Patterns and Pedagogies – approaches to developing e-learning environments

Fiona Chatteur (Kerr)
Submitted in partial completion of a Doctor of Philosophy
Design Computing and Cognition
Faculty of Architecture
The University of Sydney
Supervisor: Dr Andy Dong
Associate Supervisors: Dr Mary Lou Maher
Dr Peter Goodyear
# CONTENTS

Contents .............................................................................................................................. ii  
Table of Figures ................................................................................................................. iii  
Abstract .............................................................................................................................. iv  
Chapter One ........................................................................................................................ 1  
  1.1 Motivation ............................................................................................................... 1  
  1.2 Aims and Objectives ............................................................................................. 2  
Chapter 2 Critical Literature Review: A genuine learning experience? ....................... 5  
  2.1 Introduction .......................................................................................................... 5  
  2.2 Where Usability is King ....................................................................................... 7  
  2.3 Theories of Learning ............................................................................................ 9  
  2.4 Experiential Learning .......................................................................................... 10  
  2.5 Constructivism .................................................................................................... 12  
  2.6 Patterns ............................................................................................................... 14  
  2.7 Research Questions ............................................................................................ 21  
Chapter 3 Research Plan, methods and Design .............................................................. 24  
  3.1 Text-based research and creation of design patterns by subjects ....................... 25  
  3.2 Observation and interviews of designers ............................................................. 28  
  3.3 Ranking by panel of experts .............................................................................. 29  
  3.4 Methods mapped to research questions .............................................................. 29  
  3.5 Evaluation .......................................................................................................... 30  
  3.6 Quality Assurance ............................................................................................. 31  
  3.7 Timeline ............................................................................................................. 33  
APPENDIX 1 ................................................................................................................... 34  
APPENDIX 2 ................................................................................................................... 36  
Chapter 4 References ...................................................................................................... 37
# TABLE OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Kolb's diagram of structural dimensions underlying the process of experiential learning and the resulting basic knowledge form. (Kolb 1984 p.42)</td>
<td>11</td>
</tr>
<tr>
<td>2.2</td>
<td>Mapping architectural design patterns (after Alexander) onto the e-learning domain</td>
<td>16</td>
</tr>
<tr>
<td>2.3</td>
<td>Alexander’s pattern structure. (Alexander et al., 1977)</td>
<td>18</td>
</tr>
<tr>
<td>2.4</td>
<td>Conceptualising the problem space of educational design (Goodyear, 2005)</td>
<td>18</td>
</tr>
<tr>
<td>2.5</td>
<td>Proposed pedagogical pattern structure (after Alexander)</td>
<td>20</td>
</tr>
<tr>
<td>3.1</td>
<td>Pattern development, testing and modes of inquiry.</td>
<td>24</td>
</tr>
<tr>
<td>3.2</td>
<td>Pattern definition/solution process.</td>
<td>25</td>
</tr>
<tr>
<td>3.3</td>
<td>The interaction between Kolb’s experiential learning cycle, constructivist teaching approaches and the design process with the design patterns</td>
<td>27</td>
</tr>
<tr>
<td>3.4</td>
<td>Matrix describing relationship between research methods and research questions</td>
<td>30</td>
</tr>
<tr>
<td>3.5</td>
<td>Different axis of evaluation</td>
<td>30</td>
</tr>
<tr>
<td>3.6</td>
<td>Hypothetical mapping of experts’ preferences against designer’s use of pedagogical patterns</td>
<td>31</td>
</tr>
<tr>
<td>3.7</td>
<td>Timeline of research</td>
<td>33</td>
</tr>
</tbody>
</table>
ABSTRACT

This research will operationalize pedagogical theories into a set of design patterns that can be implemented to design e-learning courseware. The lens through which this work will focus is the constructivist and experiential learning theories. Embedding these theories into the e-learning design process will be done by generating design patterns. These pedagogical patterns will then be used to guide e-learning designers and developers in the design of e-learning courseware.

The challenge in this research is the process of embedding the pedagogical theories into the design patterns, and by doing so refocussing the design of e-learning solutions onto pedagogy, rather than the current focus, which is usability. These pedagogical design patterns will be evaluated to determine if they improve the design process over a set of non-pedagogically-based patterns. To assess design effectiveness, the designers will be observed using the design patterns, and then interviewed to evaluate their use of the patterns, to determine if they find pedagogically-based patterns an improvement over generic design patterns. To assess potential learning experiences, the resultant courseware designed using the patterns will be evaluated by a panel of experts.

The main contributions of this research will be:

1) Creating a theory and method of embedding pedagogical theories into design patterns.

2) Assess the pedagogically-based pattern language production process.

3) Confirmation if the use of pedagogically-based design patterns improves the design process of e-learning courseware.

4) Determine if the learning experience is improved with the use of pedagogically-based design patterns.
CHAPTER ONE

1.1 Motivation

The motivation for this research is to create a guiding theory that embeds the principles and methods of instruction (pedagogy) at the core of the e-learning design process. By making e-learning instructional design more pedagogically grounded in terms of learning outcomes and experiences, efforts in e-learning development will be refocussed from usability to teaching.

E-learning can be defined as being:

“The delivery of a learning, training or education program by electronic means. E-learning involves the use of a computer or electronic device (e.g. a mobile phone) in some way to provide training, educational or learning material.” (Stockley, 1996)

Poor e-learning design is a symptom of a lack of pedagogical theory in e-learning design and production. (Frizell, 2003a) One symptom or evidence of the inattention to pedagogy in e-learning design is a lack of interaction between the participants (which includes the tutor) of e-learning courseware. E-learning developers tend to replace face-to-face lectures with long text documents - useful for information, but which do not provide effective learning. Interaction is the key to effective learning, interaction with the course content, with other students and with the instructor. (Kessler, Rosenblad & Shepard, 1999) Because each student brings a different knowledge framework, learning must also be active, passive learning is likely to fail. (Ben-Ari, 1998) The e-learning environment is suited to multiple interactions, between participants and in simulating real world situations, phenomena and procedures. The interactive nature of new media provides the opportunity to “try out” situations prior to real life implementation - e-learning applications therefore lend themselves to active learning and experimentation. However, e-learning applications which inhibit student-to-student communication and tutorial support lack a fundamental building block in the learning process. The irony of e-learning is that new media provides for interaction, yet that interaction is often designed out.
Two theories of learning account why the lack of interaction impairs learning experiences. Constructivist theory states that each individual constructs his or her knowledge from practical experience acquired by multiple interactions with materials, objects, procedures and phenomena of the world. (Solomonidou & Kolokotronis, 2004) Learners, therefore, learn through interaction with the learning materials, by subsequently practicing what they learn using real world examples that reflect how the processes and systems of the world work. Constructivists also claim that the interaction between the participants in the learning process is core to the construction of knowledge, and this is as important as the interactions with the learning materials themselves. Participants include not only the students’ peers, but also the teacher, the community of scholars and like-minded students. Fellow students act not only as learners, but also as authors, critics and scholars, and this valuable interaction is important in the construction of knowledge. (Dalgarno, 2002)

Experiential learning theory states that students form theories about their learning and consolidate their knowledge through active experimentation – learning through experience. This is best done using real-world examples, with a focus on practical application (or hands-on) learning. (Kolb, 1984) Although e-learning is suited to active experimentation, as screen-based learning can be highly interactive, many e-learning courses succeed in presenting useable learning materials, but fail to consolidate the learner’s knowledge, once that knowledge has been constructed.

