# First Impressions of Novice Educational Researchers to an On-Line Reflection Tool Designed to Help Make Their Biases Explicit

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# Declaration

*I declare that the work described in this document is, except where otherwise stated, entirely my own work and has not been submitted as an exercise for a degree at this or any other university.*

*Signed:* _____

*Jake Rowan Byrne, B. Eng. Hons (DCU)*

*May 29th 2007*

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# Abstract

The aim of this research is to aid novice educational researchers in making their personal biases and values explicit while conducting their research, through the design and delivery of an online medium for individual and collaborative reflection. This case study will examine the reflections of 7 novice educational researchers conducting research as part of their course in technology and learning. A researcher's subjective nature means that their biases and values will be reflected by the researcher's choice of topic, methodology, analysis, design and implementation; this is particularly evident in qualitative research. It is believed (Mehra, 2002) that the participation in reflective processes is beneficial to qualitative researchers, as it provides them the means to acknowledge and incorporate their biases and values into their studies. There are a number of major design features that need to be considered when designing for the effective facilitation of reflection: journal writing as a personal process and journal writing as dialogue (Andrusyszyn & Davie, 1997), process display, process prompting and social discourse (Lin, Hmelo, Kinzer, & Secules, 1999). As a result the online environment must permit the entry and display of both private and public journals/reflections, while facilitating discussions and discourse on the public reflection, these reflections should both be open and scaffolded as this satisfies the need for process display and prompting. The collaborative aspect of this project is paramount as social discourse is found to incorporate many of the features that benefit the reflective process: multiple perspectives, sharing of expertise, motivation, etc.

Data was collected from the electronic transcripts of the reflections and discussions of the participants. Using qualitative methods of analysis, the effectiveness of the design themes were examined and guided semi-structured interviews were created. It was found that the chosen design processes were not achievable in the time allotted, it was not enough time for the users to become accustomed to the environment, create collaborative relationships and reflect on there. But information about the users impressions of such an environments suggests it has potential while providing key insights to the users impressions and aspirations of such an environment.

# Table of Contents

# Chapter 1: Introduction

The aim of this research is to aid novice educational researchers in making their personal biases and values explicit while conducting their research, through the design and delivery of an online medium for individual and collaborative reflection. This is deemed important as educational researcher usually consist of qualitative research, which is subjective by nature. This subjectivity inevitably leads to biases; these biases and values will be reflected by the researcher's choice of topic, methodology, analysis, design and implementation. If these biases are left unchecked it is possible that they may skew the analysis.

This leads on to the research question:

Can a reflective and collaborative on-line environment be utilized to help make novice educational researchers' individual beliefs and biases explicit?

Therefore it is necessary to explore the literature for the formation of biases. This highlights their relationship to emotions. Processes that should help make these biases explicit will then be explored; these include social discourse, collaboration and the reflective process. Social discourse in reflection is proposed by a number of researchers (Lin, Hmelo, Kinzer, & Secules, 1999; Mehra, 2002) as a method to help make biases explicit and to help explore new perspectives. This is beneficial to qualitative researchers, as it provides them the means to acknowledge and incorporate their biases and values into their studies.

There are a number of major design features that need to be considered when designing for the effective facilitation of reflection: journal writing as a personal process and journal writing as dialogue (Andrusyszyn & Davie, 1997), process display, process prompting and social discourse. As a result the online environment must permit the entry and display of both private and public journals/reflections, while facilitating discussions and discourse on the public reflection, these reflections should both be open and scaffolded as this satisfies the need for process display and prompting. The collaborative aspect of this project is paramount as social discourse is found to incorporate many of the features that benefit the reflective process: multiple perspectives, sharing of expertise, motivation, etc.

The case study will examine the reflections and discussions of 7 novice educational researchers conducting research as part of their course in technology and learning. They

used the environment over a two-week period. Data was collected from the electronic transcripts of the reflections and discussions of the participants. Using qualitative methods of analysis, codes and themes were generated, and the effectiveness of the design themes were examined. Guided semi-structured interviews were created based on the codes and themes generated from the user input. These interview questions were created to probe both the research question and the impressions the participants formed about the environment. Codes and themes were then extracted from these interviews.

It was found that the chosen design processes were not achievable in the time allocated, it was not enough time for the users to become accustomed to the environment, create collaborative relationships and reflect on there. But information about the users impressions of such an environments suggests it has potential while providing key insights to the users impressions and aspirations of such an environment.

This paper shall first explore the literature in and around the area of interest, and then a design chapter will describe the design implementations based on the literature. This will be followed by a methodology chapter, which will explain the approach to the project and the methods and procedures used. The findings will be presented before they are finally discussed in the final chapter.

# Chapter 2: Literature Review

## Qualitative Research and Knowledge Claims:

> *"Qualitative research is a type of educational research in which the researchers relies on the views of participants, asks broad, general questions, collects data consisting largely of words (or text) from participants, describes and analyzes these words for themes, and conducts the inquiry in a subjective, biased manner." (Creswell, 2005 )*

Qualitative research by its very nature is a subjective and biased activity. Therefore it is imperative that any qualitative researcher acknowledges and incorporates these ideas. Biases should be limited or at least made explicit, particularly when interpreting data (Marshall & Rossman, 2006; Miles & Huberman, 1994). Gilovich (Gilovich, 1991) states that people are adept at making ad-hoc explanations, but that they often make these assumptions based on misinterpreted or misperceived data, or put to much weight on ambiguous data, resulting in biased interpretations. Consequently when conducting qualitative research it is necessary for the researcher to make a "knowledge claim", meaning that they will state their approach to the subject and the assumptions that accompany this approach. Socially constructed knowledge, advocacy/participatory knowledge and more recently pragmatic knowledge are three major paradigms that qualitative researchers adhere to when conducting their research (Creswell, 2003), this provides a philosophical framework for their knowledge or ontology formation.

Creswell also states that it is necessary for the researcher to self-reflect on their biases, as this will make their work clear, open and as a result more valid. Other work on bias in qualitative research (Denzin, 1989; Mehra, 2002) has shown that even the research topic chosen by a researcher is a result of their personal interests and biography, again reflection is referred to as a solution in creating a more valid interpretation. Other methods for validating analysis are the use of an external auditor and peer debriefing, this compliments the paradigm of socially constructed knowledge (Creswell, 2003).

As a result the following sections shall explore how beliefs influence bias and help in their formation (and visa-versa), how this relation affects the formation of both individual, subjective knowledge and socially accepted, objective knowledge. We shall then look at how socially constructed knowledge in a collaborative learning environment may overcome the subjective nature of individual thought; these ideas are then extended into an online

environment. The discussion will then explore how reflection as an approach, will help researchers in making there biases explicit, therefore conducting a more valid and comprehensive investigation. Finally the paradigms that this research project shall utilize will be examined.

