methods (Kirriemuir and McFarlane, 2004). Despite this, the majority of researchers have moved on to issues of how, rather than if, games can be used in education (Gee, 2003, Squire, 2005, Steinkuehler, 2005). Virtually, all research on the uses of games as educational media calls for further research (Egenfeldt-Nielsen, 2003).

### 3.2.2 MUVE as Social Collaboration Platform

In the early days, Dewey believed that education is a collaborative reconstruction of experience; “the educational process has two sides – one psychological and one sociological; and that neither can be subordinated to the other nor neglected without evil results following" (Dewey, 1959, p. 20). Later on, Christopher Dede (1989) presented insights about collaborative learning supported by information technology in an article titled “The Evolution of Information Technology: Implications for Curriculum”:

> As the workplace shifts to an emphasis on group task performance and problem solving, collaborative learning will become more important. Information technology tools may increasingly be designed for use by teams rather than individuals working in isolation (Gorry et al. 1988), and new types of interpersonal skills will be needed for occupational roles in which computer mediated communication is important (Kiesler et al. 1984). He also adds that “Students in conventional classroom settings have few opportunities to build skills

of cooperation, compromise, and group decision making; shifts in teaching must occur so that computer-supported collaborative learning becomes a major type of student interaction" (Dede, 1989).

The concept of collaborative learning has been widely researched and advocated. By gathering different performance levels of learners working toward common goals, at first, they can learn from each other. Secondly, such activities will increase the interest among participants and improve critical thinking of individuals. Not only that, the underlying premise of collaborative learning is based upon consensus building through cooperation by group members, in contrast to competition in which individuals try to be better than other group members. Collaborative learning practitioners apply this philosophy in the classroom, at committee meetings, with community groups, within their families, and generally as a way of living and dealing with other people (Panitz, T., 1996). More importantly, collaboration is a promising mode of human engagement that has become a twenty-first-century trend. The need for thinking together and working together on critical issues has increased (Laal and Ghodsi, 2012; Austin, 2000; Welch, 1998),

Collaborative learning can bring many benefits, Johnsons (1989) and Pantiz (1999) list over 50 of them. In addition to promoting critical thinking skills and getting student engaging in class, it can help students to build social relationships, develop a learning community, and establish a friendly and positive atmosphere for practicing cooperation. In this way, working collaboratively can be recognized a world trend, and giving students these skills are critical for them in the future.

Having realized the importance as well as the benefit that socialization and collaboration learning can bring, virtual worlds are coming out as promising platforms for virtual social technical collaboration activities from a distance because of the following:

- ✓ **Immersion and co-presence characteristics:** taking SL as an example, SL adds to the virtual space the visuals physical realism to produce a profoundly immersive experience – one that conveys a feeling of being there and a strong sense of co-presence when other avatars are present (Warburton, 2009).

  Regarding the social interaction aspect, Yee, Bailenson, Urbanek, Chang and Merget (2007) in their study about the persistence of nonverbal social norms in

the online virtual environment, which could potentially be a unique research platform for the social science and clinical therapy, have concluded that:

> The social interactions in online virtual environments, such as Second Life, are governed by the **same social norms as social interactions in the physical world. This finding has significant implications for using virtual worlds to study human social interaction**. If people behave according to the same social rules in both physical and virtual worlds even though the mode of movement and navigation is entirely different (i.e., using keyboard and mouse as opposed to bodies and legs), then this means it is possible to study social interaction in virtual environments and generalize them to social interaction in the real world (Yee, et at., 2007). (Highlighting by the researcher)

- ✓ **Object centered sociality characteristics:** People are the central of virtual worlds, and collaboration can be seen as part of socialization. In other words, socialization is the precondition of any collaboration activities. Then one may ask what makes a virtual world a socialization world? Engeström (2005) in his article about "why some social network services work and others don't" views the social network are not just made up of people but rather the social networks consist of people who are connected by shared objects. For example, Flickr uses photos as an object of socialization; upcoming.org focuses on events as objects. What the users of SL and other virtual worlds do so well is to provide a reason (so called social objects) around which people can connect together and want to continue those connections (Warburton,2009).

Such characteristics, potentially, can also be used to support the distributed community of practice. Wenger (2001) suggests that there is the potential for professional associations to facilitate enhanced informal learning by providing opportunities for the development of online community of practice. That is a distributed community of practice given the increasing geographic distribution of employees, the global nature of work and the reliance on some kind of technology for communicating (Wenger, 2001; Wenger et al., 2002; Gray, 2004). Obviously, educators can take advantage of the social aspect and co-

presence of the virtual world with its massive-multiplayer characteristics to foster collaboration activities.

### 3.2.3 MUVE as virtual delivering method

Virtual worlds are being used as virtual classrooms, conference meetings, and a virtual delivering method in education.

**Figure 9 - Virtual Classroom from Ohio University in a virtual campus in Second Life**
**Source: http://vital.cs.ohiou.edu/vitalwiki/index.php/Ohio_University_Second_Life_Campus_History**

There is increasing research that focuses on experimenting, evaluating the use of MUVE, and assessing different aspects of educational purpose of MUVE. Kay and Fitzgerald (2008) suggest a long list of educational activities categories that they believed can be carried out in SL:

- self-paced tutorials;
- displays and exhibits;
- immersive exhibits;
- role plays and simulations;
- data visualizations and simulations;
- historical recreations and re-enactments;
- living and immersive archaeology;
- machinima construction;
- treasure hunts and quests;
- language and cultural immersion;
- creative writing.

They also comment:

> 3D virtual worlds can provide opportunities for rich sensory immersive experiences, authentic contexts and activities for experiential learning, simulation and role-play, modeling of complex scenarios, a platform of data visualization and opportunities for collaboration and co-creation that cannot be easily experienced using other platforms".

Warburton (2008b) states that the virtual world has been deployed within a number of disciplines to create educational opportunities, which implies both formal and informal learning approach that include: role-play and performative learning, experiential learning, cooperative learning and game-based learning

The educational activities that are currently operating, experimenting and being constructing or planned in virtual worlds are extensive and thus an attempt to provide a complete snapshot is likely to be impossible. In addition, the deployment of MUVE in educational activities also has difficulties and barrier which will be further analyzed. The research will provide example of such virtual classroom through the case study section 3.3 where a concrete examination are taking place.

## 3.3 Case study data and virtual world interview data

It is out of the scope of this research study to do practical empirical experiments of virtual classroom activities. Therefore, this section aims to provide the research understanding of the reality of the teaching and learning in the virtual world of MUVE by examining two empirical projects from other fields of professions. These are (1) the Design of learning spaces in 3D virtual environments – from UK Open University, and (2) Foreign language learning in Second Life and implication for resources provision in academic library – from Cambridge University, UK.

The selection of the first case serves the purpose that it is quite close to the implementation process of an institution, while the second case was selected as it seems to model a typical classroom activity that is quite close to the MET daily practice. For example, the selection of a language and inter-cultural class is expected to help the research to understand the actual

tasks, challenges that teacher and students may encounter in a virtual classroom and the viability of such practices as well.

In addition, the interview data of teachers and students in virtual worlds is discussed. It is to strengthen the understanding of the reality of teaching and learning in the virtual world of SL.

1. ***The Design of learning spaces in 3D virtual environments*** **– from UK Open University,**

   This empirical research project has its official acronym as DELVE, and aims to discover how such a virtual environment should be designed to maximize its potential and application. Part of the empirical study of the DELVE involved SL educators, designers and students to investigate their experiences with and perceptions of learning space designs in SL, and which key characteristics of learning space designs were important to them. The DELVE project also examines whether and how the realism or non-realism of learning spaces influences student learning and engagement?

   Because the DELVE's objectives, aims and research questions are different in scope and boundary, the analysis and synthesis from the content of the DELVE project's material are guided by the intention to

   (1) Further investigate the challenges, barriers in term of technical, practical aspects that an educator might face while conducting the teaching practices inside the virtual world.

   (2) Examine the challenges that an institution might encounter during the implementation process.

   (3) Explore the actual experiences of teachers and students whom had participated in teaching and learning in the virtual world.

   Bellow is keys finding:

   ✓ The students and teachers who participated in the project have to attend quite extensive training in the virtual environment before they can participate in the teaching and learning activities in a virtual setting. In the project, at the planning stage, a Second Life's user guide was developed for the students and educators, and it was improved over three iterations based on the users' feedback. The DELVE report also states that;

   "Our *pilot studies on other SL projects with educators at the Open University had shown that educators require considerable training*

*and access to SL resources before they feel comfortable bringing students in SL"*

- ✓ The re-creation and modeling power of SL are highlighted. It is observed that participants are clearly taking advantage of the interactive 3D features of SL, and tending towards more exploratory, experiential pedagogies rather than traditional instructional ones. There were evidences of utilizing the three applications of MUVE in this project. Through role-play scenarios and simulation, the students are getting opportunities to practice work-based skills such as remote team working, communication and collaboration in a distributed geographical work-setting. Scenarios and role-play are utilized in several domains such as art-exhibitions, medial scenarios, scenes of accidents, or for conducting pilot sessions within SL before conducting in real life (For example, exhibition).

  However, the participants in DEVLE mentioned that SL does not provide the scope for understanding the "unexpected" or what if scenarios. For example what if it rains on the day of the exhibition, what if a lot of people (more than the number catered for) turn up on the day and so on. That reveals the importance of the designing of the environment and it is incorporated in teaching/learning activities, where the educators should take into account skills required to be trained, the level of the learner and the available possibilities.

- ✓ Importantly, according to the report of the DELVE project, it was stated that they had collected evidence from educators about new ways of learning, particularly, informal learning through socializing, collaboration, role-play and tours. There is a transition from the traditional "directional" mode of teaching to more social constructivist pedagogy. Appropriate designed learning space in SL can be utilized to foster creativity among students, aid socialization, facilitate informal learning, and enable experiential learning.

2. ***Foreign language learning in Second Life and implication for resources provision in academic library* – from Cambridge University, UK.**

The research aims are to investigate foreign language learning in Second Life, and its implication for resource provision in academic libraries. It is conducted by qualitative interviewing fifteen foreign language teachers/ teacher trainers and one foreign language student, thirteen of whom were actively involved in teaching/training/learning in SL. The reality of teaching and learning experience observed in this empirical work pretty much follows the pattern that had been discovered in the previous case. To avoid duplication, this section only describes the most typical findings and evidences for the broader understanding of teaching and learning practices in virtual setting.

- First of all, it is important to notice that, again, the technical barriers had been cautiously acknowledged. According to the paper, the people who never used SL before can expect a steep learning curve to enable them to maneuver inside the virtual world. The report comments:

  > *"The first time visit to SL can be much disoriented and unless you receive a lot of support, it can be somewhat stressful"*

  It is pointed out that activities in SL take a lot longer than in real life. The students who have little technical knowledge can easily find their experience in SL as threatening. If it is not carefully prepared, SL can be a frustrating way to teach and therefore bringing negative effects.

- Interestingly, the social identification issue, where the learners can hide themselves behind their avatar turned out to be a good thing as a way for the learners to overcome the fear of failures. That seems to have psychological effects in the sense that they do not mind making mistakes.