Therefore there is a need to investigate how to embed learning theories into the design process of e-learning courseware. One way of doing this is to create design patterns for e-learning and place constructivist and experiential learning theories at their core, then determine if these pedagogically-based patterns are actually any better than standard design patterns.

1.2 Aims and Objectives

The aims of this research, therefore, are to:

• Create a method to develop a pattern language for e-learning based on constructivist and experiential learning theories.
• Determine if these patterns lead to more effective e-learning design and courseware than standard design patterns.

Current approaches to e-learning design lack a guiding principle for embedding pedagogical theory into courseware. Many designers, content specialists and teachers, no matter how expert in their particular field, lack knowledge of not only pedagogical theories, but also of creating e-learning courseware applications. (Vrasidas, 2004) The challenge in this research will be to operationalize a formal repeatable approach for embedding pedagogical theories into design patterns. Once developed, the patterns developed by this research will overcome lack of pedagogical knowledge by creating a guiding theory that embeds pedagogy at the core of the design process in a causal way. Embedding pedagogical theories within pedagogically-based design patterns is a solution that provides a theoretical basis for e-learning design, adding to existing e-learning methodology, where the current focus is on usability. This research will attempt to determine if this approach is effective.

The hypotheses for this research are:
• The embedding of pedagogical theories within design patterns, which are subsequently used in the design and development of e-learning courseware will improve the design process and potential learning outcomes.
• The methodology of creating pedagogically-based patterns results in patterns that are as well constructed as generic design patterns.

The objectives of this research are to:
• Develop a method to produce design patterns based on constructivist and experiential learning theories.
• Develop and implement design patterns for e-learning based on the above method.
• Evaluate design effectiveness using these pedagogically-based design patterns.
• Evaluate the interplay between pedagogically-based design patterns for e-learning learning and generic design patterns and their effect on designed courseware.
This research will create a methodology for developing pedagogically-based design patterns, which will subsequently inform the design of e-learning courseware. The research project will develop a methodology that can be used to assess the effectiveness of these design patterns. The design patterns will aid instructional designers by providing a set of pedagogically-based solutions to common design issues, by embedding learning theory into e-learning design. It will refocus the design of e-learning courseware back onto pedagogy, while maintaining current high standards in usability and content design. By embedding learning theory with design, improvements in the students’ e-learning experiences should be achieved.
2.1 Introduction

E-learning can be provided on websites, on closed networks, via CD-ROM, DVD, hand-held Personal Digital Assistants or mobile phones. In short, it can be provided on a greater variety of equipment than just a computer connected to the internet. (Stockley, 1996) E-learning can employ text, video, audio, animations and virtual environments. The learning can be synchronous – where the learner has to be “online” at a particular time, or asynchronous – it can be done at any time, anywhere; self-paced interactive learning using web portals or CD-ROMs and integrating support via online bulletin boards, chat rooms, e-mail or instant messaging. It can also come in the form of knowledge databases, where users click through information that is retrieved from a database and is only mildly interactive. (Obringer, 1998) The problem with designing such complex systems is that the current design methodology focuses on usability, rather than learning.

The development of e-learning courseware requires a different approach to those employed by the developers of the majority of interactive online and screen-based applications. Commercial website developers often measure success by the number of page impressions or how fast the customers proceed to the checkout. (Van Duyne, 2003) For e-learning the emphasis must necessarily be different. E-learning needs to place its focus on pedagogy, allowing the students time for reflection, consideration, contemplation and interaction with the learning materials. Similarly e-learning should not depend simply on delivery of content, but should provide a satisfying learning experience for the student. “Satisfying learning experience” includes observation, reflecting on those observations, constructing new knowledge, being able to create theories based on this new knowledge and putting those theories into practice. (Kolb, 1984) It involves socialising with other students, interacting with peers, scholars and tutors, in an environment that is easy to comprehend, that encourages interaction – with the materials themselves and with other people.
Current opinions in achievements in e-learning design are that it is disappointing, has poor content, contains unauthentic learning, emphasises form over substance, has a lack of standards, is boring learning or “shovel ware” - paper-based material mounted directly on the Web. (Chee, 2004; Teo & Gay, 2006) Learning Management Systems (LMS) such as Blackboard and WebCT sit behind learning portals, one-stop gateways to a variety of e-learning resources. However, students need more than a “spray and pray” approach, which is fragmented and “non-sticky”. Too much emphasis has been placed on access to learning content, to the detriment of learning. Enabling access to materials is not education. (Chee, 2004) Poor course design is one of the key problems with learning from the Web. (Frizell, 2003a) One of the key areas of emphasis in the development of e-learning is usability. However usability does not address issues such as poor course design. The materials may well be usable in terms of navigation and ease of use, but lack the context of a teaching and learning environment. There is a need to concentrate on the design of learning experiences, which should focus more on the student – what the student needs from the course, from the materials, from peers and from tutors. The learning and teaching, as much as the interface needs to be “learner centred”.

E-learning courseware should respond to student’s actions – activities as opposed to assessment. Psychological and pedagogical theories agree that knowledge that is not put into practice or used is quickly forgotten. Deep and persistent learning occurs when the experience takes into consideration the individual’s needs, styles, interests and incorporates social learning. E-learning producers should strive to accommodate these different aspects of learning. To integrate these requirements, the design of the learning experience needs to be as important as that of the learning materials themselves, and these two aspects of learning design have to go “hand in hand”. (Derntl & Motsching-Pitrik, 2004)

The technologies to enable courseware have been available for some time. Macromedia Flash, Shockwave and even the Quicktime formats allow designers to create highly interactive courseware which not only allow “trying out” of problems via simulation, but also allow the exploration of “real world” situations. These technologies when used in conjunction with social networking software such as real-time messaging,
chat, e-mail and bulletin boards and 3D virtual learning environments can address issues to do with interaction, learning activities and social networking.