## Belief, Biases and Understanding:

> *"In developmental psychology there has been a clear distinction between cognitive, social and emotional development. Each has been studied separately. But the distinctions have been gradually eroding."(Jones & Issroff, 2005)*

It is clear that a more holistic approach is needed to fully describe the affects on an individual researcher while participating in a reflective and collaborative learning environment and in turn, how they may influence that environment.

Here it is necessary to draw a distinction between what is meant by belief and understanding: belief may be taken to be the individual, subjective and affective aspects of knowledge, while understanding may be taken to be the socially accepted and "objective" knowledge (Pehkonen, 2003). The distinction highlights the difference between beliefs as individually generated schemas and understanding as socially generated schemas. Although a distinction between meanings is made, these two ideas are mutually dependant and knowledge as a whole is a dynamic interaction between these sub-sets of knowledge.

As emotions may shape, awaken, and intrude into beliefs and thus create, alter and reinforce them (Frijida, Manstead, & Bem, 2000), they are important to take into account when people are encountering new or reflecting on past concepts and experiences. There have been studies (Chinn & Samarapungavan, 2001) that have shown that students frequently do not believe what they are learning in class, but may have a good understanding of the subject matter. It is suggested that the student tries to fit the concept to their belief systems before trying to fully understand the concept.

> *"One way in which affect influences beliefs is via mood-congruent biases: we are more likely to notice, encode, remember and make use of information that in congruent with a prevailing mood." (Frijida, Manstead, & Bem, 2000)*

This shows that emotions inherently interact with biases in our thought processes, ultimately defining our goals and values. If beliefs are to be taken as a probability (Dewey, 1910), creditability or plausibility statement (Dewey, 1910; Frijida & Mesquita, 2000), it

may be seen that the formation of beliefs are motivated by the desire to be accurate (Harmon-Jones, 2000; Kunda, 1990). An alternative perspective to that of the researcher may evoke dissonance (Harmon-Jones, 2000) and as there is a desire to be accurate the researcher will become motivated to understand and reduce this cognitive discrepancy. This is dependant on the whether the belief or new concept is more resistant to change. Learners will generally tend to avoid alterations to their belief structures and the associated discomfort, as they lack both the resources and motivation necessary to cause these changes.

As the aim would be to gain or approach the ideal of "objective" knowledge or understanding, a method is needed that helps the researcher encounter situations in which their beliefs and bias will be called into question. It is suggested that a reflective collaborative learning community may provide such a platform (Mehra, 2002). This leads on to the next sections where we shall first explore the interactions between the individual and social cognitions within an online collaborative research community and secondly the process of reflection.

## Cognition in Online Collaborative Research Communities:

Utilizing an online collaborative research community may provide a way to both promote understanding, belief change and affective learning. The literature shows that collaborative interactions foster distinct emotional dimension, and that emotional arousal controls the direction of attention towards desired goals (Forgas, 2000; Jones & Issroff, 2005). Jones and Issroff mention motivational aspects such as curiosity, challenge, confidence and control. In particular they mention that a social affinity, shared meaning, and understanding can be particularly motivated activities. Motivation has been described (Frijida & Mesquita, 2000) as the desire to get rid of discomfort. Now we shall look at why a social interaction provides the appropriate environment for the researcher to challenge their current beliefs (or bias).

Oatley (Oately, 2000) mentions three forms of distributed cognition that emphasize the different interactions that occur within collaborative communities, temporal distribution, social distribution and externalization. These forms of distribution are not to be taken independently but as aspects of a dynamic interaction of the three.

Temporal distribution is the distribution of cognition over time, this allows an individual to adapt their behavior as time goes by, that is they are able to learn to act differently for the future. It also plays a major role in cultural transmission, which develops from the

social and sentimental goals of affiliation. Temporal distribution allows for an individual's beliefs to converge with those of the wider community, thus promoting empathy and the resulting affiliation and identification.

Social distribution allows for humans to distribute their cognition in order to overcome some of the defects of individual cognition, such as bias. This factor is very important in the progress of scientific knowledge as discussed by Popper (Popper, 1963), whereby knowledge evolves not from confirmation of theories, but by seeking disconfirmation, as peer-reviewed systems endorse. Social discourse also provides a source of dissonance, as members of the collaborative environment may introduce new concepts, with the added benefit or trust and identification between the participants, thus providing both the resources and motivation to alter their belief structure. Oatley also proposes that this form of distributed cognition is what gives rise to affiliation, as it arises from the desire to accomplish common goals that would not be attainable by the individual.

These ideas may be expanded upon if the ideas of communities of practice are explored (Barab & Duffy, 1998; Lave, 1993; Wenger, 1998). Interactions with the environment are not just viewed as producing socially accepted meanings but also produce identities that relate to and interact with the social environment. This promotes a sense of purpose and meaning for both the individual and the wider community. It is suggested that concepts should not be viewed as "self-contained entities" but rather as tools that can only be understood through use. This view compliments Oatley's third form of distributed cognition, externalization.

Externalization is a process that allows the conversion of difficult to perform tasks to something that is relatively easy to accomplish, through the use of technology. Language and writing are used as examples of such externalization. Writing allows us to refine our use of language allowing us to read, edit, transform and rewrite what we have written. There is some support for the idea that social distributed and externalized cognition have both technological (Resnick, 1987) and "verbal-emotive" (Forsyth & Eifert, 1996) expressions. In Forsyth and Eifert's work they claim that language is not only "verbal-emotive" but also "social-verbal" where "semantic conditioning" and "emotional meaning" are to be considered.

## Ontology and the Semantic Web:

If extending or externalizing these ideas into an online environment, the very nature of the language used within it should be examined. An area that is gaining ground is the idea of a Semantic Web, whereby ontologies are created based on specific semantic interpretations. It has been touted that "if properly designed, the Semantic Web can assist the evolution of human knowledge as a whole" (Berners-Lee, Hendler, & Lassila, 2001). But they do go on to say that, although small groups working closely can be very productive, they may produce ontologies that may not be understood by the wider community. This is one of the major problems with the implementation of semantic web technologies in a learning environment; each group develops their own ontologies and a learner/researcher using these ontologies may not easily identify/understand them. In a paper by Bateman (Bateman, 1995 ), he discusses what is meant by ontology, he starts by defining the original use of the word, from a philosophical perspective.

> *"Ontology was first and foremost an attempt to reveal the essential nature of what can be, of what exists, of reality" (Bateman, 1995 )*

He then states that one cannot go much further here, as the proposition is so broad. In an effort to ease this issue, "be" is interpreted to mean what we accept as our world-view, shared meaning or understanding. Where our understanding of the world is formed using language, as a socio-semiotic construct. This view is consistent with the views that knowledge is constituted of mentally symbolic constructs and understanding is a process of continual negotiation (Barab & Duffy, 1998). Bateman goes on to say that meaning or understanding is the result of the synergy between both "formal" and "natural" ontologies.