  > *"Hiding behind an avatar can be beneficial to some students. Asian students in particular suffer from performance anxiety in real life. Culturally it is not acceptable to them to make mistakes and they don't like to embarrass themselves in public so they don't speak up. Performance anxiety is greatly reduced in SL and several interviewees have remarked that Asian students are seen to be much more open and uninhibited when practicing a foreign language in SL."*

- ✓ At last but not least, in the application of distance learning, the interviewee reported feedbacks from distance student who said that they can get in touch with a community beyond the course and that experience was very valuable. It

is stated that there is a distinct feeling of a community amongst students on SL courses. They often become friends and meet outside of class. Obviously, such evidence embraces the hope for utilizing the virtual world to facilitate the distributed knowledge community

**3. Virtual world interview data**

To strengthen the understanding of the reality of teaching and learning in virtual worlds, the additional interviews of one teacher and one student who have experience in the virtual world of SL were conducted. In the interviews, the participants were asked about their teaching and learning experiences and challenges that they have encountered in virtual settings. The interview was conducted using semi-structure interview technique. The questionnaire template is available in the appendix B.

The interviews were carried out completely in the virtual world of SL. The communications and interactions were made through the use of avatars and communication tools such as voice chat and text.

In the data presentation, there are two conventions that need to be acknowledged: First, any omissions in a quotation are indicated by ... (ellipses), and secondly, any words that need to be inserted to aid comprehension are inserted within square brackets.

The key findings are as following:

- The participants have participated in several types of activities such as debate session, presentation, and group discussion. The observed subjects are mostly knowledge based.

  " *we have weekly debate session where … where everybody can come along and express their ideas…(ellipses) I teach more serious subject like laws, [and] business study that are in some sorts of presentation and discussion*" (an educator in SL).

  *"I attend some online courses…(ellipses) [and] following some tutorial, speeches"* (a student in SL)

- The virtual intermediate layer of avatar have some sort of side effect as it help the learner to overcome the anxiety performance and feel more comfortable to ask questions.

*"…people don't have to be themselves, they are less worry about making fool of themselves and therefore they have asked questions more freely, which is important in learning experience…"*

- As only one teacher and one student were interviewed, the research is limited in term of fully understanding the reality of teaching and learning experiences. In the interviews, it is observed that while the teacher really feel a steep learning curve in SL, the student have expressed the exciting attitude toward the virtual setting.

  *"Well it is really a steep learning curve when you are first trying SL, …(ellipses) once you are here [SL environment], it becomes a second nature"*

- The integration capability of SL, which allows third party software program to integrate into SL's engine can bring additional features. For example, a real-time translation program that can directly translate among languages makes it easier for students to communicate with their international friends.

  *"[the communication] is easy for me to talk to people, for example PJIRA [PIJRA is a translation program] will translate when you talk to other people from different countries…"*

- Within a virtual setting, it is observed that a certain mode of support has been used by teachers to support their students. Note-cards are used by a teacher to provide instructions to the students in combination with other communication tools. Note-card is an informative object that contains text and hyperlinks. In other words it is a simple text document that a user can create, view and share in Second Life.

  *"…"basically, I use note-card to instruct them [in case they need support]"*

Throughout the case studies and the virtual world interview data analysis, the research has identified limitations, capabilities and certain types of learning that can happen in virtual environments. To certain extent, the data analysis also provides the research opportunities to understand the reality of conducting educational activities inside the virtual world.

Next, the findings from the data analysis step will be repositioned under the application components model of MUVE. The snapshot made from such alignment will be investigated

under the pedagogical concerns to interpret meaningful implications in the implementation of MUVE.

<table>
<tr><th colspan="4">Empirical findings in alignment with the application components of MUVE</th></tr>
<tr><th>Components</th><th>Observed activities</th><th>Limitation</th><th>Learning philosophy</th></tr>
<tr><td>Game and Simulation</td><td>• Role-play scenario<br>• Foreign language community replication<br>• Intercultural society replication<br>(For example, art exhibition simulation, participants from distributed geographical location can join a linguistic or cultural class)</td><td rowspan="3">• Limited in scopes of situations (some “what if” situations are unable to be simulated)<br>• Social identity (learner can hide behind their avatars)<br>• Additional intermediate layer – the virtual layer (this makes the educational activities not always straight forward)<br>• Technical astute and computer literate required<br>(students who are familiar with 3D games and having good skills in computing may spend less time to successfully handle the virtual environment)</td><td rowspan="3">• Informal and collaborative learning<br>• Experiential learning<br>• There is a shift from traditional to constructivist learning paradigm</td></tr>
<tr><td>Virtual delivering</td><td>• Knowledge based class<br>• Instructional class<br>• General distance learning session<br>For example, knowledge based subjects such as laws and business study</td></tr>
<tr><td>Collaboration</td><td>• Discussion group<br>• Team-work on designing learning environment<br>• Many participants can join the same scenario to simulate various situations<br>• Social interaction and maintaining the connectivity among members in a community<br>For example, weekly open-debate, meeting, or the simulation of an over-crowded situation in an exhibition,</td></tr>
</table>

Taking into account the challenges, limitations, and potentials of MUVE that have derived from the snapshots above, pedagogically, there are implications for instructors and students who conduct educational activities in virtual setting.

**[a]. Implication for the instructors**

- Educators are expected to take initiative to be a learner first. In order to successfully conduct educational activities in a virtual environment, a considerable amount of training is required.
- An educator, as a learner, a can take advantage of the social, collaboration features of MUVE to connect with more experienced educators in the community.
- Under MUVE, different learning paradigms concurrently exist. Depending on the skill and knowledge that students need to be acquired, educators should develop suitable teaching strategies and authentic learning activities.
- It is observed that there is a shift from traditional to constructivist learning paradigm. Thus the roles of educators are transforming into facilitators, which is a key in student-centered philosophy.

**[b]. Implication for students**

- Technological astute and computer literate become important skills.
- There is a variety of learning activities that can be constructed inside a virtual world. Different groups of learners may experience different challenges in getting the balance of learning styles, learning activities, and adapting in a virtual environment. Therefore, the learners are expected to be active in selecting suitable learning approach.
- The literature review and the findings from empirical data indicate that virtual world employs a social-collaboration and participatory culture. Hence, collaborative skills are essentials in virtual worlds.

Further investigations on the empirical data, the theoretical frameworks are used as references to analyze the educational potentials of MUVE.

**[a]. Epistemic Frame:** The connection between epistemology and the reproduced practices are bounced together into epistemic frames. The replication of the reproductive practices which are valued by its communities of practice enable educators to recreate the epistemic frames that provide students with opportunities to

see the world in a variety of ways that are fundamentally grounded in meaningful activities and well align with the core skills, habit, and understanding of real world practices.

In the two case studies, it is observed that there are practices and activities that are grounded in the notions of epistemic frame. A typical real life language travel situation has been replicated inside the virtual world. In a foreigner language class, after the language lesson in the morning, the virtual field-trip was organized in the afternoon, where the students had a chance to visit a foreigner language community virtually. In that way, by utilizing the recreation possibility of MUVE, the learners can immerse themselves in a real-world replicated environment, where they can actually think, act, and practice the language skills as if they were travelers.

In another observation, students play various roles of an art exhibition. A virtual exhibition site is designed collaboratively, and its related activities are simulated before it is actually conducted in real life. Such activities do allow students to experience different perspectives of organizing a real world exhibition event. In other words, it allows them to think and to act like an exhibition organizer. By participating and acting in such replication worlds, it is possible for them to develop the situated understandings, effective social practices, identities, and ways of thinking within the community of practice.

**[b].Learning theory – different conception of learning:** It is shown that there are different conceptions of learning. Amongst these conceptions, learning can be seen as making sense or abstracting meaning. Learning involves relating parts of the subject matter to each other and to the real world. Learning can also be seen as interpreting and understanding reality in a different way. Learning involves comprehending the world by reinterpreting knowledge.

Throughout the case study, the observation was that MUVE can support various notions of learning. It is stated that the case study literatures had collected evidence from educators about the new ways of learning, such as informal learning through socialization, collaboration, role-play and tours. For example, collaboratively designing a virtual exhibition event, and by participating in a real-world replication event, learning can happen by allowing students to view, understand and interpret the reality of an art exhibition in different ways.

Furthermore, if learning is approached from the standpoint of behaviorists who view learning as products of processes resulting in changes in behaviors, then evidently, learning can happen within MUVE. The virtual language class provides chances for students to experience foreigner language community, to practice and to act like travelers, which reported the increasing in their confidence to engage in conversation with their international colleagues and in ordering food in foreign restaurants. That means there were changes in their behaviors, both cognitively and physically, from being afraid of engaging social interactions in an "unfamiliar world" to being confident to be part of it.

**[c]. Community of inquiry model:** Regarding online learning application of MUVE, the presence of the elements of COI model will be observed. In the virtual world of MUVE context, cognitive presence is the first element and can be identified as in-world or online discourse such as connection of ideas, sharing of related experiences. Social presence is the second element and can be seen through emotions, expressions, collaboration and group interconnection and interpersonal connection amongst students and between students and teacher. Teaching presence, the third element of COI can be considered as the roles of the instructor facilitating the pedagogical, social, managerial and technical aspect to ensure the meaningful educational experience.

Throughout the empirical data analysis, there are evidences indicated of the presence of these three elements. Firstly, the cognitive presence is observed as learners are able to construct and confirm meaning through sustained reflection and discourse. For example, by participating in art exhibition simulation activities, the learners have realized and demanded more "what if" situations that are limited by the designing of the in-world simulation at the time being. Obviously, the students not only understand the practices of an art exhibitor, but they can also construct the unexpected situations by reflecting the reality of exhibition events.

Secondly, the social presence is observed to be valid. In term of open communication, risk-free expression and collaboration, there are plenty of such evidences. For example, there have been weekly open debates, collaboration work in designing a virtual exhibition site. It is also stated that there is a distinct feeling of a community amongst students on virtual classes and they often become friends and meet outside

of class. In addition, the anonymity of avatars facilitates opening up to conversation, asking questions and thus being comfortable in socialization. However, there are still limitations in term of emotional expression. Emotional and physical expressions through gestures are commonly absent.

Thirdly, the teaching presence is observed as the teachers are supposed to facilitate the function of designing the educational experience such as selection, organization, presentation of the course content. They are also supposed to design and develop learning activities. In other words, the teaching presence supports and facilitates the social presence and cognitive presence. Hence, a dramatic shift in pedagogy occurs when teaching in MUVE can be observed.

Teachers/instructors are responsible for creating an environment that facilitates the expansion of knowledge through the exploration, and collaboration activities. The activities inside MUVE should be adapted to the ability of the student and the objectives of the class. For example, in the DELVE project, there are different environments for fresh students, intermediate and advance level students. For fresh students, the design of leaning environment is very similar to the traditional setting with presentation board, and lecture room. For advance level, there are combinations between indoors, outdoors and task-oriented learning space.

