

**USABILITY IN USER GENERATED LEARNING SPACES**

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# List of Acronyms

CPD Continuing Professional Development

PLE Personal Learning Environment

PDP Personal Development Planning (Planner, Plan)

PSC Private Shareable Component

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**DRAFT FOR CHAPTER ONE**

# Chapter 1: Introduction

Learning spaces “encompass the full range of places in which learning occurs, from real to virtual; classroom to chat room” (Brown, 2005). The effective design of physical and virtual learning spaces can enhance the way learning takes place and consequently the outcome. With the advancements in technology leading to convergence of platforms and proliferation of high capacity mobile devices, learners are increasingly shifting their preferences for learning environments from the physical to the virtual. For any interactive system that implements virtual learning spaces, usability is a key determinant in uptake. Usability is defined by the International Organization for Standardization (ISO 9241) as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use".

Designing for learning requires an understanding of how learners construct knowledge. Relevant learning theories need to be explored and applied within the learners' context to capture the learning activity in a way "natural" to the learners. Established theories such as social constructivism, constructionism, self-directed learning, communities of practice, etc engender strategies for facilitating learning. However, the context of learning keeps evolving. It is therefore important to re-examine these theories with a view to adapting them to the prevailing contexts in which learning occurs. This becomes more challenging when viewed from the virtual learning perspective. Interestingly, information and communication technology (ICT) provides a lot of tools that can help us realise our objectives. These ICT tools have been applied in various ways but the question is how usable are they?

This project is concerned with improving usability in user generated learning spaces. User generated learning spaces are “(learning) spaces which are populated with content by one or more learners” (van Harmelen, 2011). This content according to Harmelen “might be learner generated, or co-opted from elsewhere and used unchanged, or modified, or mixed with other content”. Whatever the case might be, the purpose remains the same, “to help the user(s) learn about a particular topic area, or fulfill one or more learning goals” (Harmelen, 2011). The project is motivated by the need to support learning among diverse categories of learners. Doing this raises vital questions which are clearly discussed in the next section.

## 1.1 Research Motivation and Questions

Learning is a continuous process; one does not stop learning (Dechant, 1991, Doukidis, Mylonopoulos & Pouloudi, 2004, Bergan, 2007). However, there are stages in our life when learning is formalized such that one is strictly bounded by rules as to what to learn, when to learn it, how to show that what is required has been learnt and a reward (or otherwise) given for successfully showing it. Apart from this kind of formal system which majorly happens in academic institutions, one can also learn on his own. This kind of learning is referred to as personal learning, personal study, personal development, etc. As an example, a graduate lawyer who majored generally in oil and gas law might become particularly interested in oil financing laws. He does not have to return to law school to get a degree for such knowledge; rather, he takes up a personal study and gets acquainted with the practice of oil financing laws. This kind of scenario is more formally emobodied in what is known as Continuing Professional Development (CPD) (Rughani, Franklin & Dixon, 2003). However, it must not be formal to produce results if properly supported. The challenge is that such kind of personal learning is usually not very effective in the absence of a formal learning framework. This is because there is no external authority mandating the learner to carry out such learning effectively. Nonetheless, the serious learner, for personal reasons will proceed to carry out his personal studies and with the availability of a proper supporting framework, will do it effectively thus reaping the expected outcomes (JISC-CRA, Undated). Such supporting framework can be in form of formal/informal processes, coaching, mentoring, group studies and of course technology. This is where Personal Learning Environments (PLE) comes to play. A personal learning environment can support the learner to achieve his learning goals in many ways. Some examples are given below:

* It can act as a repository of knowledge for the learner
* It can enable the learner to store and bookmark learning resources
* It can provide a social layer where the learner can collaboratively share knowledge with other learners
* It can help the learner monitor progress of his learning
* It can help the learner reflect upon his learning and evaluate the outcome of such learning.

The motivation behind this research project is to support the learner in the ways listed above and in many more ways to achieve his learning goals. In order achieve this, we focus on usability in user generated learning spaces which has already been briefly discussed in the introduction and is further discussed in section (@TODO Which section?). The project focuses on how to use interactive virtual learning spaces to support the user in pursuing his personal development in the presence or absence of a formal learning framework. Although there are various interactive multimedia tools in use today for similar purposes, this project is unique in that it does not focus on interactive multimedia technology in isolation; rather, it attempts to lay solid psychological and pedagogical foundations for the tools, processes and methods provided. Consequently, the research seeks to answer the following vital questions:

* Can one use interactive multimedia spaces to actively support a learner in achieving his/her learning goals?
* Can one develop a usable multimedia learning space that will run smoothly despite the limitations of the internet?
* Can a learner develop a personal development plan (PDP) in the multimedia learning space and use it to pursue a learning goal successfully?
* Can a personal development plan so created by a learner be converted to a learning artifact which can be used and/or re-used by other learners to achieve similar outcome(s) as the initial creator/learner?
* Can a learner share his personal development plans and pursue his learning goals collaboratively?
* How can the learner use Private Shareable Components (PSCs) in pursuing his learning goals?
* Can a learner recover components that have been deleted from the multimedia learning space intentionally or mistakenly?
* Can the usability of such multimedia learning space be evaluated by users?
* Is the creation of personal development plans by the learner and the transformation of these plans into explicit learning resources a useful way to support learning?