> *"The formal semiotic ontology is provided by fundamental dimensions such as stratification, metaredundancy/realization, paradigmatic alteration, and syntagmatic. The natural semiotic ontologies are given by abstracting away from the generalized resources of lexicogrammars to obtain discourse semantics, abstracting from discourse semantics to obtain contexts, and from contexts to obtain ideologies." (Bateman, 1995 )*

This fits with the idea that socially distributed cognition in an environment allows concepts to evolve and change and these are then externalized in the form of ontologies. This suggests that for a collaborative learning community to be affective, the learner must be involved in the formation of the ontologies that are used within the community. One

emerging method that may allow for the dissemination and simple formation of "natural" ontologies is that of "folksonomies", "social-classification" or tagging (Sturtz, 2004).

## Reflection: A Tool in Making Beliefs and Biases Explicit:

> *"Active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends, constitutes reflective thought… it includes a conscious and voluntary effort to establish belief upon a firm basis of evidence and rationality."(Dewey, 1910)*

It would seem that Dewey supports the idea that knowledge is formed from beliefs and that the process of reflection may foster reassessment of current beliefs and development of new rational beliefs. This idea has been taken further:

> *"the reflective process is a complex one in which both feelings and cognition are closely interrelated and interactive. Negative feelings, especially about oneself, can form major barriers towards learning. They can distort perceptions, lead to false interpretations of events, and can undermine the will to persist. Positive feelings and emotions can greatly enhance the learning process; they keep the learner on the task and can provide a stimulus for new learning."(Boud, Keogh, & Walker, 1985)*

Boud, Keogh and Walker take the holistic idea that both emotion and cognition need to be considered together and have united it with the reflective process. They clearly state the affective nature of reflection and the motivations that result from the process. They break up the reflective process into three steps: returning to experience, attending to feelings and re-evaluating experience. These stages or not linear and may involve cycles between each of the steps.

**Returning to experience:**

Here the experience or concept that is the subject of reflection is recollected, with the aim of remaining as descriptive as possible while refraining from both conveying emotion and making judgments. This should set the context for the rest of the reflective process.

**Attending to feelings:**

Emotions and feelings experienced are attended to. There is evidence that simple awareness of feelings may have motivational effects (Forgas, 2000). This helps make feelings explicit allowing assessment of their impact on our perspective.

**Re-evaluating experience:**

This step has been divided into four sections: association, integration, validation and appropriation. These sections are not stages to be passed through but elements of a whole.

- **Association:** This is the association of the ideas and feelings from the original experience with existing beliefs.
- **Integration:** Here the nature of those ideas and feelings are explored, and then conclusions and insights may be explored. It is suggested that concept maps may allow the visualization of how concepts are related.
- **Validation:** Seeking to validate what has been integrated. Affective motivation may arise from the desire to be accurate (Kunda, 1990), and to have social affinity, shared meaning, and understanding (Jones & Issroff, 2005). This provides a situation for external audition and peer debriefing, as desired in qualitative research.
- **Appropriation:** This is an important step where some of the ideas that have been integrated become part of our belief/value systems. Again supports the holistic view of feelings and beliefs.

A number of design features need to be considered when designing for the effective facilitation of reflection: journal writing as a personal process and journal writing as dialogue (Andrusyszyn & Davie, 1997), process display, process prompting, and social discourse (Lin, Hmelo, Kinzer, & Secules, 1999).

## Evaluation:

As this case study is one of a qualitative nature, it shall be conducted using the methods previously discussed. It will be assumed that knowledge is socially constructed while both advocacy/ participatory and pragmatic knowledge paradigms will be employed (Creswell, 2003). The reasons for the adoption of the socially constructed knowledge paradigm will

be clear from the previous arguments. The participatory paradigm shall be adopted as the researcher himself shall participate within the environment created, this, it is hoped, shall allow this research to incorporate the tools and methods developed herein. A pragmatic paradigm shall be adopted to allow pluralistic and holistic views. Both personal and collaborative reflections will be undertaken with the aim of validating the research undertaken and in making biases explicit.

Although this case study will be mainly one of qualitative research, a mixed methods approach will be employed to allow a thorough investigation of the system implementation and usage. Thus concurrent and transformative strategies of inquiry (Creswell, 2003) will be employed when collecting and analyzing data.

# Chapter 3: Design

## Design Introduction

This project will be looking at novice educational researchers initial perceptions of an environment that should allow them to collaboratively explore their biases and beliefs. The design choices emerged from the suggestions from the literature and will explored in the following section, this is summarized in Table 1 in the appendix 1.

The literature suggests (Mehra, 2002) the process of reflection will aid the user in making their biases explicit through higher order thinking; therefore it is necessary for the environment to have a mechanism to post and save reflections, this was achieved by creating a memoing tool. Others suggest (Boud, Keogh, & Walker, 1985) that a number of steps or stages should be attempted to get the most out of the reflective process; these steps help the user approach a single topic from a number of perspectives, this was achieved by providing the user with a jotter which would allow them to add to their initial memo under a numbering of headings (feelings, associations, integrations, validations and appropriations).

There are also suggestions (Lin, Hmelo, Kinzer, & Secules, 1999) that process display is an important aspect of any reflective environment; this helps make the process and methods the user is utilizing clear and allow for reassessment. This was implemented by clearly displaying the past memos and allowing ease of access to them, a second design feature was added through the creation of a small window ("min-viewer") that appears to the left of the main memo and display the additions made by the user.

Process prompting is suggested (Lin, Hmelo, Kinzer, & Secules, 1999) to help guide the user; reflection is a difficult process to engage in, therefore it can be necessary to provide a user with prompts so as to help them along. Simple guides were provided for what was necessary for each step of the process, there were also a number of questions used as prompts to start the reflective process, these questions were taken from the literature (Mehra, 2002) as it was suggested that they may help revel biases.

Collaboration and social discourse are mentioned (Lin, Hmelo, Kinzer, & Secules, 1999 ; Mehra, 2002) as being beneficial to the reflective process; This exposes the user to alternative perspectives and should help them probe their personal beliefs and biases. This was achieved by creating a discussion forum where users could post messages and

reply to other users, also the validation step of the reflective process had the option of been made public, this follows on from the idea of external audition.

As the literature recommends that a users personal ontology is important to take into account if an affective environment is to be achieved. Due to time constraints a full implementation of this technology was not attempted, instead a number of inputs were provided that suggested to enter “key-phrases”. The intention here was to asses the usage of such inputs to allow for greater understanding for future implementations.