Regarding social presence support, the report from the DELVE project states that some of the educators have consciously designed social spaces near formal learning spaces for chance encounters and informal learning. The social responsibilities of the teachers/instructors are to create a positive and nurture a cooperative learning environment that encourages the social and cognitive development of participants within MUVE. According to DELVE, pedagogically, there is a transition from the traditional 'directional' mode of teaching to a more social constructivist pedagogy. Further, through role-play scenarios and simulations, students are getting opportunities to practice work-based skills such as remote team working, communication and collaboration, and as a result, the social presence is strengthened.

To certain extent, it is clear that the reality of teaching and learning practices in the virtual world of MUVE can represent the three elements of COI, which are critical to ensure a meaningful educational experience. Theoretically, that also means MUVE can be utilized in online distance education. The role of teaching presence elements is the key to support and

facilitate the social presence and cognitive presence. However, it is important to be aware that the investigation of the roles of teacher or assessing the role of teacher in MUVE context is out of scope of this research, therefore, it is provided that the appropriate teaching approach are being used and the role of teachers are properly facilitated.

# Chapter 4

## Assessing the use of MUVE in MET

### 4.1 Survey data analysis – Situation of utilizing MUVE in MET

### 4.2 Interview data of MET educators – Technical, pedagogical, and practical concerns in MET context

*Chapter 4 helps the research to achieve its research objectives – assessing the potential and challenges of MUVE in MET.*

*In order to assess the use of MUVE and its educational benefit in MET, first of all, a literature review served as a piloting exploration where it highlighted the need for the research to identify:*

- *What is the situation of applying the concept of virtual world (or MUVE) into teaching and training in the MET area?*
- *What is the application scope of the concept within the MET context?*
- *What is the advantages/disadvantages and barriers of the implementation process?*

*Section 4.1 presents the survey data, which provides information about the current situation of utilizing MUVE's application in MET.*

*In Chapter 3, the paper has provided information about the educational potentials of MUVE based on the literature research. It also clarifies the actual practice of applying MUVE in education by presenting the case study data analysis and the in-world interview data. Coming into chapter 4, in section 4.2 the analysis of the MET interview data with opinions, insights from MET experts about the implementation of MUVE into MET practices will be presented. It serves the purpose to realize the reality of using MUVE in the educational activities from other fields of professions, as well as taking into account the reality of MET practices.*

*Altogether, these pieces of empirical work lay the basic reference point for discussion that will be introduced in chapter 5.*

## 4.1 Survey data analysis – Situation of utilizing MUVE in MET

Throughout the literature review process, there was a tendency that the application of the virtual world concept into educational and training activities is still limited within the MET area. This tendency highlights the need to perform a survey focusing on the MET community to examine the situation of applying MUVE in teaching and learning activities.

In fact, the survey result seems to indicate the validity of such interpretation. However, it should be recognized that additional sampling will have to be done to confirm the statistical significance.

**Table 1 - The percentage of respondents in the use of MUVE in teaching activities in MET**

**The use of Multi-User Virtual Environment in teaching**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | no | 10 | 83.3 | **83.3** | 83.3 |
| | yes | 2 | 16.7 | **16.7** | 100.0 |
| | Total | **12** | 100.0 | 100.0 | |

The questions in the survey asked the respondents whether they have experienced or used any game-based or MUVE for teaching purposes. With n=12, there are 83.3% that has not had any experience with the use of MUVE in teaching activities before. Interestingly, in further investigating the other 16.7% of respondents, it turned out that these respondents had misinterpreted the concepts by indicating “CBT, and Bridge Simulation” which is a different concept. This leads to the conclusion that the valid percentage is 100% of the respondents that had not had experience with utilizing MUVE in education.

However, only 66.67% of respondents come from native maritime institution. This percentage is represented by 50% that come from maritime universities and 16.67% that come from maritime vocational training centers. The remaining 33.33% comes from other types of institutions.

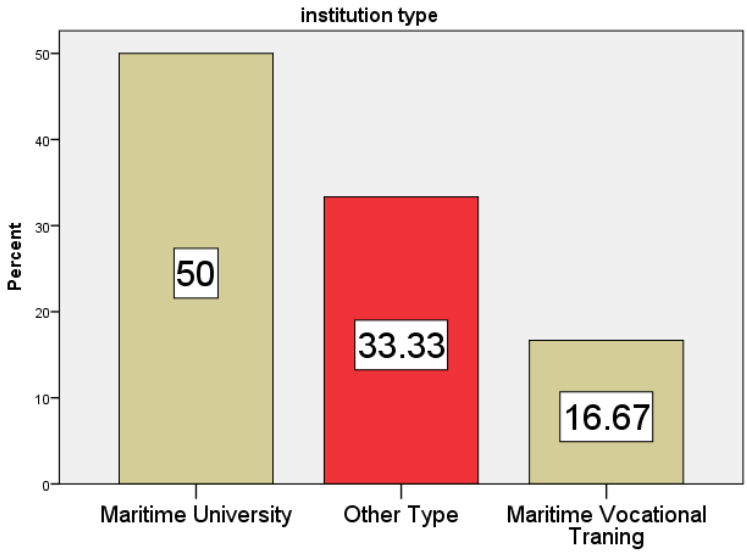



**Figure 10 - surveyed Institution type (in percentage)**

The data of this survey appears to show that there was not sufficient focus on the area of utilizing MUVE for teaching purposes within MET practices. However, it is important to take into account the fact that the survey asked the respondents about their personal experience with MUVE, but not asking about the use of MUVE at their institution level. With a small sample (n=12), and 33.33% respondents come from other types of institutions, probably there are MUVE implementation processes that are undergoing at institutional levels that the survey did not fully cover.

To explore the potential of the application of MUVE as a virtual delivering method, the survey investigated the current status of distance education and its future deployment within the MET community.

The results show that currently only 25% of the surveyed institutions have offered distance education. However, in the next five years there is a growing expectation in delivering distance education, with 41.7% of the respondents intending to provide distance learning services.

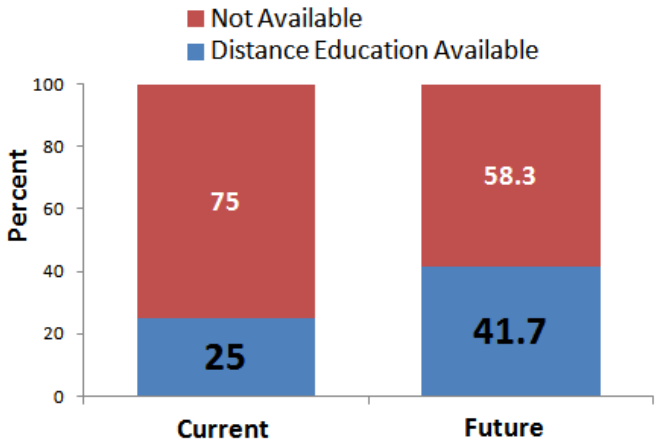



**Figure 11 - Expectation on distance learning in the next five years**

75% of the respondents believe that there is a shortage of experienced maritime instructor in their institution.

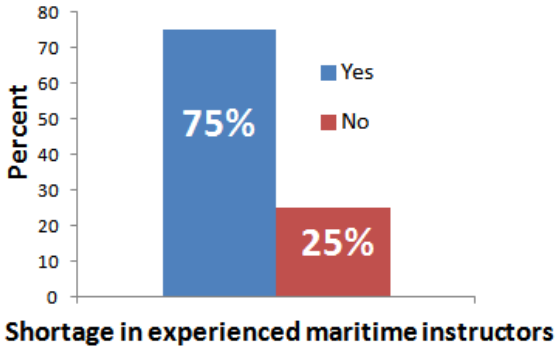



**Figure 12 - Belief in there is a shortage of experienced maritime instructors**

Regarding the willingness of implementation of the MUVE concept into education, there are still 25% (in total of 91.7%) who are hesitant, and the other 66.67% (in total of 91.7%) think that the virtual concept can be applied in the MET contexts. 8.3% of the respondents have not responded to the question.

**Table 2 - percentage of respondents in the question asking about the possibility of applying MUVE in MET**

**Can this concept applied in MET context?**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Yes | 8 | 66.7 | **72.7** | 72.7 |
| | "no opinion" | 3 | 25.0 | **27.3** | 100.0 |
| | Total | 11 | 91.7 | 100.0 | |
| Missing | “not filling” | 1 | 8.3 | | |
| **Total** | | **12** | **100.0** | | |

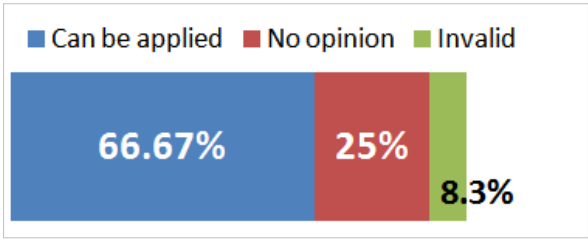



**Figure 13 - Valid percentage in the response to the question asking about the possibility of applying MUVE in MET**

## 4.2 Interview data of MET educators – Technical, pedagogical, and practical concerns in MET context

The interview data of maritime experts show that they are quite open to the new educational concept of MUVE. However, they express their concerns regarding pedagogical, social, and technical aspects. The data shows that the majority of participants have not used or experienced MUVE concepts before. It is also observed that there has been a misinterpretation of the MUVE concept with the current Marine Simulation Platform.

To make it easy for the reader to understand the phenomena, the data in this section is presented by the following themes. First, the data will show the willingness and openness of the participants with the concept. Secondly, concrete pedagogical, social, and technical concerns are presented. According to the experts, these are viewed as requirements and prerequisites in order to successfully utilize the application of MUVE in the MET practices. Finally, their insights about the subjects that can benefit from the application components of MUVE are provided.

In the interview data, there are two conventions that need to be acknowledged here; any omissions in a quotation are indicated by ... (ellipses); and any words that need to be inserted to aid comprehension are inserted within square brackets.

Before asking the question, the interviewer took some time to explain the concept to the participants to make sure that both, at least, should share a common ground of the concept before proceeding.

> *"We are about to introduce the teaching – learning concept that the teaching and learning is taking place in the Multi User Virtual Environment, in which the teacher(s) control his or her avatar (character) and the students also control their character via their personal computer, and together they are*

*joining inside a virtual environment and deliver the class there.*"

The explanation before interviewing.