However, to date, there has been a lack of widespread pedagogical innovation in e-learning design. The innovation has been in improving access to materials and widening participation in learning, in making content more comprehensible – but the improvement in quality has been a product of creativity, in improving the way “social actors involved in the educational situation work with the technology, rather than with the technology itself.” (Dillon, 2004 p. 143) There is clearly a need to integrate many of the differing software solutions into a comprehensive suite that addresses all of the issues raised in the authoring of e-learning.

The design of e-learning materials should not be divorced from teaching, collaboration between students and even socializing. The solitary experience for students who are left alone to work through content can be demotivating – a degree of guidance, hand-holding and mentoring is required – and this is best done through contact with human teachers and fellow students. Standard features of learning technology such as bulletin boards, forum, chat, 3D virtual environments and advanced features such as simulations, intelligent agents and others have been technically well defined. However, much remains to be done in the reengineering of the learning process to exploit the technology so that it goes beyond representation and instead redefines the learning experience. (Derntl & Motsching-Pitrik, 2004) By embedding design patterns into the design of e-learning courseware it may be possible to improved the learning experience.

Social learning does not occur naturally in e-learning situations and must be explicitly introduced by the lecturer or tutor, and this functionality needs to be available to them in the application design. (Berge, 1995) If the social dimension is considered when designing e-learning experiences, students will be better able to construct their knowledge through the additional interaction provided with contact fellow students and the tutor.

2.2 Where Usability is King

Current practices in e-learning place the focus of the design process on usability. Usability is the idea that interactive applications should be easy to use and easy to learn,
and in order to do this, developers have to take into consideration the psychological, ergonomic, social and organizational factors that determine how people work. They also have to take into consideration group working, user interaction and how the media is integrated with the entire user experience of the application. However, there is often a gap between what is known about interface design and design practice. (Sheild & Kukulska-Hulme, 2006) Developers have attempted to overcome this gap by placing the user at the centre of the design process, where ease of use, technical performance, content and satisfaction are the key issues. (Van Duyne, 2003) User centred design is a process of iterative design which is cyclical: design, prototype and evaluate (repeat N times until usability goals are satisfied). The evaluation of the prototype involves empirical measurement of the interaction firstly by early use of paper based designs and further into development by using simulations and prototypes. The user’s performance and reactions are observed, recorded, measured and analysed. (Preece, Rogers & Sharp, 2002)

The problem with the current focus on usability is that developers are omitting to consider the user experience of the entire e-learning system, (Preece, Rogers & Sharp, 2002) which has to incorporate the learning materials, the user-interface, modes of communication, collaboration spaces and so on.

Usability does not take into account:

- Theories of how people learn,
- Social interactions between students,
- Learning outcomes,
- Collaboration,
- Communication between students and tutor,
- “Real world” problem solving,
- Simulations,
- Interactive learning materials

E-learning courseware, no matter how sophisticated the technology used, should enhance the learning and interaction at the cognitive, behavioural and physiological levels. (Teo & Gay, 2006) In essence, there is a lack of focus on pedagogical methodology, of the overall teaching experience in the design of e-learning courseware. It
is necessary, therefore, to rely on an educational theory to drive the design of e-learning courseware.

2.3 Theories of Learning

E-learning applications must be examined not only in terms of a teaching and learning resource, but also in terms of teaching strategies, or how they are to be used within the learning context. Instructional strategies therefore need to be informed not only by theories of learning, but also the pedagogies that apply to those theories and how they impact upon instructional design and practice. (Adams et al., 1996)

Pedagogic theories loosely fall into two approaches:

- A psychological approach that looks at the internal mental processes and how these change as a student learns;
- A social and contextual approach that looks at how learning is made possible through other people and the student’s connection with the learning materials as well as the world outside. (Adams et al., 1996)

The trouble with learning theories is that they can only be expressed as a plural. There is no “Learning Theory in the Grand Singular.” Because learning theories have their basis in psychology, educators often look to that field to aid their understanding of how people learn. Humans (and other organisms) respond to both their external and internal environments. How people receive and process information from these environments to organise their responses is still largely unknown. Because psychology has not been able to standardise ideas on learning into a single conclusive theory, the picture for educators trying to find something of use in psychological theories is not clear. It remains for educators to develop their own ideas, seeking help, but not answers from psychology. (Toye, 1973) It is for this reason that this research focuses on two learning theories that complement each other in the learning and teaching realm, constructivism and experiential learning. These theories have their beginnings in psychology, but remain educational theories which focus on the use of interactivity and
real world problem solving. This focus makes them ideal for inclusion in design patterns for e-learning.

### 2.4 Experiential Learning

Learning is thought of as a process, and according to experiential learning theorists such as Kolb, should not be seen in terms of outcomes, or constant, fixed elements of thought. Experiential learning theory stems from a set of assumptions that ideas are not fixed, but are constantly being reformed through experience. Learning is a “process whereby knowledge is created through the transformation of experience”. (Kolb, 1984 p. 38) Experience is always modifying thoughts, and that is why no two thoughts are ever the same – experience always intervenes. Learning is, by its very nature, a “tension and conflict filled process”. (Kolb, 1984 p. 30) Kolb believes that effective learners have to have four different kinds of abilities; **concrete experience, reflective observation, abstract conceptualization** and **active experimentation**. (See Figure 2.1) He defines **concrete experience** as the learner’s ability to involve themselves fully and openly in new experiences. **Reflective observation** is the ability of learners to reflect on their own experiences from many perspectives. The ability to integrate these observations into logically sound theories Kolb calls **abstract conceptualization**. Learners have to be able to use these theories to solve problems and make decisions – this Kolb calls **active experimentation**.
One aspect to learning that Kolb admits is under explored in research is the interaction between learners and their environment. He states that “learning involves transactions between the person and the environment”. (Kolb 1984 p. 34) However, its implications have been largely ignored in research, which instead focuses on a person-centred psychological view of learning. The wider world environment, according to Kolb, is seen to shape behaviour but researchers disregard how behaviour shapes the environment. This person-centred view also decontextualizes learning – experiential learning laboratory situations bore so little resemblance to real learning conditions that the results could not be extended to the subjects in their natural environment. (Kolb 1984)