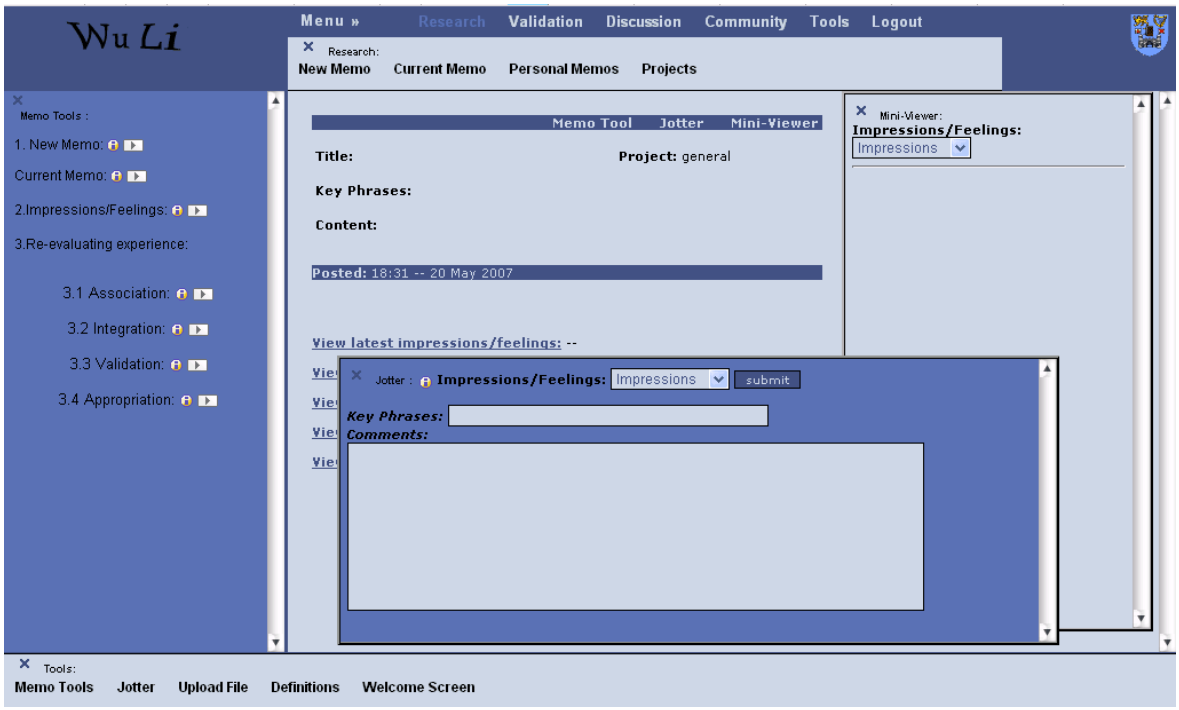


Figure 3-1: General Page Layout

Fig. 3-1 shows the general layout of the page. At the top is the main navigation menu, below that a menu will appear depending on what section the user is currently exploring. To the left is a tool bar that will display various tools throughout the process (Memo Tools, Upload File Tools, Definition Tool, and Comment Tool). The central “window” will contain the main content that is being explored; it will display lists and individual memos, discussions and validations. On the right the mini-viewer will appear during the reflective process, it will show all the inputs made under the current memo/reflection. Finally the Jotter will pop up after a memo is added, or alternatively it can be called up using the memo tools section or using the tools bar at the bottom (access from the main navigation menu at the top); the Jotter allows the addition to the current member under the various steps of the reflective process.

## Technical Specifications

The design will need a number of features to facilitate a variety of tasks to be completed and inputted, while also allowing the ease of navigation to reference tasks already completed. Data will be collected with the aim of interviewing the users about their experiences. This will call for a dynamic display and submission implementation.

As a dynamic interface is necessary JQuery, a variety of JavaScript library, was used. JQuery allows for very dynamic displays by manipulating the HTML and CSS on the page using very simple and elegant code. For the dynamic submission of input JQuery sent data via AJAX to PHP scripts that submitted them to a MySQL server. This means that the whole interface is viewed through a single webpage, meaning no page reloads or interrupts, while still permitting data to be updated to the page; this is particularity important so as not to loose text that has not been submitted. This allows for a variety of tools to be loaded, closed and viewed through this single page.

## Reflection/Memo Tool:


Figure 3-2: Reflection/Memo Tool Navigation Menu

The reflection process is accessed through the main navigation menu, under the heading research. When research is clicked the menu in Fig. 3-2 appears. This menu allows a user to create a new memo, view their current memo, view all of their personal memos and view the projects that are available to them.

Users can create a project in the project section using the tool in Fig. 3-3; it is recommended that this is done before starting their first memo, as it will give the user some direction to their memo.

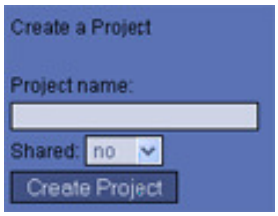


Figure 3-3: Create Project Tool

The reflective process is private, with the additional option of making validations public to promote collaboration.

**Return to experience/new memo:**

This follows on from that first step of the reflective process as stated by Walker, Keogh and Boud. The "return to experience" title has been replaced with "new memo" in this design as it is believed that a memo is a more common phrase that would help reduce confusion.

When new memo is selected from the menu in Fig. 3-2, the memo tool in Fig. 3-4 will appear on the left of the page and the new memo composer in Fig. 3-5 will open in the main page. The memo tool has the various steps of the reflective process numbered, with both guide (  ) and access (  ) buttons for each of these steps.


Figure 3-4: Memo Tool

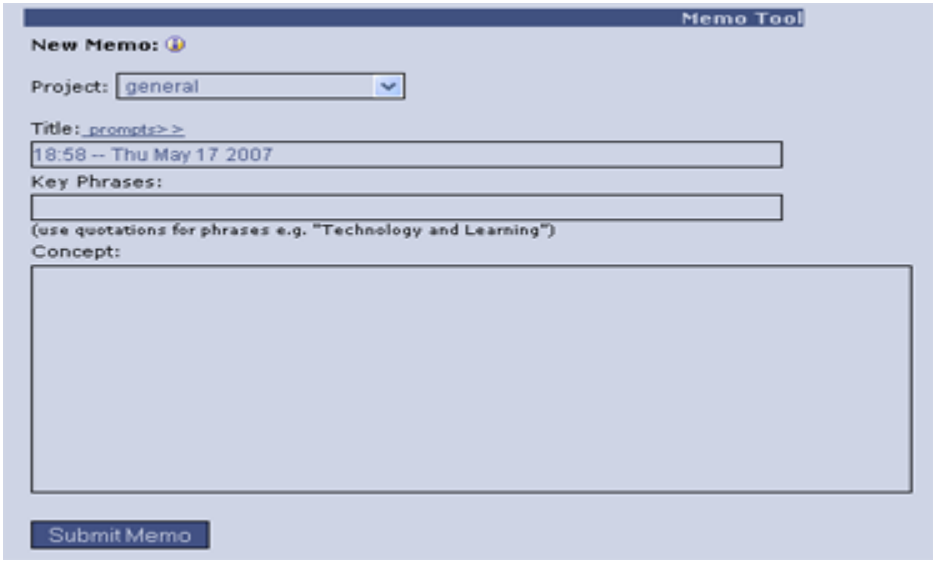


Figure 3-5: New Memo

The new memo composer allows the user to add a memo to a project of their choice (A new project can be created here too). There is a title input for the user to create a title that is relevant to what they are going to reflect on. Here a date will appear as default, as many people use memos in a diary format. Prompts are also provided in a drop down menu, but these shall be discussed in a subsequent section. There is then a section for key phrases, this section has it's basis in the idea that individuals should create their own ontologies and knowledge-base, although this will not be implemented in this project, it will allow for the analysis of user habits when asked to input key phrases. These key

phrase inputs will appear again in the other steps of the reflective process. Finally there is the concept input, here the concept due to be reflected upon is described before submission.