**a) The attitude of the MET community toward the implementation of MUVE**

The participants have shown their openness and a welcome of the concept with various degrees of concerns, from having a little bit of criticism such as

> "*I think that simulation and the use of virtual technology whether it's for education or connectivity is definitely going to growth. only something inhibited at the moment by cost and times, if you look at other industries…and how they use distance learning and e learning to support the work force… the maritime industry is still have to catch up...have to follow, still ways behind"*.

or having immediate reflection of the application of MUVE as a distance learning tool, and there has also been some degree of reluctance:

> "*…yah.. it might work, I haven't had any experience in that way, distance learning… I know very much getting used but you still see that many distance learning programs had a short period of contact as well, I don't think you can do everything distance... But to greater extent probably you can... If you have the right computer, if you have the right internet connection, the right tools...*"

> "*…some people might have some reluctant... but you should have to give it a try to see what the results are... I mean that the only way, and compare with the student that have not been trained in that way [then]compare the competence afterward…* "

> "*I thinks it would be fantastic ideas, though... I think it's fantastic ideas for the young people, young generation...they are now using the computer, mobile phone, online and everything ... [ however] I don't know how it could be... people are around fifty year olds or even above...[anyway] I think... it's a good thing.*"

However, the openness attitudes can be compromised due the inconsistency in interpretation of the concept. There are misinterpretations of the term MUVE with other types marine

simulation such as Ship Handling Simulation or Virtual Engine Room Simulation. Such phenomena can be observed through the repeated occurrences where participants make examples of the use of the MUVE concepts by referring closely to (or at least compare to) Engine Room Simulation, or Ship Handling Simulation. The risk of misinterpretation highlight the need for further explanation of the term "simulation and game" in section 2.3.

For example; after explaining the concept and asking a question of "*do you think this concept can be applied in Maritime Education and Training context within certain subjects?*" the participant might reply as:

> "*Absolutely, did you go on the tour? [the tour is about visiting a newly developed Virtual Engine Room Simulator at "Willem Barentsz Maritiem Instituut"]*"

Sometime it shows their expectation of the concept to be comparable with more serious marine simulator:

> "*The value of it to the organization are those in the term of cost, so if you can really get 100% transfer in the virtual environment instead of getting the real thing then it is valuable for the course where you need ...(ellipse), for example the Virtual Engine Room Simulator we've refer to[this interview happen after the researcher and the participant have visited virtual engine room facilities], if you can get it transfer via the Virtual Engine Room Simulator then it is cheap cheaper, and the use of space it's much limited compare to having a big room for the real engine.*"

**b) Pedagogical concerns**

Despite such limitations, the interview data reveals various concerns of the participants regarding the use of the MUVE concept in MET. The physical, real world social identity and interaction are highly emphasized by the participants.

> "*…my concern could be there is a lack of interaction between student, …(ellipse) interaction is very important, very important for the student and also for the lecture…to be easy...to be able to...to understand the progress of the student…(ellipse). If you're face to face, you are able to tell how good the*

*lecture is, in term of teaching and in term of the way he conducts [his/her] class, in term of how [he/she] responses to the student...*"

"*I think that the human interaction is very important...(ellipse) I think it's easier to explain something when you can use your hands... so if I want to say something that is very large, I will do like this [the interviewee use their hands to perform gestures], [by doing that] they(the student) not only remember that I said it was large, but they still see that it was large..and you lose that [under the virtual setting]*"

"*the negative thing is that the student are not, necessarily honest, they can pretend to be somebody that they are not and the relationships are not the same…(ellipse). I think the student can get to know each other in the situation [in the virtual world], but they are not really knowing each other, they know the attributes that they want to portrait [via their avatar]... that doesn't mean that they won't learn... I mean if the only goal is learning then they can attend that way [attend the class at distance apart] absolutely.*"

In addition, the data expresses the pedagogical concerns in applying the concept of MUVE into MET practices. The selection of subjects should be so careful to ensure that they can successfully utilize the benefit of the recreation and modeling power of virtual worlds. It is supposed not to bring frustration to the learners. By using the virtual setting, the learners have to pass through an additional abstract layer – the virtual layer, and then additional training may be required in order for the learners to be familiar with the virtual grammar. That would challenge the educator to implement such concepts into teaching and learning activities. It is because by doing so, they have to struggle, or learn to be skillful in dealing with a variety of tasks in the virtual world (for example, handling communication – public, private channels, text or voice chat, instant message and email). Moreover, if necessary, they are expected to help their students, or train their students to deal with a variety of settings in virtual worlds.

According to these experts, the design of the teaching and learning in a virtual setting has to show its advantages over the existing model, or software programs that are available in the market. The implementation process should take into account altogether: the level of the learner, the skills they need to acquire and the possibility that the concept could bring. They

warn that the amount of activities that utilizes the applications of MUVE should be appropriately applied, over usage or using it in a wrong way may bring negative effect to the learners. Bellows are their explanations:

> "*…you are teaching somebody how to move in a virtual environment which you could setup at school to do it, and then you are going to use that experience, that exposure to let him learn how to start the main engine [in virtual environment], so if you compare this to the traditional education... it just like you coming to the nautical school and you don't know how to read.. Then you have to be taught how to read and then use the reading as a tool to learn maritime affairs... so if your students are not every good in virtual environment then you are now teaching them to be good the virtual environment before they can get to the actual learning process…*"

> "*...the question one could ask is that ... what is the addition that it would give,...(ellipse) the value of this has to be more in statistic, and what is the learning experience that avatars can add anything to the classroom experience ?* "

> "*…as long as it's only on the screen, only on the PC so the student just think that it is just another computer game… (Ellipse) Life is not a game, and you don't want to program the student to think that everything is as the same level capacity, philosophy as game, whether you call it serious game or whatever you call it... I'm a bit careful there... cautious there and especially if the students have to learn the real world and not only learn the ideal computer world or computer game... so you have to be careful there... not to overdo it... it's a good tool but don't take it to the extreme...*"

> "*you have to look at the skills that you are going to develop, you have to look at the trainee and the level of the trainee; are they novice, expert or intermediate? Then you have to look at the technology that you have available, and match the three.*"

**c) Applications of MUVE**

- **The utilization of game-simulation component and making use of recreation power**

Despite of such concerns, some experts express that the recreation capabilities and game/simulation component of MUVE potentially can contribute to the MET teaching and learning activities. It is because risky and complex situations can be simulated, which is impossible or so expensive to experience in real life. For example, abandon ship situation and maritime accident investigation.

> *"Abandonment of the ship can be animated, and an accident can be studied. The investigator of that accident or a person who had studied it, let called the instructor who now onboard of the vessel recreate the accident, so the student can go through the process,…(ellipse) you can let the learners go through that experience, they can have discussion [during the virtual lecture]. Creating that is extremely values... in my opinion, how can I, in real life, can take my students to the accidents before and after [the accident] so that [is] the advantage... with that you can simulate many situations!"*

- **The utilization of collaboration component com**

Regarding the collaboration usage, the data analysis helps to investigate the objective of how this concept can facilitate the MET community of practice. It is observed that there is a need for graduate students early in their professional career to get back up and support from their institution or from the community. This could also be the other way around as a community of practice also needs the knowledge contribution of the workforce. However, due to practical considerations, such provisions may encounter technical challenges. First, the internet connection is limited or it is still a very expensive resource in the maritime profession work field. For example, seafarers cannot access the virtual facilitated services during their time at sea, and they have to wait until they are ashore or at the end of the voyage. Secondly, the internet facilities are not evenly developed around the world. In some countries that do not have sufficient establishment of the internet facilities, the deployment processes will encounter many challenges. These insights are highlighted by experts as follows:

> *"when the student graduate, then they become a professional, in the beginning, the starting of his profession, he might like to get some backup, some information... but then after the few years, he probably know more*

*than the teachers then it is little use anymore....or then the teachers use that to get more information to teach for the new students... that might be the case I think…(ellipse) after probably 10 years in their profession, the students knows more than a teacher does."*

*"the problem is at sea, the internet connection service on ship is still very…very absent, there no a great built of ship or ship operators who provide internet services onboard for the crews. When we talking about all of these provisions, all of these technology that are available we really talking about its available on land. That shouldn't be a reason to say "no" because seafarer still come on land whether it is during the voyage or end of the voyage… and so all the resources of virtual simulation and SL could be still available to them.. It just might mean that they have to wait until the ship is in port or until they flight home to be able access"*

*"My other concern is that...I come from …(ellipse)[the country name, and organization name have been omitted by researcher to maintain the anonymous] I would concern is there any availability for that area... for maritime institution, there's issue of cost... from the development point of view then.. The development level is difference around the world..."*

In general, although the educational purposes of MUVE are recognized within the MET community, the use of MUVE in MET is still very limited. MET with its special characteristic of a profession, the experts acknowledged the requirement of careful consideration in the implementation process regarding pedagogical and practical issues.

# Chapter 5

## Discussion: Potentials and challenges of utilizing MUVE in MET

*Chapter 5 helps the research to answer the research question by discussing the potentials and challenges of utilizing MUVE in MET.*

*The assessment task on the use of MUVE in MET described in this section has taken into account the analysis outcomes of the literature review, case study data, and the virtual world interview data. In other words, all the empirical work and literature review will be utilized to discuss the use of MUVE in MET.*

## 4.3 Discussion – Potentials and challenges of utilizing MUVE in MET

The discussing the pros and cons of MUVE implementation in MET helps answering the research question in detail. Throughout the literature review and the empirical findings, obviously, the potential that various applications of MUVE can be brought into MET is both promising and challenging. Although MUVE's application might empower the learners, educators and their institutions with plenty of possibilities, however, if it is not properly setup, there will be a volatile environment and the outcomes might be negative and frustrating.

In MET, research in the area of applying MUVE into teaching and learning activities is still very limited. Therefore, the capital experience in practice is becoming one of the constraints. The implementation of the virtual institution concept, hence, along with its potential, needs to be weighed against barriers and challenges.

The assessment task on the use of MUVE in MET described in this section has taken into account the analysis outcomes of the literature review, the two case study data, and the virtual world interview data. In other words, all the empirical work and literature review will be utilized to discuss the use of MUVE in MET.

In the discussion, the realization of potentials and challenges of MUVE in education from the empirical work will be synthesized and repositioned into typical identified issues in MET. The outcomes from the literature research are also utilized. It is where the potentials and challenges have been identified in other educational professions.

First, the discussion presents the possibilities and potentials of MUVE, and reflections on contemporary issues of MET are clarified. Secondly, the identified challenges of applying MUVE in educational activities will be discussed in combination with the concerned MET practices.

1. **What are the potentials and possibilities for MET?** Based on the literature research and the empirical work, the application components of MUVE are used as references to assess the potential of MUVE for MET. Theoretically, the three application components of MUVE (social collaboration, virtual delivering, and Game-Simulation) provide MET educators with usage flexibility. These applications can be deployed in MET in various educational scenarios.

a) **Game-simulation component:**. The various papers from journal publications helped the research to realize the situation that there are increasing studies in the area of applying MUVEs as educational tools.

The virtual world with its gaming and simulation capabilities together with its recreation power can enable educators to create an enhanced learning environment. In addition, educators can make use of the recreation power of MUVE to create 3D illustrations of objects, animations, and concepts that may help the students to understand subject matters easier. The educational purposes of game and simulation are widely recognized. The virtual world of MUVE can be designed to be used locally where the blended learning metaphor is applied. That is where the traditional teaching activities are blended with role-playing game, risky situation simulation or open-ended exploration learning game.

From the two case studies, it is observed that the recreation capabilities powered by game/simulation component has been utilized. For example, role-play scenarios, replication of foreign language community replication, art-exhibition test.

The outcomes of the case studies indicate that there are practices and activities that are grounded in the notions of epistemic frame. A virtual foreign language community is constructed, which provides students with opportunities to immerse themselves in a real-world replicated environment, a risk-free environment, where they can actually think, act, and practice the language skills as if they were travelers.