In experiential learning theory the relationship between learner and the environment, according to Kolb, is symbolized in the dual meaning of the word experience. One meaning is subjective and personal, as in “I have experienced great joy”, the other is objective, as in “She has 20 years’ experience in her job”. These two meanings interact in complex ways – every experience is subjective and at the same time objective. (Kolb 1984) The word interaction, according to Dewey, assigns equal rights to both objective and subjective meanings of experience. (Dewey, 1938) Therefore a learning experience cannot be divorced from its environment – the layers of meaning are intertwined.
Kolb furthers this argument by stating that there are two distinct modes of grasping experience – comprehension and apprehension. Apprehension is the environment’s input into a person’s sense of situatedness – the feel of a chair on a person’s back, the blue glow of a desk lamp, the colour of the room. The colours, textures and sounds of a person’s environment are apprehended – this is how our bodies perceive reality, through sight, hearing, sound, taste and touch. It is effortless – apprehended with “no need for rational enquiry or analytical confirmation… In this sense, concepts and the associated mode of knowing called comprehension seem secondary and somewhat arbitrary ways of knowing. Through comprehension we introduce order into what would otherwise be a seamless, unpredictable flow of apprehended sensations, but at the price of shaping (distorting) and forever changing that flow”. (Kolb, 1984 p. 43) Comprehension of experience can be communicated in a way that transcends apprehension, which disappears as soon as you change your situation, for example, leaving the room with the chair and lamp, the former is replaced by new apprehensions. The comprehension of the experience allows you to transmit that knowledge in the form of a model of that situation, to others. (Kolb 1984) And it is here that we begin to understand the importance of the situatedness or the environment that encapsulates the learning. The comprehension of learning materials is a way that the student orders that which he or she has apprehended. And for that, environment is key.

2.5 Constructivism

Constructivism has grown in prominence over the past 25 years and is seen as the last development in cognitivism. There are many different forms of constructivism; it generally states that each individual learns best when they mentally construct their own knowledge. It differs from logical positivism in that it states that the world cannot be known directly – it can only be known through the construction imposed on it by an individual’s mind. How we develop meaning, according to constructivism, is internal and individual. Constructivism takes an epistemological perspective on learning – it states that the integration of knowledge is done by either placing it into existing schemes (assimilation) or by changing those schemes according to new knowledge (accommodation). (Young & Collin, 2004)
The information transmission approach to learning has had a large impact on ICT and how it has developed. This is a form of constructivism that views learning from an information perspective – it states that learning arises out of how data is coded and transformed by people attempting to make sense of their world and their experience of it. (Dillon, 2004) The information transmission approach refers to what Kolb calls comprehension as categorization, and defines the difference between perceptual categorization and conceptual categorization. On their own, the coding of perceptual categorizations gives only a fragmentary classification of immediately available sensory inputs. Conceptual categorization is the coding of sensory data through non-local stimuli coming from memory and experience. (Dillon, 2004) Perceptual coding of sensory data invokes prior knowledge. This means that perception categorization is never wholly free from context, and the prior life experience of the perceiver.

Learning, according to the social constructivist approach, occurs not only with the student’s interaction with the learning materials, but also with the teacher and with the student’s peers, the community of scholars and like-minded students. Social constructivism maintains that knowledge and social interaction go together. (Dalgarno, 2002; Young & Colln, 2004) Learners construct their knowledge from these interactions. Fellow students take on a number of roles, they are not only authors and presenters, but also peers, reviewers and active listeners. (Derntl & Motschnig-Pitrik, 2004) Learning through guided discovery promotes active reflection in both student and teacher. In distance education these interactions between student and teacher and fellow students are limited, to the detriment of learning. (Fabri & Gerharo, 2000)

It is not enough to simply point the students in the direction of readings, interactives or activities. They need mentoring by lecturers or teachers; they need to be able to socialize and interact with their fellow students; they need to be embedded in a learning environment.

Each person has their own representation of knowledge and learning occurs when a gap occurs in the learner’s knowledge or an inconsistency arises between their knowledge representation and experience. (Dalgarno, 2002) Learners serve a cognitive apprenticeship, which should be dealt with by employing six teaching methods; modelling, coaching, scaffolding, articulation, reflection and exploration. Modelling,
coaching and scaffolding lead to the acquisition of cognitive and metacognitive skills through them observing, then being supported and coached as they put their new skills into practice. Articulation and reflection allows students to think about problem solving and finally, exploration leads to learner autonomy and problem formulation. (Chee, 2004)

When used in conjunction, constructivism and experiential learning theories form a valuable partnership that form a balance between descriptive and normative theories of learning. Experiential learning describes what Kolb believes happens when a student learns something, whereas the cycle outlined in Chee’s work, based on constructivist theories, describes what should happen when an instructor teaches. When used in conjunction with a pattern language to inform design, it is hoped that the resultant designs encapsulate and integrate these theories of learning in the design of e-learning environments, resulting in improved e-learning experiences.

Usability alone does not take into consideration the process of learning and teaching, either of the consolidation or construction of knowledge, the cognitive apprentice addressed by Chee’s teaching cycle nor does it allow for the reflective process outlined in Kolb’s learning cycle. If these theories are firmly placed within the design process by embedding them within design patterns, the design process can be assisted. Similarly, if a methodology for doing so is standardised and tested, any resultant pattern language can be extensible. But what is a pattern language, and how can its structure be adapted to incorporate these theories?

2.6 Patterns

The task of designing e-learning courseware is particularly complex. Not only does a designer need to make the product aesthetically pleasing, treat the content in an interesting and interactive way, but with the added burden of integrating user-centred design and usability into the process, it is little wonder that integrating pedagogy into the design can come as an afterthought. One way of reducing an extraordinary difficult problem into a set of integrated steps is the use of what is known as design patterns. By breaking a set of design problems down into smaller integrated components, a pattern language provides a shared vocabulary for designers that captures and transmits the design process. (Chan, 2003) Using patterns also allows for the creation of course
modules that are composed of smaller elements, but which are linked in an integrated way. (Derntl & Motschnig-Pitrik, 2004)

Designing using patterns began with a series of papers written by Christopher Alexander in the 1960s, culminating in the publication of the book *A Pattern Language* in 1977. A design pattern “describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice”. (Alexander et al., 1977 p. x) Originally a generic problem/solution set, patterns were developed as a way of describing and solving architectural design problems. They have since been developed as a language of design. Each design domain requires its own pattern language, its own way of solving problems. Since their inception, design patterns have been applied to a number of design domains, including their originating field of architecture and IT software design, providing concise and accurate communication for designers, and guidance for novices. (Frizell, 2003) When written in an accessible way that enables novice designers to connect to new problems, design patterns have been shown to be an effective tool in teaching and enabling software design. (Clancy & Linn, 1999)

Patterns focus on modelling workflows and processes that are completely abstracted from specific content. (Derntl & Motschnig-Pitrik, 2004) One of the most comprehensive sources for online website patterns is to be found in *The Design of Sites*, which organizes the patterns in genres, which in turn reference lower level patterns. (Van Duyne, 2003) However, Van Duyne’s work focuses on customer based e-commerce sites, and although some of the patterns are applicable to e-learning, it does not provide complete solutions for e-learning developers. Pattern languages have been developed for some e-learning solutions, such as Learning Management Systems and blended learning approaches, (Avgeriou, 2003; Chan, 2003; Derntl & Motschnig-Pitrik, 2004; Frizell, 2003) but what is lacking is an approach that embeds pedagogical theories into the patterns and therefore the design process itself.