**Attending to feelings/impressions and feelings:**

This step represents Walker, Keogh and Boud's second step to the reflective process. This also allows the user to acknowledge there emotions, which has been argued will help them expose their beliefs and biases. The original title of "attending to feelings" has been changed to impressions/feelings, as it was thought that the people are averted from the phrase feelings.

After a new memo is created the Jotter tool will pop up in the foreground, with the memo submitted loaded in the background. This allows the user to view the initial memo while reflecting on their feelings. After submission the results will appear on the right of the screen in the mini-viewer. The Jotter tool also has a drop down menu that will redirect the user to the other steps of the reflective process.


Figure 3-6: Impression/Feelings

**Re-evaluating experience - association:**

This step is the first section of Walker, Keogh and Boud's third step, re-evaluating experience. It is the association step; the additional features in this step are the ability to extract the key phrases that have been inputted so far, Fig. 3-7. This enables the user to simply copy and paste one of those key phrases to the phrase input, and write whatever springs to mind in the comments section.

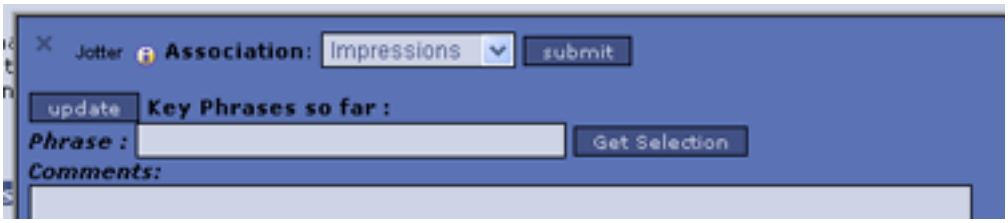


Figure 3-7: Association

**Re-evaluating experience - integration:**

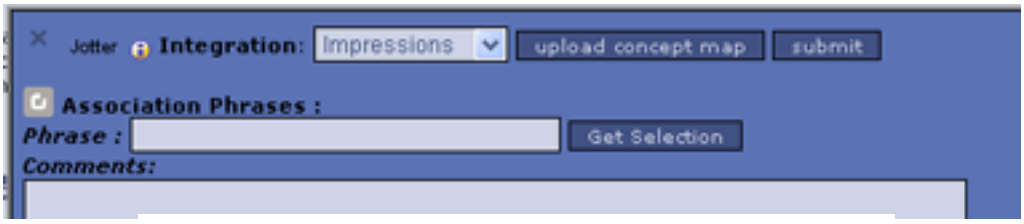


Figure 3-8: Integration

This step is the second section of Walker, Keogh and Boud's third step, re-evaluating experience. The integration step has an additional feature; it has the ability to upload concept maps, which will be displayed along with any textual inputs, Fig.'s 3-8 and 3-9.

The literature suggests that concept maps will help the user visualize how there concepts are related. There is a link to where free concept map software may be acquired.

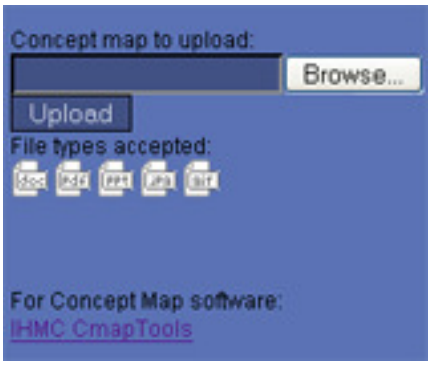


Figure 3-9: Upload Concept Map

**Re-evaluating experience - validation:**

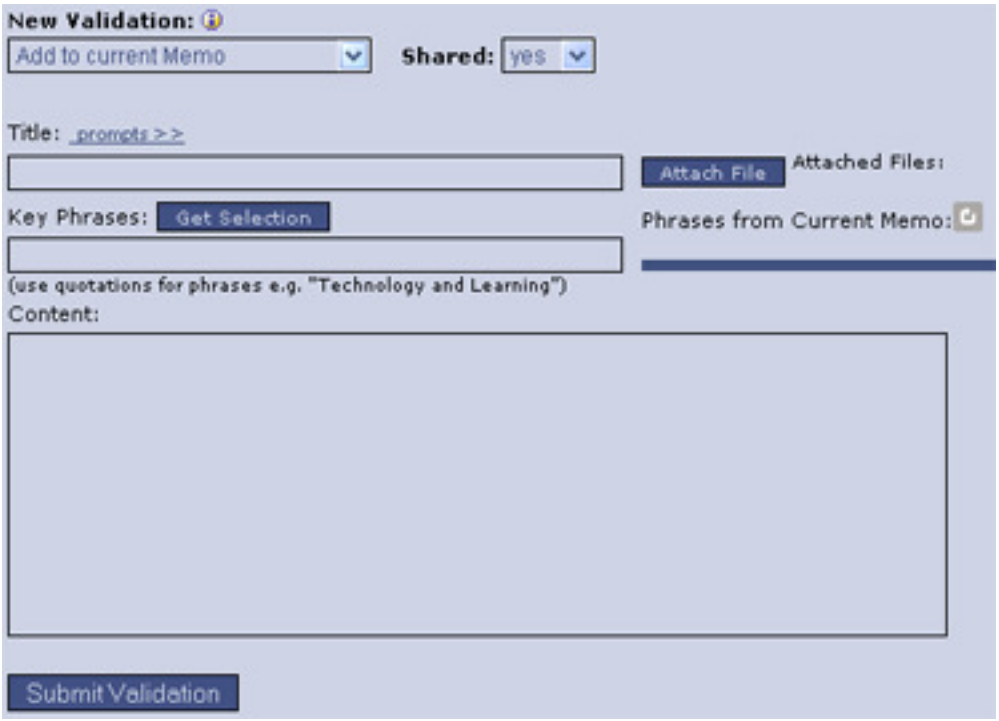


Figure 3-10: Validation

This step is the third section of Walker, Keogh and Boud's third step, re-evaluating experience. The validation section will be displayed in the main window, Fig. 3-10; this is to emphasize the importance of this section and is the only step of the reflective process that may be shared with other users. The validation section is a chance for the user to collaborate with other users, with the aim to expose and explore their own personal beliefs and biases by exposing themselves to alternative ideas and perspectives. It is much the same as the new memo section but has the options of adding a file and can extract the key phrases from the current memo.