Additionally, students play various roles in an virtual art exhibition. Its related activities are simulated before it is actually conducted in real life. Such activities do allow students to experience different perspectives of organizing a real world exhibition event. In other words, it allows them to think and to act like an exhibition organizer. By utilizing MUVE, it is possible to provide students chances to develop the situated understandings, effective social practices, identities, and ways of thinking within the community of practice.

In MET, according to the MET educator interviews, there are many situations that can be simulated to support learning activities. For example, an abandon ship situation, accident investigation, or crisis situations, where the synchronous communication and multiplayer allow educators to simulate the crowds, communication, organization and reactions of participants.

Additionally, the introduction of the STCW 1978/1995/2010 amendments has brought the communicative competences and culture awareness to the light as they are now the explicit requirements. Multi-cultural communities can be simulated to support the maritime communication English and culture awareness classes.

b) **Virtual delivering and the application of distance learning:** In this sense, the virtual world plays a role as an add-on to the existed traditional distance education. The virtual classroom can be used standalone or in combination with other web-based or internet-based learning programs and web-based distance learning programs to maximize the learning experience. Enhanced social interactions features, extensive modes of communication and immersive environments can impact the affective, empathetic and help to form meaningful educational experience.

As mentioned in the case study data analysis in section 3.3, all the elements of the Community of Inquiry model (social presence, teaching presence, and cognitive presence) are observed to be valid under the virtual world settings. This means that the virtual institution concept can be deployed as a distance learning tool. It is observed that there are distance learning activities that have been conducted inside the virtual world. These are knowledge based class, and instructional class such as laws, business study subjects and tutorial sessions.

Importantly, with the persistent characteristic of the virtual world, the entire user created objects, such as 3D animations, illustrations, and scenarios are reusable and available at any time. In other words, the virtual objects that have been created for using the local class can be reused for distance education at other times.

In a MET context, According to the survey, there is an increasing interested within the MET community in providing distance education service in the future.

From the industry, the rapid emergence of new technologies makes the ship's instruments increasingly more advanced and sophisticated. These kind of ships require less number of crew members, and seafarers today are becoming more high-tech compare to the past (Ziarati, n.d.).

On the other hand, the dynamic and changing nature of the maritime industry (legal issues, new regulation and convention, commercial demand) brings the need to keep seafarers informed, updated with the reality and certifications. Solanki and Nakazawa (2007) emphasize the need of continuously supporting quality education for the seafarers. Such issues reveal the important role of MET distance education in the future.

The empirical data suggests that the use of MUVE in MET is still limited, and in general, the application of virtual world in distance learning is still at the dawn of it development. However, if it is designed appropriately, obviously, the applications of virtual worlds can be prevailing tools to support distance learning activities.

c) **Collaboration platform and its application in informal learning and collaborative activities**: Having the immersion, co-presence with native sociality characteristics, and having extensive modes of communication available, SL turns out to be a prevailing collaboration platform across disconnected geographical location. The persistence characteristic enables people in the knowledge community opportunities to participate at any time from everywhere that have adequate internet connection at low cost. It is almost free for the user to register to join the virtual community. However, the participant need sometimes to be familiar with the environment, and the host institution should build the tool to facilitate the collaboration work. Despite that, the extensive availability and accessibility make it be a prevailing tool for collaboration work today. The evidence of that kind of usage are plenty, where many reputable organizations take advantage of the sense of "presence" in

virtual worlds to conduct virtual team meetings, conferences, talk shows, group discussions (Schneider Electric, IBM).

The case study outcomes indicate that MUVE is empowered with strong collaboration features. Various collaborative activities were observed such as group discussion, team-work on designing learning environment, weekly open-debate and meeting.

In the MET area, the importance of implementing ICT into educational activities has been widely recognized. There are efforts in the knowledge management domain to encourage the contribution and facilitation of knowledge exchange within maritime knowledge communities

According to Rolf Petrén Nilsson (2006), chief editor of Scandinavian Shipping Gazette, within MET, there is a need to establish a unified platform to promote collaboration and expertise exchange between institution, teachers and students. To this end, MUVE is equipped with native socialization and collaboration characteristic that are promising tools to fulfill such demand, or at least deserve the consideration for the usage.

Being influenced by many factors such as technology innovation, the dynamic change in international laws and regulations, and the changes in industry culture, future seafarers need to be equipped with interdisciplinary skills and knowledge to handle the dynamic and uncertainty of working reality. That means the faculty member of MET institutions should always find ways to upgrading, and exchanging the knowledge and expertise with their students and their peers.

Actually, the calling for the utilization of collaboration tools to address the immediate needs of the campus has been strongly emphasized. Expertise exchange is crucial in MET. It is important for a maritime expert, who is a maritime vocational instructor moving from shipboard operations to an academy simulation laboratory. It is also important for another “practice” faculty, who a language teacher is moving from other university settings to the maritime campus setting. There are always challenges of understanding and

embracing the pedagogical and scholarly demands associated with a dynamic balance of theoretical and experiential education.

If it is properly designed, the virtual institution with its collaboration capability can help MET to tackle these issues. For example, in an inter-cultural class, it is possible for the students in Europe to join with the student in Asia to discuss, collaborate and exchange culture values and knowledge. In another case, a language teacher can join a virtual session with a maritime engineer from distance to deliver the class together.

2) **But then what are the challenges?** Obviously, the potential of MUVE for MET is plenty and fruitful, but the challenges are also many. These challenges could be classified into technical challenges, which mostly concern about the information technology facility, virtual world architecture and its native characteristics; and practical challenges, which mostly concern the pedagogical, reality of working practice in MET and its industry.

[1] **Technically**: Online virtual worlds work on the client-server architecture, and the issue of bandwidth, hardware and firewall affecting the network traffic may lead to issues of downtime and lag. Such issues make the interactions and the presentation of the virtual environment become frustrating. There are also human or usage related issues, which include managing client interface, developing the basic in-world competences such as navigation through terrains, creating objects, handling inventory, manipulating one's avatar and developing a visual 3-D grammar. These two issues can act in combination and can have different impact on different users, which make the in-world experience not consistent for all the participants. For example, when conducting this research, the researcher encountered the firewall problem within the university campus, which prevented the access to the virtual world of SL. Such technical issue is going to have many implications in practice when participants are in public place and using the internet connection which is under the restriction of a firewall. In that case, seeking for the IT support is problematic, and inherently it is not an immediate support.

In addition, the identity authentication issues can be disconcerting and confusing. Users can hide behind their avatar, as identities are never fixed and they are free to

play with the virtual identities. It causes managing the accountability to become an issue of concern. Moreover, the virtual social community also has its own set of codes, norms and etiquette (Meadows, 2008). That does not mean to say that there is no ways to deal with the identity issues from the view point of an institution, it just means the peer to peer social relationship in a virtual community is not really straightforward.

There is also a lack of open standard or interoperability amongst virtual world platforms, which could potentially make institutions limit themselves or lock themselves inside a particular platform. So the operation of their virtual facilities and activities completely depend on the service provider (for example, SL). Hence, there a risk of wasting investments, time, economic and intellectual resources inside a single non-transferable setting. There are initiative actions to deal with the interoperability issues. Consensus is being reached over the need for open standards, open specifications and a drive towards interoperability that will allow bridging between 2-D and 3-D domains (Livingstone, Kemp & Edgar, 2008; Sun Services White Paper, 2008). Standardization remains a major problem for developers who want to integrate other technologies and resources into virtual worlds.

Economic factors and business models are different across virtual world platforms. It is different in a sense that these virtual worlds can be hosted locally or outsourced, its code-base can be open-source or proprietary, and the service providers can either use the subscription plan, owned or a similar model. Particularly for SL, the game engine and so everything that are in-world are hosted by Linden Labs on their servers, while the user access the virtual world via an open-source program called Second Life Viewer and it is free to download. A basic account is free, which allows a user to own an avatar and join the world, but everything beyond that basic-setting does cost money. For instance, buying land to create teaching/learning space, or purchasing in-world tools (unless you create it on your own; these in-world tool can be power point streaming board, or video streaming), or employing virtual world designing and scripting expertise cost money.

[2] **Practically**: The introduction of utilizing MUVE into MET's teaching and learning practices is not really a straightforward process.

First of all, the timing issue is the most obvious one. When dealing with a virtual learning environment, even a simple thing can take a long time. Designing, validating, running teaching activities, and down to other simple tasks require an educator to develop multiple skills. From the educators' viewpoint, they need to familiar themselves with the virtual environment before they can actually participate in the teaching activities. For example, they have to know how navigate through terrain, how to use and create objects and interact with them and handling inventory. It takes time to be familiar with the use of communication tools and techniques, as well as manipulating their avatar and developing a visual 3-D grammar. More time means there are more work for them which might compromise their working timeslot.

As the empirical data indicated, teaching in a virtual environment either as distance setting or as local gaming/simulation setting take more time than usual. In addition, the students themselves also need a training or orientation period in order to manipulate the tools properly inside the virtual world. That will bring challenges for the institution to fit these activities in their already tight curriculum. Such issues are especially critical in METs as they are already overwhelmed with rapid change requirements from the industry and most of the training programs are short courses.

From the student viewpoint, when participating in the in-world activities, they sometimes found that it is hard to concentrate on the learning activities (Macías-Díaz, 2008b). Even worse, they might think that it is just another video game and that could establish prejudice attitudes toward the use of virtual world in education, which can easily lead to a low motivations level. Also, as they learn and participate in the class virtually, it is hard for educators to monitor the educational process. Particularly, in distance setting, it is hard to tell if the student are actually learning or playing.

Secondly, most of the METs faculty members do not have formal training about 3D application development and much less with scripting or programming. As a

result, a MET institution that has the virtual facilities implemented will depend on the 3rd parties' solution and probably costly investment in human resources.

In fact, every tool or solution has its own positive and negative sides. These application components of MUVE are considered as educational tools, so it is argued that as long as something is considered as a tool, its effectiveness very much depends on the way how it is used and utilized. It is also true with MUVE as it is considered as education tools. In other words, the effectiveness of applying a virtual learning environment into MET's educational activities is going to depend on how educators utilize it in their practices in particular, and how an institution is planning to deal with it in their strategy development in general.

Virtual worlds should be seen as an inclusive and not an exclusive tool for education. It is expected to be used in combination with other useful tools that are available, such as simulation, online learning resources, 2.0 learning website, blog, and wiki. MET has a long history with the hands on-practices and learning by doing culture. That does not mean that there is no place for virtual setting in MET's practices. There is never a tool for every task, therefore the use of MUVE's application should be carefully selected so that the level of the learner, the skills, and knowledge that need to be trained or transferred, and the appropriateness of the available tools meet in balance.

The technical barriers have been mentioned many times. However, it would not be enough by not mentioning the industry's efforts of trying to tackle these issues as well as the future development of MUVE. Although SL is a dominant platform for education at the moment, SL is just the tip of a big iceberg. KZero (2009, www.KZero.co.uk), a group that is analyzing market trends in virtual world usage, has already identified over 150 virtual environments as either live or in development and projected it at 450 by 2011.