Although Alexander’s pattern language dealt with architectural design and town planning, the structure of large-to-small elements in design can be mapped to the
structure of e-learning design (see Figure 2.2). This mapping forms the foundation of a strategy for the creation of a pattern language for e-learning.

![Diagram](image)

*Figure 2.2 Mapping architectural design patterns (after Alexander) onto the e-learning domain.*

Using this mapping of smaller to larger elements gives the structure of the pattern language an overall skeleton, although the resultant structure of the individual patterns will necessarily be more complex than this initial mapping. In mapping the design of an e-learning system there are more aspects to consider than just the one-to-one mapping of an e-learning application to Alexander’s language of physical space. There are pedagogical techniques to consider as well. Goodyear (2004) suggests that:

“Thinking in similar ways about the design space of networked learning, one can advance some tentative proposals about an equivalent pattern language. What would be the largest pattern, equivalent to Alexander’s ‘Independent region’? I suspect it would be a course, or Programme of study. This is the largest entity which can be designed. At smaller scale levels there are the building blocks of a course, however one labels them in one’s own system or institution – Study unit, Module, etc. Then there are the kinds of pedagogical technique catalogued by Paulsen: Discussion group, Debate, etc. Within these are smaller pedagogical tactics (tasks), smaller organisational forms, as well as the tools and artefacts with which we populate the learning space.” (Goodyear, 2004 p. 344)
As Goodyear and Alexander both point out, the power of a pattern language is not in the individual patterns themselves, but in the links and relationships between the patterns. An individual pattern is difficult to evaluate on its own. It must be seen in context of the patterns that support and surround it. (Alexander et al., 1977) Each problem must be looked at in detail, trying to capture a generic and recurrent problem/solution set through the lens of pedagogical theory, and at the same time structuring the language so that it encompasses larger and small patterns and the complex relationships between them. So writing a pattern language is done on two levels – looking at the detail of the pattern itself and its relationship to those that surround it – a bottom up and top down approach at the same time. (Alexander et al., 1977; Goodyear, 2004)

Design patterns can augment educational design by:

• Providing the designer/teacher with a set of courseware design ideas.
• Creating a structure so that it is easy to understand the relation between each pattern.
• Providing clear articulation between the design problem and solution by providing an underlying principle that bridges research-based evidence with the designer’s experiential knowledge of design.
• Encoding this knowledge in a way that integrates with the iterative design process in a fluid way, over the entire production process. (Goodyear, 2004)

Some problems with e-learning patterns to date are that unlike architectural patterns, it is difficult to find a single place to find e-learning design patterns. The community of e-learning pattern-makers is dispersed and fractured. There are a number of papers available but no refereed books. Another problem is validation. There are few studies that document pattern language use for e-learning, apart from one or two individual patterns, as in Goodyear (2004). There are few empirical studies in e-learning patterns and very few published results. (Garzotto & Retalis, 2007)

A pattern as written by Alexander takes the structure outlined in Figure 2.3.
However, the structure of an Alexandrian pattern may not contain enough elements when considering e-learning. When considering a pattern language in e-learning there are higher level pedagogical issues to deal with as well. Goodyear (2005) describes these as the “pedagogical framework” that define the educational problem space. He conceptualises the educational problem space as having two layers of tasks:

- pedagogical philosophy (a set of beliefs on how we think people learn, what knowledge consists of, how we think people should be treated, etc.),
- high level pedagogy (broad approaches such as problem based learning, cognitive apprenticeship, collaborative knowledge building),

Figure 2.4. Conceptualising the problem space of educational design (Goodyear, 2005)
• pedagogical strategy (directly related to action, eg. the use of an online debate) and
• pedagogical tactics (the detailed methods we use to set tasks for students, encourage their participation, offer guidance and feedback, etc). (Goodyear, 2005)

The importance of an online team having the same pedagogical philosophy cannot be understated. If members of a team approach the creation an educational e-learning course with deep philosophical differences, this “can lead to fatal divergence in the day to day operational work” (Goodyear, 2005 p. 84) From this flows the high level pedagogy, the approach taken when designing a particular approach, for example, “problem based learning” and from these the strategy and tactics flow. The pedagogical philosophy of this research, therefore, is to write a pattern language through the lens of constructivist and experiential learning. This will inform the high level pedagogy of each learning solution and the strategy and pedagogical tactics will be created in accordance with these teaching theories.

Although pattern languages have been posited as a solution methodology to a class of design problems, there are problems with their use. One is in how the patterns are written, and the level at which they are aimed. Novice users may find expert patterns inaccessible. In one study of a class using IT patterns, a group of students were given the same patterns, one set written using descriptive rules that described what the patterns did, while another group were given the same patterns using constructive rules which described how the pattern should be used. Students given the constructive rules created significantly more correct results, 18 out of 20 when compared to 12 out of 20 for those using the descriptive rules. (Clancy & Lim, 1999; Shackelford & Badre, 1993) This study outlines the importance of understanding the process of knowledge integration when designing patterns.