It is also a section that can be submitted independent of a memo to help create some collaborative discourse. There are additional options that will appear if this option is selected.


Figure 3-11: Independent Validation Options

Validations may be pursued from the main navigation menu at the top of the page, after validations have been selected a menu will appear Fig. 3- 12. Here a new validation may be created, past validations viewed and collaboration with other may be initiated.


Figure 3-12: Validation Menu

**Re-evaluating experience - appropriation:**

This step is the fourth and final section of Walker, Keogh and Boud's third step, re-evaluating experience. This section has no unique features Fig. 3-13. It is a section that should reflect what has been learnt from the reflective process and should highlight the change or reinforcement of beliefs and biases.


Figure 3-13: Independent Validation Options

## Process Display:

The literature suggests that process display shows the user explicitly what they are accomplishing to complete their task. This will help them revise their approach and procedure. The mini-viewer is designed to meet this requirement, Fig. 3-14; it enables the user to view all the submissions for each of the steps using a drop-down menu.


Figure 3-14: Mini-Viewer

## Process prompts:

As the literature suggests, some prompting may be necessary to aid the reflective process. Within the new memo section there is an option to select a prompt, Fig. 3-15, a number of question were taken from Mehra's work that are said to help probe bias in research, these are then followed up by the main chapter headings that educational researchers would include in their dissertations. There are also guides along the way marked by ; this provides another layer of prompting. It is hoped that both of these features will guide the users through the process.

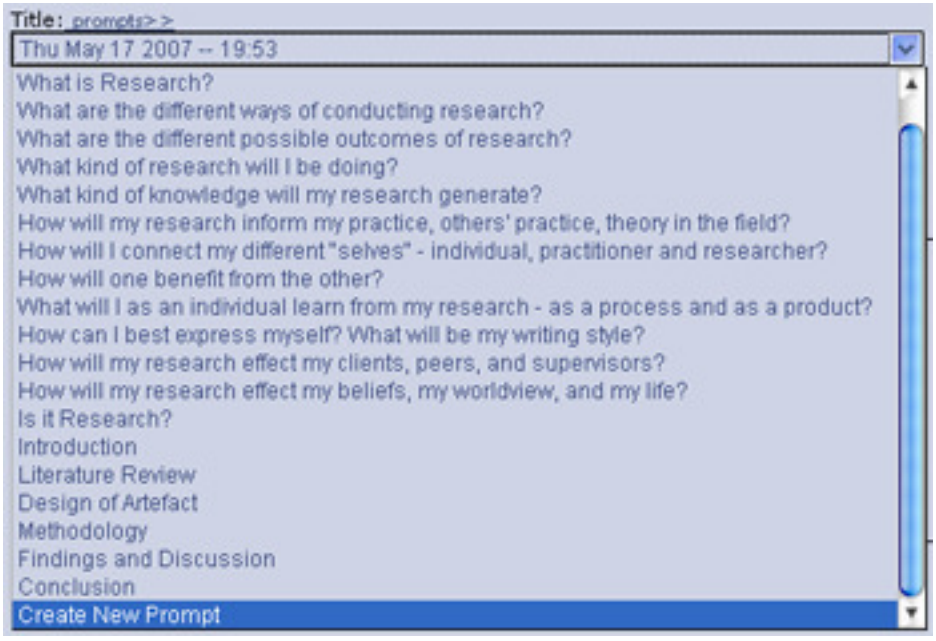


Figure 3-15: Prompt Menu

## Additional Design Features:

There is a welcome screen that appears each time the user logs in, it introduces the users to the purpose of the site and processes that are to be followed. It has links to the necessary sections and general instruction to follow.

Finally there is a discussion section that users can engage in informal discourse and discuss how to utilize the environment or talk about topic that are of interest to them.

# Chapter 4: Methodology

## Research Design Methodology

As this research shall explore the impressions of 6-7 post-graduate educational research students, an ethnographic case study (Creswell, 2005) has been chosen as the research design methodology. A case study was chosen as it allows for an in-depth analysis of a bounded system, as the research will only explore the usage of the environment by a small number of participants whom share a common goal, college course and time constraints, it was deemed that a case study would be applicable. Therefore a case study will permit the thorough investigation of the actions and events that take place within the environment, while also allowing them to be put in a social context. This should help to obtain a more holistic picture of the participants' experiences. A pragmatic paradigm shall be adopted to allow pluralistic and holistic views.

## Data Sets

| Quantitative Data Sets | Qualitative Data Sets |
|---|---|
| Login stats | Memos and subsequent sections |
| Discussion Article Views Stats | Discussion Articles (CMC) |
| Validation Views Stats | Codes from reflection process |
| Number Memos/User | Codes from discussions |
| Utilization of Reflective Steps | Themes from reflection process |
| Validations/User | Themes from discussions |
| | Interview responses |
| | Codes from Interview |
| | Themes from Interview |
| | "Key-Phrases" |

Table 4-1: Data Sets

Most of the data will be collected using the data collection methods mentioned in the design chapter, in a MySQl database. A data collection protocol was followed whereby each entry was time and date stamped and the usernames of the participants were recorded; for example see Table 2 in the appendix 1.

The quantitative data sets will give an overview of how the users utilized the environment. The login statistics will show how often the users logged in to use the system and how often they returned to the system after they first logged in. The discussion article and validation views will reflect how often the users viewed the posts made in the discussion and validation sections respectively, this will help explore how often collaboration was pursued and whether users just "lurked". The numbers memo per user, utilization of reflective steps and validations per user should reflect the aspects of the environment the users utilized.

The qualitative data sets should provide some answers to the research questions. The memos and subsequent sections will give an overview of how the users used the tools provided and whether it leads to them making their biases explicit, the validation section will also explore if collaboration was employed. The discussion forum should reflect to users' informal concerns and interests within the environment, any extra guidance required should emerge through this data set. Codes and themes will be extracted form these data sets. These codes and themes will then be combined with the research questions to construct purposeful question for a post-usage semi-structured interview (Creswell, 2005).These interviews shall be conducted via email as the timing of the interview coincides with a busy week for many of the participants, a face to face interview was made optional, this was pursued by one participant. It is hoped that the results of the interviews will help answer the research questions, while also exploring some of the unexpected and alternative themes that have emerged from the data. It may then be possible to explore the potential of creating new codes and themes, to get a more rounded view of the case.

The "key-phrases" data set will explore the habits of the users when asked to input tags or key-phrases. It is expected that the data collected will be invaluable for any future implementations.

## Ethics

Memos are private submissions by the participants; validations and discussion posts will have the option to share. All data will be made anonymous before being used within this project and any requests by participants to remove data from the findings will be respected.

Privacy is paramount and only the researcher shall view the data, this does not apply to users passwords as are encrypted so as they cannot be viewed by anybody. If it is necessary for any third party to view the part data, it will be made anonymous and permission to do so will be sought from the relevant participant.