There are initiatives that are starting to address perceived weaknesses and promise advances in usability and applicability that will strengthen the use of virtual world within mainstream education (Warburton, 2009, p.424).

- New initiatives are appearing in the area of portable identities. These efforts would effectively free avatars to roam from virtual world to virtual world while maintaining their identity and assets across multiple platforms

- A number of projects are also exploring the use of haptic devices to mediate interactions with virtual worlds. These devices, sensitive to force feedback, aim to provide a richer immersive experience.
- There is an Open Source Project called SLOODLE, which integrate MUVE such as SL with learning management systems such as MOODLE.

It is clear that Multi-Users Virtual Learning Environments are not at its prime time yet, and most of the educational activities involved in MUVE are still at an experimental stage, but the virtual world technology and its culture is forecasted to be growing at a fast pace. Technology innovation as a whole has changed the way people live, the way people work and the way people learn. Like any other educational organization, MET institutions should prepare for change by exploring new technology in education.

Having realized all the potential educational values and barriers that MUVE might bring, as well as taking into account the long term strategy development of MET and the healthiness of its network of distributed community of practice, it is possible to apply the concept of Virtual Institution into the MET area. At the moment of this research, there has not been any practical guideline for implementation or designing the virtual learning environment yet. Therefore each of the identified barriers to the use of MUVE in MET presents challenges that require careful consideration in the design and implementation process.

# Chapter 6

## Conclusions and suggestions

### 6.1 Conclusions

### 6.2 Limitation of the research

### 6.3 Recommendations

*Chapter 5 will recall the research objectives with the indication of whether each objective has been accomplished. A brief description of how has it been achieved is also grounded. The recommendation for future research will be discussed and the contribution of this research to the development of the MET field will be clarified. Finally, the limitation of the study will be discussed for future considerations.*

## 6.1 Conclusions

The overall aim of this research was to explore the understanding of the educational potential of Muti-User Virtual Environment in the Maritime Education and Training contexts. Thereby, the conducting of this research was guided by the following research question

*"Would it be possible to apply the concept of virtual institution into the Maritime Education and Training context?"*

The research objectives pursued in order to answer the research questions are to:

**R01:** Investigate the potential and challenges of applying MUVE into education, focusing on the use of virtual world in Second Life.

**R02:** Examine how the virtual institution concept - an embodiment of MUVE can contribute to the educational activities of a MET institution?

**R03:** Assess the challenges that a MET institution might encounter during the implementation process

This section will revisit these objectives with the summary of the findings and the conclusion for each. Along the way, this section will reflect on the research outcomes as to inform the readers whether and how each research objective has been accomplished.

**Research objective R01:** Investigate the potential and challenges of applying MUVE into education, focusing on the use of virtual world in Second Life.

The literature review has identified potentials and challenges of utilizing MUVE in other professions of education. The potentials are synthesized and modeled as the application components of MUVE. Educators can use MUVE either as (1) a game or simulation platform, (2) collaboration platform, or as (3) a virtual delivering platform. The applications of MUVE can be used to facilitate informal learning by promoting information and expertise exchange across a distributed knowledge community. Other than that, the rich interactions and socialization characteristics of virtual worlds, which are representations of MUVE, can potentially foster the experiential and constructivist learning metaphor.

Together with the literature review, the findings of the case study data from the two empirical projects and the virtual world interview help to identify challenges of implementing MUVE in education. These challenges can be grouped as:

1) Technical: Bandwidth, hardware, firewall and IT infrastructure.
2) User related issues: The users need to be trained in order to handle the virtual environment properly, or to be familiar with the 3D visual grammar. It is a hard steep learning curve.
3) Limitation of the virtual world's characteristics in itself: Lack of body language or facial expression, authentic identity issues because people are hiding behind their avatar. The virtual world culture has its own set of codes, norms and etiquette which may turn out to be strange, distracting or volatile for the users.

**Research objective R02:** Examine how the virtual institution concept, which is an embodiment of MUVE, can contribute to the educational activities of a MET institution.

To achieve this objective, the accomplishment of objective 1 is utilized. Beside, the application components of MUVE are used as a framework to reflect on the MET's educational reality and its future development, which is based on the findings of MET survey data, and open-ended interview data.

Throughout the literature review and the empirical work, it is apparent that the implementation of MUVE within the area of MET is still very limited. However, the MET community showed their willingness with the new concept. It is observed that the distance learning is expected to grow in the next five year, and most MET institutions are now facing the shortage in experienced maritime instructors. This highlights the needs for information and expertise exchange in the MET community. When these issues are aligned with the MUVE's application components, then theoretically, the virtual institution concept can help MET institutions to tackle these problems in numerous of ways as follows:

- As an add-in tool in a traditional classroom: This is where the recreation capability of virtual world, which is powered by game-simulation component, is being utilized. With this, educators can create an enhanced learning environment by designing simulation scenarios, 3D animation, illustration, or open-ended game which may help to foster the learning process.
- As a distance learning tool: This is where the rich interactions, the native social networks, the sense of presence, and the persistence characteristics of virtual world in combination with extensive modes of communication (verbal & nonverbal) show their usefulness. There are several benefits that this tool can bring over traditional distance learning. It does add a certain level of interaction into the learning experience, which

is normally quite absent in traditional distance learning settings. Educators and the distance learners are able to access and reuse all the virtual assets such as simulation scenarios, 3D animation, illustration, or open-ended game that are created and used in face-to-face classrooms.

- As a collaboration tool: In this respect, most characteristics of the virtual world that have been mentioned before and the extensive availability and accessibility make it a prevailing tool for collaboration work today. Meetings, conferences, group discussion, talk shows, and seminars can be conducted under virtual institution, which could facilitate, situated learning, information and expertise exchange.

These tools can be used either as standalone tools or in combination with other tools that are available to extend their flexibility and effectiveness.

**Research objective R03:** Assess the challenges that MET institutions might encounter during the implementation process

By using the outcome of research objectives 1 and 2, case study data, and the findings from MET experts and virtual world interview data, the researcher was able to achieve the objective 3.

The challenges that a MET institution might encounter are classified as technical and practical concerns. Technical challenges mostly concern the information technology facility, virtual world architecture and its native characteristics. Practical challenges mostly concern the pedagogical aspects, reality of working practices in MET and its industry.

Technically, the virtual world is working on client-server architecture so the issues of bandwidth, firewall, and client side hardware are mainly regarded. It requires the users to develop multiple skills for the basic in-world competences as prerequisites in order to effectively use the virtual world to conduct teaching and learning activities.

In addition, the identity authentication issues can be disconcerting and confusing. Users can hide behind their avatar, identities are never fixed and they are free to play with identity, which makes the managing of the accountability become an issue of concern.

Currently, there is no common open standard or interoperability between virtual world platforms, which could potentially make institutions limit themselves or lock themselves inside a particular virtual platform. Hence, there is a risk of wasting any investments in terms

of time, economic, and intellectual resources inside a single non-transferable setting. There are initiative actions to deal with the interoperability issues, though standardization remains a major problem.

Economic investment is another thing to consider. A basic account is free, which allows a user to own an avatar and join the virtual world, but everything beyond that basic-setting does cost money. Buying the virtual land to create teaching/learning spaces, purchasing in-world tools and employing designing and scripting expertise are all costly.

Practically, the timing issue is probably the most obvious challenge. Dealing with the virtual worlds, even a simple thing can take a long time. Both teachers and students need time to get familiar themselves with the virtual environment before they can effectively participate in the teaching/learning activities. More time means there are more work for them, and consequently compromising their working timeslot and workload. That also brings challenges for the institution to fit these activities in their fixed curriculum.

From a student viewpoint, if the tools are not properly designed, they might think that it is just another video game, which could result in prejudice attitudes toward the use of the virtual world in education, which can easily lead to low motivations level. Also, as they learn and participate in the class virtually, it is a concern for educators to monitor the educational process.

Another point is, most of the METs faculty members do not have formal training about 3D application development and much less with scripting or programming; by implication, an institution may have to depend on the 3rd parties solution and probably costly investment in human resources.

**Answering the research question**: Having realized all the potentials an institution of MET can benefit and challenges that it would face, as well as taking into account the future development of the virtual technology, the common trend in using technology in education and the current situation of MET in using MUVE's applications, the answer is that it is possible to implement the concept of virtual institution into the maritime education and training context. Though it is important to notice that its effectiveness very much depends on the way it is designed and implemented into difference context of teaching and learning. The Online Multi-User Virtual Learning Environment technology is still in its dawn of development, there have not been any practical guidelines for implementation or conducting

the virtual educational activities established yet. Therefore, the MUVE concept should be implemented with careful consideration.

## 6.2 Limitation of the research

There are three key limitations of this research identified:

Firstly, because the use of MUVE in education activities is still very limited in the MET area, the findings in the case study are based on the work from other professions. Most of the participants in these projects already have technical expertise and have already integrated it into their lives and work. Therefore, it failed to understand how the concept will influence those that have maritime background in terms of the virtual setting experiences and responses. Consequently, it is also fail to understand how their experience is changed or developed over the time as their expertise and familiarity with the virtual setting are improved. Therefore, the research is unable to make full judgments on the impact as well as challenges that a MET institution will face.

Secondly, the data from the case studies used in this research does not cover the collaboration of empirical work. Though these reports did mention the group discussion and other sort of collaborative activities, exploring the collaboration aspects is not the main objectives of these studies. Therefore, it weakens the evidence that is supporting the collaboration potential of MUVE.

Thirdly, the major part of this research focuses heavily on the current stage of MUVE and its application in education. The technology innovation is growing at fast pace and so virtual technology. Moreover, this paper mainly focused on Second Life platform which is just one of the over 300 other virtual platforms which are either already online or under development at the moment (KZero, 2011). While this research was unable to analyze the future development of MUVE as well as the development of other educational tools, then the reported advantages, challenges, problems and its limitations are thus not justified adequately.

## 6.3 Recommendations

The utilization of MUVE in educational practice is a young research area. Having realized the potentials, challenges and the limitations of this research, there are several ways to improve the knowledge in the area of MUVE and its applications in MET. It is suggested that

the future research topics, in general, should take the application components of MUVE as the core to explore further down in the three directions either as game/simulation application, collaboration or distance learning application.

However, because of the limitations of this research itself and there is still very limited exploration in the use of MUVE in MET at the time being. It is critical to suggest that research should investigate the following: Does the learning in virtual world of MUVE transfer to the maritime reality of work and how? Such piloting studies will lay the foundation for the next wave of discovering, improving, synthesizing and determining the best practice of design and conducting educational activities in virtual world setting.

Lastly, since this research focused solely on Second Life virtual world platform, there should be examinations on other virtual world platforms. It is also important to analyze the future development of MUVE as well. In that way, MET institutions could have sufficient instruments to respond to the educational technology innovation and hence, hopefully, providing them better consideration in their decisions on the strategic development plan.

# References


Abt, C. C. (1970). I - The reunion of action and thought. In *Serious games* (pp. 6-7). New York: Viking Press.