Studies taken from pattern use in IT have also shown that the context of a pattern’s use in case studies can also help. A case-based pedagogical approach was tested in ten high school Pascal programming courses. A case study was a fully worked out solution to a programming problem with narrative explanation of the development process along with study questions designed to help students consider alternative
approaches, similarities and differences between code segments and multiple representations of programming concepts. All classes were given an introductory case study. Then, classes were randomly assigned to one of three groups: working with the case study alone, solving the problem first then working with the case study, solving the problem first then being given a solution programme to study. The students were then tested to assess their understanding of programme design skills, without relying on anything contained in the narrative. The resulting scores showed that students who used the complete narrative significantly outperformed those who did not. The use of narrative case studies appeared to help the students distinguish between the design patterns and understand how to use them. (Clancy & Linn, 1999)

Although IT patterns address a different design domain to those that would be integrated into e-learning systems, lessons learned from their use could be embedded in the structure of a pattern to help in their use. Similarly, Goodyear’s pedagogical framework could also be integrated into the design patterns. In terms of creating a pattern language for the e-learning domain, additional elements to Alexander’s basic problem/solution set could be added:

<table>
<thead>
<tr>
<th>Background: An introductory paragraph setting the context for the pattern (explaining how it helps to complete some larger patterns)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem: A headline, in bold type, to give the essence of the problem in one or two sentences</td>
</tr>
<tr>
<td>Solution: in bold type. This is the heart of the pattern – the field of physical and social relationships which are required to solve the stated problem in the stated context. Always stated as an instruction, so that you know what to do to build the pattern, and describing the solution in terms of learning outcomes relating to constructivist and experiential learning theories.</td>
</tr>
<tr>
<td>Teaching Strategies: A paragraph outlining teaching strategies that can accompany this design solution [pedagogical tactics].</td>
</tr>
<tr>
<td>Consider these other solutions: A paragraph outlining the solution in terms of differing pedagogical theories [differing pedagogical philosophies if applicable].</td>
</tr>
<tr>
<td>Case Studies: [As inset sidebar boxes: narrative examples of the solution in practice or short case studies]</td>
</tr>
<tr>
<td>References: A list of references for further study.</td>
</tr>
</tbody>
</table>

*Figure 2.5 Proposed pedagogical pattern structure (after Alexander)*
The differences between this pattern structure and that of Alexander are firstly that the picture of the archetypal example of the pattern becomes optional, because a picture is not always possible in pedagogically-based patterns. (Goodyear, 2004) The second point of difference is that the heart of the pattern, the solution is not only stated as an instruction, but explains the solution in terms of how it relates to the constructivist and experiential learning theories. Accompanying the solution is a set of teaching strategies, which outline how the pattern solution can be helped by adopting particular teaching practices. The consider these other solutions section is included so that pedagogical solutions that do not map to the constructivist and experiential learning theories may also be used if applicable. Case studies are included within the pattern as a separate sidebar or textbox so that novice users can see how the pattern is used in context, and users who have used this pattern before can omit them. (Clancy & Linn, 1999)

### 2.7 Research Questions

E-learning affords itself to the use of constructivist and experiential learning theories because these theories place an emphasis on interaction. By embedding these pedagogical theories into design patterns, problems with teaching and instruction could be overcome, with designers and content providers being able to concentrate on their respective areas of expertise, released from the additional burden of designing pedagogy.

If embedding pedagogical theories into a design patterns potentially improves e-learning design, one question that needs to be asked is:

\[
R1: \text{What is the methodology for embedding a pedagogical framework incorporating constructivist and experiential learning theories into e-learning design patterns?}
\]

One of the main tenets of constructivist learning theory is that “learners should be engaged in active exploration, they should be intrinsically motivated, and they should develop an understanding of a domain through challenging and enjoyable problem-solving activities.” (Bares, Zettlemoyer & Lester, 1995 p. 76) These should be authentic real-world problems which allow the students to construct their own knowledge through
cooperation with other students and by employing self-regulated learning. (Loyens, 2006) But how can one create a process for embedding such information into the patterns themselves? The first research question addresses the issue of creating the patterns based on the two pedagogical theories into a standard and repeatable methodology.

**R2: Do pedagogically-based patterns improve the design of e-learning courseware over generic design patterns?**

The use of pedagogically-based design patterns may allow the development of standard approaches to the design and architecture of e-learning courseware applications, and by informing the design, could lead to an improved learning experience over generic design patterns.

Currently e-learning development follows standard commercial practice, commencing with stakeholder meetings, utilizing paper prototyping, focus groups and ongoing usability testing though a series of development stages. (Van Duyne, 2003) The content is informed by specialist subject matter experts, but who may not be expert in pedagogical practices. The designers are often experienced in multimedia, but not necessarily in pedagogy and in how the needs of students differ from other users of online systems. The disadvantage of this development approach is that designers and producers are constantly reinventing the wheel when it comes to e-learning systems, and struggling with different approaches to learning and teaching. (Chee, 2004) By providing pedagogically-based patterns it is hoped that these problems in e-learning application production will be overcome, by providing a fluid integration of teaching principles into the design process.

**R3: How do pedagogically-based design patterns assist e-learning designers to be more effective authors in the development of design solutions for e-learning?**

The final research question is designed to determine if the use of pedagogically-based design patterns aids designers in developing their e-learning systems. In answering these research questions, patterns for e-learning will be developed that have embedded
within them both constructivist and experiential learning theories. The patterns will also incorporate the pedagogical framework outlined by Goodyear and each pattern will include case studies demonstrating the pattern’s use, and will be written in an accessible manner, taking the user’s knowledge integration into consideration in the pattern’s design. By embedding these theories of learning in the patterns themselves, it is hoped that the design and development of e-learning solutions will be grounded in solid learning theory, rather than remaining undirected or uninformed of current pedagogical thinking.

This will then be contrasted with design patterns that do not use or embed pedagogical theories, and designers will be asked to assess which they feel are more useful in the design process.
CHAPTER 3
RESEARCH PLAN, METHODS AND DESIGN

There will be a number of outcomes arising out of this research: the formulation of a method for the development of pedagogically-based design patterns for e-learning; the development and evaluation of the patterns themselves, the evaluation against generic patterns and the design and evaluation of online e-learning designs using these patterns. The subject matter of the courseware applications will be identical – the variables are the design of the applications and how the learning materials have been organized.

Figure 3.1 summarizes the research plan.

---

*Figure 3.1 Pattern development, testing and modes of inquiry.*
3.1 Text-based research and creation of design patterns by subjects

The first part of this research is designed to evaluate the methodology for the creation of pedagogically-based patterns based on the template in Figure 2.5. It will consist of text-based research that examines current research, theories of learning, existing online education systems, technologies and current design practices to identify and define a design problem for e-learning. Then a text search will be undertaken to gather together materials that embody the generic solution – one which can be used a million times but never in the same way twice – for the identified problem.

These problem and solution materials as well as background material on constructivism and experiential learning will be given to a group of eight subjects, who will formulate the pattern’s solution incorporating the two theories and Goodyear’s pedagogical framework, using the pedagogical pattern structure outlined in Figure 2.5.