[@TODO Possibly re-order this list of questions in a more logically flowing manner]

These questions are the motivating factors for this research and they were all answered successfully as can be seen in the concluding section (@TODO Where?). The objectives of the project were set so as to ensure that the research questions raised are properly answered. These are discussed in the next section.

## 1.2 Project Objectives

The target goal of the project is to investigate usability in user generated learning spaces. The findings will then be applied in improving the usability of virtual learning spaces in a Personal Learning Environment (PLE). As part of this I will be working on improving the user interface of the multimedia learning space in the Manchester PLE; performing development in FLEX® 4 and complementary technologies.

In order to ensure the goal of the project is achieved, it has been decomposed into broad objectives that will act as guiding posts to achieving the main goal. They are as follows:

* To understand the application of relevant learning theories to the design of learning spaces
* To improve active construction of knowledge by users in virtual learning spaces
* To improve self-directed as well as collaborative learning in virtual learning spaces
* To Investigate (by user evaluation) the usability of current learning spaces in the PLE
* To develop improved user interfaces (that are being tested by users) for the current learning spaces in the PLE
* To assess and improve by user testing, the usability of the developed user interfaces

This project covers a broad spectrum because it involves designing for learning. However, given the time available for the project, a limited scope that ensures the target goal is achieved successfully was defined.

## 1.3 Project Scope

The project scope includes investigating and improving the usability of virtual learning spaces in the Manchester PLE. Usability evaluation for pedagogical applications comprises two parts namely: technical/functional usability evaluation and pedagogical usability evaluation. This involves the use of testing and formative evaluation in iterative process of design & implementation. A careful comparison of various frameworks for usability testing was made to select the most appropriate one that can be applied. Cooperative evaluation was selected for its inherent benefits. This is further reported in section x.x (@TODO Section What?). Web usability is also within the scope of the project. This is because virtual learning spaces are mostly implemented on web pages. Consequentially principles of web usability design were incorporated in the design and implementation of the improved learning space. Finally, evaluation of the improved learning interface was carried out periodically using formative evaluation with users and reported accordingly in section x.x (@TODO Section What?). Some innovative features of the improved learning space are as follows:

* Personal development planning (PDP) which enables the learner to take control of his learning. This is discussed in details in section (@TODO Which section?).
* The ability to convert static PDPs to reusable ‘Learning Artefacts’.
* The ability to track and highlight changes in the space both in private and collaborative mode
* The ability to undo actions including in collaborative mode, considering the fact that some other actions might have been performed based on the action to be undone.
* The transfer of desirable classroom and informal space characteristics into the virtual learning space such as ambience, immersion principle, attention and motivation theories, layout re-configurability, knowledge discovery, etc.

The scope defined above was broadly covered and the target goal of the project was achieved. The rest of this report gives a background of the project as well as design and implementation details. The structure of the report is discussed next.

## 1.4 Thesis Structure

The project has been introduced; the motivation for it given as well as the major questions that motivated the research. The goal and scope has also been clearly stated. The remaining part of this thesis describes how the goal was achieved and is structured as follows:

**Chapter 2 – Background**

This section discusses relevant background materials with the aim of situating the project into a wider research theme. Relevant learning theories and how they apply to learning are discussed. Learning theories as we shall see do not only apply to learning but also to the design of learning spaces. This is discussed here also. Current trends in learning space design are examined and then usability in learning spaces design with focus on usable virtual learning spaces is discussed. Finally, a firm theoretical foundation is laid in support of user generated content in learning spaces as well as personal development plans.

**Chapter 3 – System Design 1**

Chapters 3 and 4 cover the design phase of the project. Chapter 3 in particular only covers a part of the system design and is largely devoted to the existing implementation of the multimedia learning spaces in the Manchester PLE. Subsequent chapters cover the design of the new features for the PLE. In this chapter, basic assumptions, problem analysis and design goals are discussed first. An architectural analysis of the existing and proposed system is made. Frameworks, micro-architectures and design pattern (both existing and proposed) involved are also discussed.

**Chapter 4 – System Design 2**

Chapter 4 gives a clear description of design considerations for the main features to be added to the PLE. These include the Twitter Box, Space Painter, Personal Development Planner (PDP), etc. The design of each new component or subcomponent is clearly described.

**Chapter 5 – Implementation**

In order to achieve the kind of rich user experience expected of this kind of system, Rich Internet Application (RIA) platforms were chosen. This section sets out with a proper introduction of the tools of the trade; giving justification for the choice of Adobe Flex ® and complementary technologies. In order to ease entry into the existing code base, some form of code reading and optimising was carried out. This involved debugging certain parts of the existing implementation and also improving the user interaction of existing multimedia components. Having become comfortable with the existing code base, further development was then carried out to implement additional features. This is fully reported in this section also.

**Chapter 6 – Evaluation and Critical Analysis**

This section captures the details behind the evaluation methodology adopted for this project. The strategy as well as the results is reported accordingly. The chapter ends with identification and analysis of the limitations of the system.

**Chapter 7 – Reflection and Future Work**

In this section a brief reflection on the project is done. The research questions are re-visited and a summary of achievements is made. Additionally, areas for future development are identified.

**Chapter 8 – Conclusion**

A run through of the research is done and the project is brought to a logical conclusion.

**Appendices**

**Appendix A:** Contains ….

**Appendix B:** Contains….