Atherton, J. S. (2010). Learning and Teaching; What is learning? *What Is Learning?* Retrieved August 29, 2012, from http://www.learningandteaching.info/learning/whatlearn.htm

Aung., M. S. (2009). *Improving maritime community communication through information communication technology: A feasibility case study at the Myanmar Maritime University*. World Maritime University].

Increasingly, Information Communications Technology (ICT) is an important component for the global industries and maritime educational institutes that presents both new opportunities and challenges. The main question addresses within the study is how MET

Bartle, R. A. (1999). *Interactive Multi-User Computer Games*. Retrieved September 3, 2012, from http://www.mud.co.uk/richard/imucg0.htm

Bartle, R. A. (2004). *Designing virtual worlds*. Indianapolis, Ind.: New Riders Pub.

Bell, M. W. (2008). Toward a definition of "Virtual Worlds" *Journal of Virtual World Research*, *1*(1), 2-4.

Boellstorff, T. (2008). Chapter 1. In *Coming of age in Second Life: An anthropologist explores the virtually human* (pp. 6-28). Princeton: Princeton University Press.

Brabazon, T. (2007). *The University of Google: Education in the (post) information age* (I. Ebrary, Ed.). Aldershot, Hampshire, England, Burlington, VT: Ashgate.

Bryman, A. (1988). *Quantity and quality in social research*. London; Boston: Unwin Hyman.

Bryman, A. (2001). *Social research methods*. Oxford; New York: Oxford University Press.

Cassell, J., & Jenkins, H. (1998). *From Barbie to Mortal Kombat: Gender and computer games*. Cambridge, Mass: MIT Press.

Cassell, J., & Jenkins, H. (n.d.). From Barbie to Mortal Kombat gender and computer games. *From Barbie to Mortal Kombat Gender and Computer Games*. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=393

Castronova, E. (2004). *Synthetic worlds: The business and culture of online games*. Chicago: University of Chicago Press.

Chiotoroiu, L., & Buibas, M. (n.d.). Work in progress: E-Learning impact on Romanian Maritime Education. In M. Jurian (Author), *2006 Frontiers in education annual conference* (pp. 27-28). IEEE. doi: 10.1109/FIE.2006.322612

Cohen, Richard B. & Bradley, Robert H. (1978). Simulation Games, Learning, and Retention. *The Elementary School Journal*, (78) 4.

Damer, C. (2007, March 26). Bruce Damer's presentation on origins and evolution of social virtual worlds. *Virtual Worlds Timeline*. Retrieved September 2, 2012, from http://www.vwtimeline.com/presentations/pub-launch-vwtimeline/index.html

Davidson, C. N., & Goldberg, D. T. (2010). *The future of thinking: Learning institutions in a digital age*. Cambridge, MA: MIT Press.

Dede, C. (1989). The Evolution of Information Technology: Implications for Curriculum. *Educational Leadership, 7*(1), 23-26.

Dede, C. (1995). The Evolution of Constructivist Learning Environments: Immersion in Distributed, Virtual Worlds. *Educational Technology*, *35*(5), 46-52.

Dewey, J. (1902). *The child and the curriculum,*. Chicago: University of Chicago Press.

Dewey, J. (1916). *Democracy and education : An introduction to the philosophy of education*. New York: Macmillan.

Dewey, J. (1959). *Dewey on education : Selections*. New York: Bureau of Publications, Teachers College, Columbia University.

Dickerson, D. P. (1975). *A comparison of the use of the active games learning medium with passive games and traditional activities as a means of reinforcing recognition of*

*selected sight vocabulary words with mid-year first-grade children with limited sight vocabularies* (Unpublished doctoral dissertation). University of Maryland,.

Dickey, M. D. (2003). Teaching in 3D: Pedagogical Affordances and Constraints of 3D Virtual Worlds for Synchronous Distance Learning. *DISTANCE EDUCATION*, *24*, 105-122.

Dickey, M. D. (2005a). Brave new (interactive) worlds: A review of the design affordances and constraints of two 3D virtual worlds as interactive learning environments. *Interactive Learning Environments Interactive Learning Environments*, *13*(1-2), 121-137.

Dickey, M. D. (2005b). Three-dimensional virtual worlds and distance learning: Two case studies of Active Worlds as a medium for distance education. *British Journal of Educational Technology*, *36*(3), 439-451.

EA Games Simulation. (2012). *Electronic Arts*. Retrieved September 3, 2012, from http://www.ea.com/simulation

Egenfeldt-Nielsen, S. (2006) Thoughts on learning in games and designing educational computer games. *Games Research*. Retrieved Sep 1, 2012, from http://game-research.com/index.php/articles/thoughts-on-learning-in-games-and-designing-educational-computer-games/

Ellington, H., Addinall, E., & Percival, F. (1981). *Games and simulations in science education*. London; New York: K. Page ; Nichols Pub.

Engeström, J. (2005). Why some social network services work and others don't—or: the case for object-centered sociality. Retrieved August 20, 2012, from http://www.zengestrom.com/blog/2005/04/why-some-social-network-services-work-and-others-dont-or-the-case-for-object-centered-sociality.html

Franklin, S., Peat, M., & Lewis, A. (2003). Non-Traditional Interventions To Stimulate Discussion: The Use of Games and Puzzles. *Journal of Biological Education*, *37*(2), 79-84.

Garnham,C. & Kaleta, R. Introduction to Hybrid Courses. Retrieved on May, 14, 2007. http://www.uwsa.edu/ttt/articles/garnham.htm

Garrison, D. R. (1997). Computer conferencing: The post-industrial age of distance education. *Open Learning*, 12(2), 3 - 11.

Garrison, D. R., Archer, W., & Anderson, T. (2003). *E-learning in the 21st century : A framework for research and practice*. London: Taylor & Francis.

Gee, J. P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave Macmillan.

Gee, J. P. (2005). What Would a State of the Art Instructional Video Game Look like? *Innovate: Journal of Online Education*, *1*(6).

Graves, L. (2008). A Second Life for higher ed. US News & World Report, 144(2), 49–50.

Gray, B. (2004). Informal Learning in an Online Community of Practice. *Journal of Distance Education*, *19*(1), 20-35.

Guetzkow, H. (1963). *Simulation in international relations : Develpoments for research and teaching* (p. 25). Englewood, N.J.: Prentice-Hall.

Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. Paper presented at the 4th International Conference on Computer Assisted Instruction. Hsinchu, Taiwan. March, 1995.

Hammersley, M., & Atkinson, P. (1995). *Ethnography : Principles in practice*. London; New York: Routledge.

Hammersley, M. (1996), The relationship between qualitative and quantitative research - paradigm loyalty versus methodological selectivism in J. Richardson (ed.) *Handbook of Qualitative Research Methods for Psychology and the Social*Sciences, Leicester: BPS Books

Hays, G. (2008). *The social virtual world's a stage*. Retrieved November 1, 2008, from http://www.personalizemedia.com/2008-metaverse-tour-video-the-social-virtual-worlds-a-stage/

Horck, J. (2004). An analysis of decision-making processes in multicultural maritime scenarios. *Maritime Policy & Management*, *31*(1), 15-29. Retrieved September 30, 2012, from http://dx.doi.org/10.1080/03088830310001642021

Hundsberger, S. (2009, June). Foreign language learning in Second Life and the implications for resource provision in academic libraries (Rep.). Retrieved October 21, 2012, from http://arcadiaproject.lib.cam.ac.uk

Inman, C., Wright, V. H., & Hartman, J. A. (2010). Use of Second Life in K-12 and Higher Education: A Review of Research. *Journal of Interactive Online Learning*, *9*(1), 44-63.

Jarmon, L., Traphagan, T., Mayrath, M., & Trivedi, A. (2009). Virtual World Teaching, Experiential Learning, and Assessment: An Interdisciplinary Communication Course in Second Life. *Computers & Education*, *53*(1), 169-182.

Karlin, M. W. (1971). *The Development and Utilization of a Card Game for Teaching Prime Factorization in the Fifth Grade*. Doctoral Dissertation, University. of Colorado.

Kay, J. & FitzGerald, S. (2008). Educational uses of Second Life. Retrieved July 12, 2012, from http://sleducation.wikispaces.com/educationaluses

Kirriemuir, J., & McFarlane, A. (2004). *Literature review in games and learning*. Retrieved January 5, 2012 from: http://telearn.archives-ouvertes.fr/hal-00190453/

Klopfer, E., Osterweil, S., & Salen, K. (n.d.). Moving learning games forward. *Moving Learning Games Forward*. Retrieved August 29, 2012, from http://education.mit.edu/papers/MovingLearningGamesForward_EdArcade.pdf

Koster, R. (2004, July 07). A virtual world by any other name? *Terra Nova*. Retrieved August 12, 2012, from http://terranova.blogs.com/terra_nova/2004/06/a_virtual_world.html#c1400675

Koster, R. (n.d.). The persistence of space. *Raph Koster's Website*. Retrieved August 12, 2012, from http://www.raphkoster.com/gaming/book/4c.shtml

KZero. (2009). *Presentations | KZero Worldswide*. Retrieved from http://www.kzero.co.uk/presentations/

Laal, M., & Ghodsi, S. M. (2012). Benefits of collaborative learning. *Procedia - Social and Behavioral Sciences, 31*(0), 486-490. Retrieved August 20, 2012, from http://www.sciencedirect.com/science/article/pii/S1877042811030205

Laughlin, D., & Marchuk, N. (2005, November). *A guide to computer games in education for NASA* [PDF]. From: http://learners.gsfc.nasa.gov/nlt/files/NASAGamesGuideLaughlin2005.pdf.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge, UK: Cambridge University Press.

Livingstone, D., Kemp, J. & Edgar, E. (2008). From multi-user virtual environment to 3D virtual learning environment. *Association for Learning Technology Journal*, 16, 3, 139–150.

Lucas, L. A., Postma, C. H. & Thompson, J. O., A (1975). Comparative Study of Cognitive Retention Using Simulation Gaming as Opposed to Lecture-Discussion Techniques, *Peabody Journal of Education*, 52.

Macías-Díaz, A.. (2008b). Survey of E--business Module (MN5553). School of Management, St Andrews University..

McLester, S. (2005). Game plan. *Technology & Learning, 26*(3), 18-26.

> When one considers it was only 10 or so years ago that some experts were questioning the appropriateness of multimedia and other "frills" as learning tools, it's not surprising that the idea of using games as a core instructional resource remains controversial

McLester, S. (2007). Career Education in the Digital Age: What Vocational Education Has to Teach Mainstream Programs about 21st-Century Learning. *Technology & Learning, 28*(3), 22-26.

Merriam, S. B., & Caffarella, R. S. (1991). *Learning in adulthood* (pp. 124-125). Jossey-Bass Pub.,: San Francisco :.

Michels, P. (2008, February 25). Universities Use Second Life to Teach Complex Concepts. *Government Technology*. Retrieved October 3, 2012, from http://www.govtech.com/education/Universities-Use-Second-Life-to-Teach.html

Minocha, S., & Mount, N. (2009, September 1). Design of learning spaces in 3D Multi-user Virtual Environments (Rep.). Retrieved October 21, 2012, from http://www.jisc.ac.uk/whatwedo/programmes/elearningltig/delve.aspx

Morgan, D. (1998). Practical strategies for combining qualitative and quantitative methods: Applications to health research. *Qualitative Health Research*, *8*(3), 362-76.