The meta-strategy for undertaking this part of the research is outlined in Figure 3.2.

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text search for problem</td>
<td>Problem</td>
<td>Text search for solution (materials for subjects)</td>
<td>Solution in terms of constructivist and experiential learning theories. (by subjects)</td>
</tr>
<tr>
<td>Based on mapping of Alexander et al’s structure onto e-learning (See Figure 2.2) Working from larger to smaller components, and incorporating pedagogical issues (after Goodyear)</td>
<td>Definition of design problem based on research.</td>
<td>In researching solution also find case-studies and teaching strategies for incorporation into design pattern.</td>
<td>Parsing solution based on pedagogical philosophy. Written incorporating knowledge integration of users.</td>
</tr>
</tbody>
</table>

By basing the text-based research on this meta-strategy, the embedding of pedagogical theories into the design patterns becomes operationalized. The aim here is to develop and refine the method for producing design patterns, not just to develop a pattern per say.

The subjects will be asked to use this method to make a pattern whose problem has been defined during steps one and two. As the subjects define the pattern solutions, they will also note appropriate case studies and teaching strategies. The solutions will be
parsed to determine if the pedagogical framework and philosophy of the solution set maps onto constructivist and experiential learning theories. The solution will be written through the lens of these learning theories. If alternative solutions exist in relation to different learning theories, they will be noted in the “consider these other solutions” section of the pattern.

Particular attention will be paid to the Kolbian experiential learning cycle and the constructivist teaching model. (See Figure 3.3) If it is found that the text-based research consistently and regularly finds solutions that do not employ or map onto constructivist and experiential learning theories, the solutions will be written according to appropriate alternative learning theories, and this will be noted as part of the solution text. The resultant patterns would therefore take a different form than anticipated.

These patterns generated by the subjects will then be evaluated and ranked to determine:

1. The effectiveness of the design pattern making methodology;
2. The best pattern.

The best pattern will then be used in conjunction with a generic pattern (eg Goodyear 2004, see Appendix 2) for the next phase of the research.
Figure 3.3 The interaction between Kolb’s experiential learning cycle, constructivist teaching approaches and the design process with the design patterns.
3.2 Observation and interviews of designers

To address the second and third research questions, the best pattern from the previous phase of the research, and a similar generic pattern will be used in the development of e-learning designs by sixteen designers, organised into two groups. One group will be given a pedagogical pattern and the other will be given a generic pattern. Each designer will be given the same course content and will have access to/be made aware of the same e-learning development toolkit. The learning materials will be taken from the UK’s Open University (OU) Open Learn website which consists of material from an existing OU course.

It is anticipated that the designers will take a paper-based approach in the design process. They will be asked to create screen designs and site architecture of an e-learning application. This process will take place individually, without collaboration.

On completion of the first set of designs, those designers with pedagogically-based patterns will be given a generic design pattern and vice versa. The designers will then be asked to create a design based on the other design pattern structure.

To address the third research question, once the design process has been completed, the designers will take part in a structured interview to determine their opinion of the design process using both the generic and pedagogically-based patterns to determine which they felt was more useful. (See Appendix 1). This part of the research will involve qualitative assessments on what impact the different patterns have on the production of online materials.

The designers will also be observed and will be recorded on videotape for analysis purposes. During the observation period, the observer will make note of the following matters:

− How did the designer plan for their design approach?
− What part of the design did they attempt first?
− How does the participant make use of the patterns?
− Does the designer make use of collaborative spaces?
− Does the designer try to use a “hands on” philosophy when dealing with the subject matter?
− Does the resultant design reflect real-world practice?
− What social interaction has been allowed for in the application?
− Did you over-hear any interesting comments? Did the participants say anything to you?
− What problems, difficulties, or frustrations did the participant experience?

These observations form a secondary correlation to the interviews to build an overall picture of the usefulness of the pedagogical patterns as a form of design assistance.

### 3.3 Ranking by panel of experts

To address research question two, the sixteen designs will be ranked by an independent panel of experts, who will determine which designs they believe best fulfil pedagogical outcomes. This ranking will be done without the panel of experts knowing which applications used pedagogically-based patterns and which did not. This ranking will be used to determine if overall one approach is more successful than another. Any bias towards one method will be highlighted in the results.

### 3.4 Methods mapped to research questions

The preceding section outlines the research plan, methods and design. Figure 3.4 describes the research questions and the methods that relate to each of the questions.

<table>
<thead>
<tr>
<th>Methods</th>
<th>Research Question 1</th>
<th>Research Question 2</th>
<th>Research Question 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>What is the methodology for embedding a pedagogical framework incorporating constructivist and experiential learning theories into e-learning design patterns?</td>
<td>Do pedagogically-based patterns improve the design of e-learning courseware over generic patterns?</td>
<td>How do pedagogically-based design patterns assist e-learning designers to be more effective authors in the development of design solutions for e-learning?</td>
</tr>
<tr>
<td>Preparation/Formulation</td>
<td>Creation of pattern solutions to include pedagogy by subjects.</td>
<td>Creation of designs based on best generic and pedagogically-based patterns.</td>
<td>Creation of designs based on generic and pedagogically-based patterns.</td>
</tr>
<tr>
<td>Observation/Data collection</td>
<td></td>
<td></td>
<td>Observation of designers</td>
</tr>
<tr>
<td>Assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tools and</td>
<td>Ranking of resultant</td>
<td>Ranking of resultant</td>
<td></td>
</tr>
</tbody>
</table>
3.5 Evaluation

The evaluation of the research maps onto three different axes of the diagram outlined in figure 3.5.

![Figure 3.5 Different axis of evaluation](image)

The quality of the pattern making method will be evaluated by ranking the pedagogical design patterns created by the subjects. This ranking will be done by evaluating existing e-learning design patterns, (Goodyear 2004, Frizell 2003, Chan 2003, Van Duyne 2003) creating an evaluation checklist/tool and comparing the created pedagogical patterns with the existing generic published ones for quality control. The patterns created by the research subjects will also be cross checked with the pedagogical pattern template to ensure that all required elements are present. The “best” pattern will then be used in the design of e-learning sites, as part the next stage of the research. (See Appendix 2 for example patterns)

The quality of the design solution will be evaluated by ranking the resultant e-learning designs by a panel of experts to determine if the quality of the pedagogy is improved with the use of pedagogically-based design patterns. The designers will design
with two sets of patterns, generic design patterns and pedagogical patterns. The experts will not be made aware of which designs have been created with which patterns. They will be ranking the resultant designs on the quality of the pedagogy. This quantitative data will be illustrated in a series of graphs to determine if the pedagogically-based patterns result in improved e-learning solutions. In the hypothetical result Figure 3.6, designers who used patterns consistently fall into the highest category for pedagogical excellence. For those designers we are looking for minimum variance between results.