Data will be kept for a period of two years, after this time it will be disposed of in a manner that will guarantee the anonymity of the participants.

## Researcher/designer Bias

Researcher/designer bias is of particular interest as this is the topic of research. It has been noted that during the design process that it is likely that the researcher, as a lone designer, will bring many of their biases to this process. These may include technological implementation, display and interface preferences. What may be intuitive to the designer may not be so straightforward to the user. Unfortunately this aspect was unavoidable due to the time constraints on this project, although attempts were made in the early design process to get feedback from volunteers.

## Reliability and validity

To verify the results a number of strategies will be employed. Triangulation of data; data will be collected from a number of sources. Researcher bias shall be explored in a reflexive fashion. All data shall be explored this includes discrepant data. Any final findings shall be grounded in the data with the aim of reducing researcher bias.

## Participant Selection and Implementation

The participants were chosen using an opportunistic sampling method. An email was sent out looking for volunteers, 6 responded. These students come from a single course and are familiar with each other; this should provide a level of trust between them.

The environment will be accessed on-line in the researchers own time over a two-week period. Email interviews shall be pursued at the end of this two-week period; there will also be an optional face-to-face interview. Unfortunately there are time constraints on the project, both in its implementation and on the time available to the participants, as they will be conducting research of their own.

## Methods of data analysis

Although this case study will be mainly one of qualitative research, a mixed methods approach will be employed to allow a thorough investigation of the system implementation and usage. Thus concurrent and transformative strategies of inquiry (Creswell, 2003) will be employed when collecting and analyzing data.

The data from the environment will be collected over two weeks; it will then be coded and themed, Fig. 4-1. Interview questions will be formulated based on these codes and themes; this should provide more relevant and pertinent data to answer the research questions.

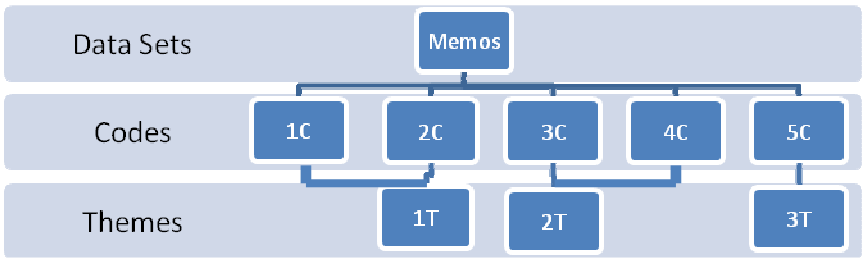


Figure 4-1: Example of Codes and Themes Procedure

To conduct the data analysis it was necessary to compile all the data from the environment into coherent spans of text. The coding and themeing process will be iterative with the aim to sensitize with the data; many passes will be made over each entry looking for codes and themes. After this has been completed, these codes and themes will be used to create interview questions that should help explore these codes and themes in further depth.

Now that the methodology of data analysis has been dealt with, the next section will deal with the implementation of these ideas with the aim to help answer the research questions and explore any unexpected results.

# Chapter 5: Findings and Discussion

## Intro

As the main aim of the data analysis will be to answer the research questions, we shall therefore start by listing them. We shall then look at how this data was handled before moving on to the findings and the discussion of these findings.

**Research Questions**

**Core Question:**

- Can a reflective and collaborative on-line environment be utilized to help make novice educational researchers' individual beliefs and biases explicit?

**Subsidiary Questions:**

- What are the first impressions of such an environment?
- How did they utilize the environment?
- How did they use the "key-phrase" inputs?
- Were there cases of collaboration?
- What were the perceived impacts of the environment on the participants? i.e. did they asses their biases?
- What aspects of the environment would they alter and what would they recommend for future implementations?

## Data Handling

For the data from the on-line environment to be analyzed it first had to be extracted from the MySQL database on the server. PHP scripts were written to extract the data from the database and display it as basic HTML in a web-browser it was then copied into a word processor for formatting and to prepare it for coding and themeing; an example can be seen in Table 3 in appendix 3. The statistical data for the quantitative data sets was entered into spreadsheet editor for the creation of graphs.

The email interviews were again transferred to a word processor so as they could be analyzed for codes and themes; an example can be seen in Table 4 in appendix 3. The single face-to-face interview had only interesting comments extracted due to time constraints.

## Descriptive Statistics

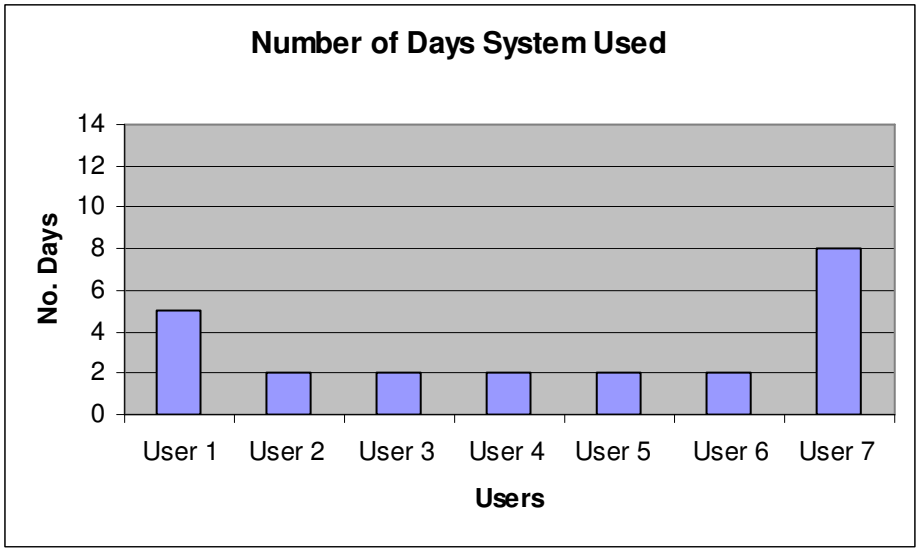


Figure 5-1: Number of Days System Used

Figure 5-1 shows that most users only accessed the environment on two days out of the two-week period, this is understandable due to the time constraints on the participants in terms of their own project work.