Muirhead, P., & Brandt, P. (2000). *Simulation, open learning and the World Wide Web: Opportunities for a new training paradigm?* (I. M. Lecturers' Association (IMLA). & I. N. Simulator Lecturers' Conference (INSLC), Eds.). Kalmar, Sweden: Kalmar Maritime Academy.

Muirhead, P. (2002). *A study of the impact of new technology and teaching methodologies on global maritime education and training into the 21st century*. [Perth, Western Australia]: Curtin University of Technology.

"Global maritime education and training (MET) is currently subject to great change brought about by new international legislation, a dynamic shipping environment, the growing impact of technology, and the challenges maritime institutions face to survi

Muirhead, P. (2003). *A global perspective of the impact of new technology and teaching methods on MET institutions in the 21st century: Mapping a way forward?* (I. M. Lecturers' Association (IMLA). & I. M. Lecturers' Association, Eds.). Beijing, China: China Communications Press.

Muirhead, P. (2003). *Technology and maritime education and training*. Singapore ; London: World Scientific.

Nilsson, R. P. (2006, October 18). Harmonised education is the key issue. *Maritime Education and Training | Scandinavian Shipping Gazette*. Retrieved September 26, 2012, from http://www.shipgaz.com/old/magazine/issues/2002/02/editorial_0202.php

Olaiya, J. O. (2002). *Web education management systems: An investigation of system needs and usage for total academic learning and management purposes in educational institutions*. World Maritime University.

Page, G. & Mateja, J. (1979). Retention: the real power of simulation/gaming?, *Journal of Experiential Learning and Simulation,* 1 (3).

Pierfy, D. A. (1984). *The effects of a simulation game on the learning of geographic information at the fifth grade level* (Unpublished master's thesis).

Ramsden, P. (1992). *Learning to teach in higher education*. London; New York: Routledge.

Resnick, L. B. (1991). Shared cognition: Thinking as social practice. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition*(pp. 1 - 20). Washington, DC: American Psychological Association.

Ritchie, J., & Lewis, J. (2003). *Qualitative research practice : A guide for social science students and researchers*. London; Thousand Oaks, Calif.: Sage Publications.

Robson, C. (2002). *Real world research: A resource for social scientists and practitioner-researchers*. Oxford, UK: Blackwell.

Ross, T. L., Castronova, E., & Wagner, G. G. (2012). Empirical Research Methods in Virtual Worlds. In C. Silva (Ed.), *Online Research Methods in Urban and Planning Studies: Design and Outcomes* (pp. 299-311). Hershey, PA: Information Science Reference. doi:10.4018/978-1-4666-0074-4.ch018

Salt, B., Atkins, C., & Balckall, L. (2008, October). *Engaging with Second Life: Real education in a virtual world* [Literature review].

Second Life Education Directory. (2012, May 16). *Second Life Wiki*, . Retrieved 19:31, September 6, 2012 from http://wiki.secondlife.com/w/index.php?title=Second_Life_Education_Directory&oldid=1167366.

Shaffer, D. W. (2003). Pedagogical praxis: Using technology to build professional communities of practice. *SIGGROUP BULLETIN*, *24*, 39-43.

Shaffer, D. W. (2006). Epistemic frames for epistemic games. *Computers & Education*, *46*(3), virtual learning, 223-234.

Shaffer, W., Squire, K., Halverson, R., Gee, J. P., & Academic Advanced Distributed Learning Co-Laboratory.,. (2005). Video games and the future of learning. *Phi Delta Kappan*, *87*(2), 104-111.

Säljö, R., & Göteborgs universitet. (1979). Learning in the learner's perspective. Mölndal, Sweden: University of Göteborg. Institute of Edücation.

Smith, M. K. (2003). Learning theory. *The Encyclopaedia of Informal Education*. Retrieved August 20, 2012, from http://www.infed.org/biblio/b-learn.htm

Solanki, I., & Nakazawa, T. (2007). Empowering seafarer - Role of Maritime Universities. *Proceedings of the 8th IAMU International Maritime Association University*, 387-399.

Squire, K. (2005). Educating the fighter: buttonmashing, seeing, being. *On The Horizon*, 13 (2).

Steinkuehler, C. A. (2005). *Cognition and learning in massively multiplayer online games : A critical approach* (Unpublished master's thesis).

Warburton, S. (2008a). Loving your avatar: identity, immersion and empathy. *Liquid Learning*. Retrieved July 12, 2012, from http://warburton.typepad.com/liquidlearning/2008/01/ loving-your-ava.html

Warburton, S. (2009). Second Life in higher education: Assessing the potential for and the barriers to deploying virtual worlds in learning and teaching. *British Journal of Educational Technology*, *40*(3), 414-426. doi: 10.1111/j.1467-8535.2009.00952.x

Weber, P., & Abuhamdieh, A. (2011). Educational service strategy: Educational service platforms and E-learning patterns. *International Journal of Instructional Technology and Distance Learning*, *8*(4), 3-14.

Wenger, E. (2001). *Supporting communities of practice: A survey of community-oriented technologies*. Retrieved August 30, 2012 from http://www.ewenger.com/tech/

Wenger, E., McDermott, R., & Snyder, W.M. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston, MA: Harvard Business School Press.

Williams, D., Ducheneaut, N., Xiong, L., Zhang, Y., Yee, N., & Nickell, E. (2006). From Tree House to Barracks. *Games and Culture, 1*(4), 338-361.

Wolf, M. J. (2008). *The video game explosion : A history from PONG to Playstation and beyond*. Westport, Conn.: Greenwood Press.

Yee, N., Bailenson, J. N., Urbanek, M., Chang, F., & Merget, D. (2007). The Unbearable Likeness of Being Digital: The Persistence of Nonverbal Social Norms in Online Virtual Environments. *CyberPsychology and Behavior, 10*(1), 115-121.

Zingale, D. (2007). Multi-campus conferencing for faculty professional development. *Proceedings of the 8th IAMU International Maritime Association University*, 41-44.

# Appendices

## **Appendix A -** Survey questionnaire template

### General Information

**1.** How old are you? ☐ 25-30 ☐ 31-40 ☐ 41-50 ☐ above 50

**2.** Do you have any sea-time experience? ☐ Yes / ☐ No

a. How long have you been at sea? _____

**3.** Which country is your current institution located: _____

**4.** Name of your institution: _____

**5.** Types of institution:

☐ Maritime Vocational Training Center

☐ Maritime University / Technical University

☐ Others type? Please mention: _____

**6.** Number of students in your institution: ☐ 1-300 ☐ 301-800 ☐ above 800

### Resources | Teaching-learning delivering

**7.** What subjects are you teaching at the moment? _____

**8.** Have you ever experienced any First-person-view or third-person-view game before ☐ Yes / ☐ No

**9.** Have you ever used game-based/Multi-user virtual environment for teaching purpose? ☐ Yes / ☐ No

**If yes** What is the name of the platform? _____

What was the subject being taught? _____

**10.** Does your institution offers any maritime courses by distance learning: ☐ Yes / ☐ No

**If yes** What are the resources being used for delivering the course?

Video-conferencing ..... ☐

Email Communication ..... ☐

Web-based distance learning management software ..... ☐

Online Multi-User Virtual Environment ..... ☐

Other (please specify) _____

**11.** Have you ever participated in distance learning activities: ☐ Yes / ☐ No

**If yes** What are the major areas of concern regarding issues of distance learning?

Technical issues ..... ☐

Interaction aspects ..... ☐

Accessible to material of students ..... ☐

Other (please specify) _____

_____

**12.** Does your institution plan to offer distance learning in the next 5 year ☐ Yes / ☐ No

**13.** Do you believe that there is a shortage in
experienced maritime instructor in your institution ☐ Yes / ☐ No

NOTE! ①Strongly disagree/very bad, ⑤ Strongly agree/very good

**14.** Internet connection is well established in your country? ① ② ③ ④ ⑤

**15.** How do you rate the connectivity of internet access in your institution? ① ② ③ ④ ⑤
(E.g. easy to establish video chat, high speed download and upload, etc…)

**16.** Do you use any social network at the moment? ☐ Yes / ☐ No

**17.** Do you use the social network to keep continuous contact with your students ☐ Yes / ☐ No

**18.** Do you use the social network to help your student in problem solving matters ☐ Yes / ☐ No

## Opinion!

We are about to introduce the teaching-learning concept that the teaching and learning is taking place in multiuser virtual environment. The teachers control his/her avatar(character) and the students also control their characters via their personal computer, together they are joining inside a virtual environment and conducting the class there.

**Do you think this concept can be applied in Maritime Education and Training within certain subjects?**

☐ Yes / ☐ No

What kinds of subjects (subject matters) can be applied under this concept _____

_____

_____

_____

Do you have any comments? _____

_____

_____

_____

_____

_____

**THANK YOU FOR YOUR KIND COOPERATION**

## **Appendix B –** Virtual world interview question template

**For students**

| | |
|---|---|
| **1** | Do you have any experience with 3D game? |
| **2** | What were the subjects that you have participated in virtual world? |
| **3** | How do you feel about the in-world communication with your teachers and others<br>Do you used any other supplementary tool out of SL |
| **4** | What are the challenges you have encountered so far. |
| **5** | How would you compare learning in virtual environment versus learning in reality |
| **6** | How teacher support you in class and after the class<br>How you and your classmates support each others |
| **7** | What do you think you have learned because of SL environment that you could have not learned in other setting |

**For teachers**

| | |
|---|---|
| **1** | What were the subjects have you taught in Virtual world? |
| **2** | How would you compare teaching in virtual environment versus teaching in reality |
| **3** | What are the challenges you have encountered so far. |
| **4** | how much did you enjoy the teaching activity in virtual environment? What is the reason |
| **5** | What were the class setting - lecture, role-play, game setting, group discussion etc... |
| **6** | How do you support your student in virtual setting? |
| **7** | What are the possibilities that you have been empowered because of SL environment that you could have not had in traditional setting. |

## **Appendix C –** List of Tables, Figures and Abbreviations

### List of Tables



### List of Figures

## List of Abbreviations

| | |
|---|---|
| COI | Community of Inquiry |
| DELVE | An acronym for a project titled: Design of Learning Spaces in 3D Multi-user Virtual Environments |
| IMLA | International Maritime Lecturers Association |
| MET | Maritime Education and Training |
| METNET | Maritime Education and Training Networks |
| MMOGs | Massive Multiplayer Online Games |
| MOODLE | Modular Object-Oriented Dynamic Learning Environment |
| MUVE | Multi User Virtual Environment |
| SL | Second Life™ |
| SLOODLE | Simulation Linked Object Oriented Dynamic Learning Environment |
| SLURL | Second Life Uniform Resource Locator |
| UNIMET | Unification Maritime Education and Training |
| VI | Virtual Institution |
| VLEs | Virtual Learning Environments |