![Figure 3.6 Hypothetical mapping of experts’ preferences against designer’s use of pedagogical patterns.](chart)

The final stage of the research involves qualitative interviews with the designers. The results of these interviews will be written up as a report, with quotes highlighting and illustrating points of interest, answering research question three, along with a report on the observations of the design process. The overall trends as to which patterns the designers preferred will be highlighted, along with any valuable comments and observations.

### 3.6 Quality Assurance

The design patterns will be given to a set of 16 designers to use in the development of e-learning courseware. Half of the designers will be given a pedagogically-based pattern to aid their design, the other half be given a generic pattern. Once they have
completed their designs, the designers will be given the alternate pattern-making structure and asked to re-design the courseware based on the new pattern. It is important that the order in which the designers have been given the patterns is recorded, as it is anticipated that the second set of designs could be slightly better due to the designers’ familiarity with the subject matter on their second attempt. This bias will be noted.

The designers will not be allowed to collaborate and as they will be using only two patterns to design with, which will present the same problem. They will not be given the opportunity to examine these patterns out of the experimental setting. This removes the opportunity for communication or collaboration between the designers outside the experiment. The designers will also not be told which pattern set is of importance to this experiment in advance of their design activity.

The designs will be assessed by an independent panel of four experts and ranked according to effectiveness of design. The designs will be given random codes so that there is no correlation between either the designers’ first and second attempt, or use of pattern schema. The experts will not be made aware of which designs used which patterns or the order of the pattern presentation to the designers.

The interviews and observations will primarily be structured, with opportunity at the end for the designers to add comments of their own. (See Appendix 1).
3. 7 Timeline

Below is the proposed timeline for the completion of the research programme.

![Timeline of research](image)

*Figure 3.7 Timeline of research*
APPENDIX 1

Observations of Designers

During the observation period, the observer will make note of the following matters.

- How did the designer plan for their design approach?
- What part of the design did they attempt first?
- (if applicable) How does the participant make use of the patterns?
- Does the designer make use of collaborative spaces?
- Does the designer try to use a “hands on” philosophy when dealing with the subject matter?
- Does the resultant design reflect real-world practice?
- What social interaction has been allowed for in the application?
- Did you overhear any interesting comments? Did the participants say anything to you?
- What problems, difficulties, or frustrations did the participant experience?

Designer Interview Questions

1. Age?
2. Gender?
3. Where were you born?
4. How long have you been in Australia?
5. Do you consider yourself an educator or a designer?
6. How long have you been working in this field?
7. Please list any other relevant work experience or qualifications that you may have.

Additionally, the observer may ask the designer several questions to better understand the design experience. These questions can be grouped into the following categories.
<table>
<thead>
<tr>
<th>Category</th>
<th>Content</th>
<th>Sample Questions</th>
</tr>
</thead>
</table>
| Learning | These questions will ask the designer about their approach to the learning in their application. | 1. What were your thoughts on the learning process for the users of your application?  
2. Did you make use of student-to-student and student/teacher communication in your application?  
3. Did you allow areas in your application for students to be able to socialize?  
4. Were you applying any particular learning theories to your design?  
5. Did you allow for the users of your application to consolidate their learning? How? |
| Planning | These questions will ask the designer about the planning process for their application. | 1. How did you go about the planning of your application?  
2. How did you organize the materials?  
3. What did you take into consideration when you decided what to include in your application? |
| Navigation | These questions will ask the designer about the navigation of their site. | 1. What ideas went into the navigation of your application?  
2. Did you create a flowchart or as sitemap before you started, and if so what thoughts went into this? If not, why not?  
3. Did users have access to areas where they could communicate with other users?  
4. Did users have access to areas where they could collaborate with other users?  
5. Were users guided to areas or activities where they could consolidate their learning? |
| Design | These questions will ask the designer about the design of their site. | 1. What ideas went into the design of your application?  
2. Did you use patterns for your design? If so, how do you think they changed how you design?  
3. Do you feel that using learning theories when designing an application such as this would help what you do? How?  
4. Was there any particular philosophy in what you decided to include/not include in your application? What was it?  
5. Overall how did you feel the design experience was for this project? |
APPENDIX 2

Example Generic Pattern

Discussion group (Goodyear 2004)
This pattern is mainly concerned with the establishment of appropriate organisational forms for knowledge-sharing, questioning and critique. It is a way of helping implement the patterns LEARNING THROUGH DISCUSSION, COLLABORATIVE LEARNING and NETWORKED LEARNING PROGRAMME.

Discussion groups are the most common way of organising activity in networked learning environments. The degree to which a discussion is structured, and the choice of structure, are key in determining how successfully the discussion will promote learning for the participants.

Discussions can be relatively structured or relatively unstructured, and they may also change their character over a period of time. It is not uncommon for a teacher to set up a discussion in quite a formal or structured way, and for the structure then to soften as time goes by – for example, as the participants take hold of the conversation, opening up and following new lines of interest.

The structure of a discussion should be such that it increases the likelihood of:

a) an active and substantial discussion, with plenty of on-task contributions
b) the students coming away from the discussion with a good understanding of the contributions made
c) contributions being made by all members of the group and ‘listened’ to by all other members of the group.

Unstructured discussions run the risks of (for example)

- not getting going properly within the time available
- dissipating into a number of loosely related strands that fail to engage effectively with subject being studied
- dissolving into monologues or two-way conversations that fail to involve the whole group (Wertsch, 2002).

Pilkington & Walker (2003) have demonstrated the value of assigning explicit group roles in online discussion groups. Some writers, for example, McConnell (2000) are not sure about the validity of the teacher setting specific structuring devices, preferring to make the group itself responsible for determining how it wants to discuss things, or carry out its work more generally.

Therefore:

Start any online discussion by establishing its structure. Make the rules and timetable for this structure explicit to all the members of the group. Where there is little time available to the group for the discussion, and/or the members of the group are inexperienced at holding online discussions, the teacher/facilitator should set the structure. Where the students are to set their own structure, the teacher/facilitator should give them support and ideas about how to do this, and encourage them to do so in a fair and timely way.

Patterns needed to complete this pattern include: DISCUSSION ROLE, FACILITATOR, DISCURSIVE TASK


Dewey, J. (1938). Experience and Education. New York: Kappa Delta Pi (pp.42-43)