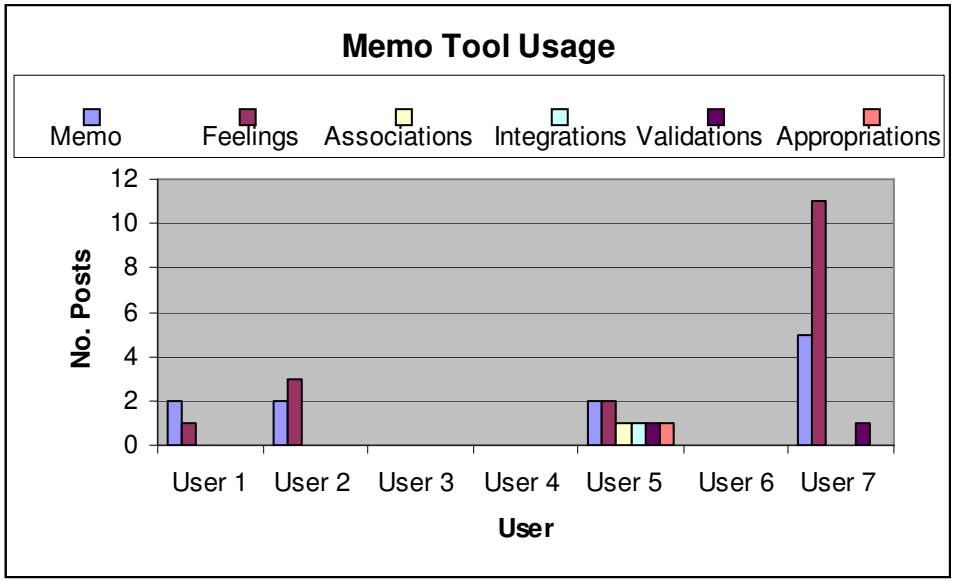


Figure 5-2: Memo Tool Usage

Figure 5-2 shows that most users never got through the whole process, and half did not even attempt to use the memo tool. A correlation may be drawn between those that viewed the discussion forum and those that used the memo tool, see Figure 5-3; it is possible that the extra guidance that was provided through the forum motivated some of the users to attempt a reflection. There is an outlier, User 4, to this hypothesis but it was noted that this user did remark that they were uncomfortable with the reflective process.

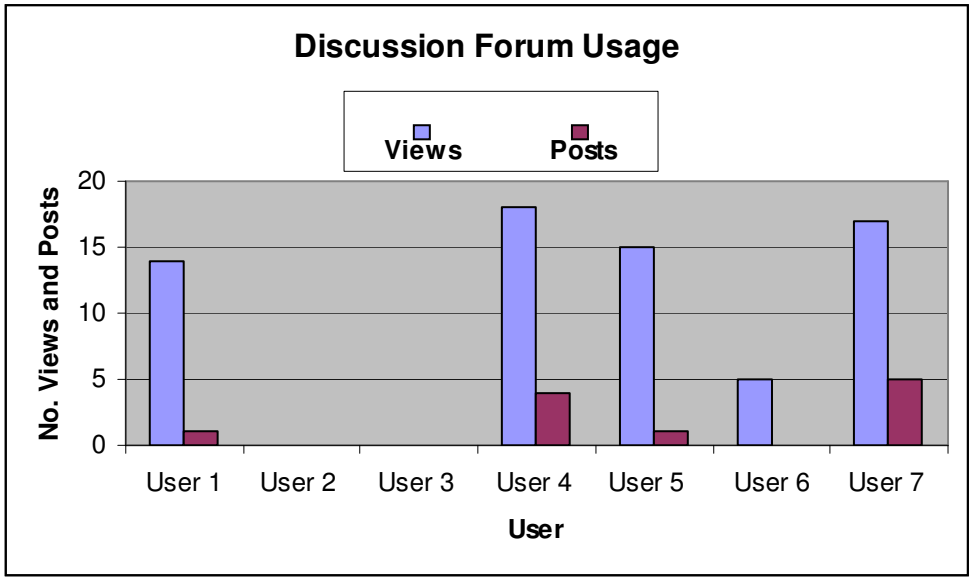


Figure 5-3: Discussion Forum Usage

## Qualitative Analysis

After all the data had been collected, organized, coded and themed a list of themes emerged that encapsulated the codes that emerged from the data. Examples of these codes shall be explored before they are expanded upon in the discussion section.

### Emergent Themes

#### Time:

The concept of time appeared in a number of codes, these varied from time constraints on using the environment, the time of the academic year that the environment was released and the time needed to learn how to use the environment.

| Code | Data Set | Example |
|---|---|---|
| Lack of time | memo | “mess..... lack of time”<br>”just messing about here.. to see whats going on : )<br><br>time time time.. never enough of it..” |
| Lack of time | Email Interview | “I really had no time” |
| Learning curve | F-2-F Interview | “not particularly steep… but it’s long ” [in relation to the learning curve) |
| Not a priority | Email Interview | “Was so engrossed in my own project” |
| Earlier release date (in terms of academic year) | Email Interview | I feel such an environment would have been interesting if introduced easlier in the year - possibly around the same time as "reflection" was introduced. |

Table 5-1: Time Codes and Examples

**Perceived Potential:**

The perceived potential of the environment was generally positive. With the exception of one user.

| Code | Data Set | Example |
|---|---|---|
| Sees potential | Email Interview | “will be ideal I feel for nest years research project” |
| Sees potential | Email Interview | “I feel such an environment would have been interesting if introduced |

| | | |
|---|---|---|
| | | easlier in the year” |
| Sees potential | Email Interview | “I think the tool is in fact a very practical thing” |
| Sees potential | Email Interview | “this stuff has great potention” |
| Doesn’t see potential | Email Interview | “Don’t think that this is something I would use” |

Table 5-2: Perceived Potential Codes and Examples

**Collaboration:**

There was not much collaboration in the environment, but the reaction to the concept was varied.

| Code | Data Set | Example |
|---|---|---|
| Confidence with system affected collaboration | Email Interview | “not really knowing what you are expected to put in doesn’t encourage collaboration ” |
| Biases made explicit during collaboration | Email Interview | “I have been aware on a number of occasions of my biases during the year – these biases normally appeared to emerge during group discussions” |
| Lurking for inspiration | Email Interview | “I was kind of trying to see if anyone put anything… lurking and get some inspiration” |
| Not enough time to collaborate | Email Interview | “not enough time using it” [in response to question about collaboration] |
| Positive about collaborating | Email Interview | “I am very used to the review process, and welcome tough reviews, the tougher the better in fact, itsthe only real way I can improve my writing.” |

Table 5-3: Collaboration Codes and Examples

**Feelings:**

Feelings emerged in relation to the visual appearance of the environment and usage of the system.

| Code | Data Set | Example |
|---|---|---|
| Mixed emotions, Positive visually, negative functionally | Email Interview | "visually great, but functionally…. confusing" |
| Frustration | Email Interview | "I put that down to my own frustration with the environment." |
| Negative Visually | Email Interview | "the dark blue was too depressing" |
| Mixed emotions, Positive visually, negative functionally | Email Interview | "calm colours, not very intuitive, confusing, intimidating " |
| Positive visually | Email Interview | "it was still laid quite simply which made it less intimidating" |

Table 5-4: Feelings Codes and Examples

**Guidance:**

It was generally agreed that there was not enough guidance provided, suggested methods of guidance included tutorials and animated guides.

| Code | Data Set | Example |
|---|---|---|
| Unsure about functionality | Discussion Forum Post | "Not sure what the difference between a memo and a jotter note is. Can U explain." |
| Not enough guidance | Email Interview | "Not enough guidance." |
| Not enough guidance | Email Interview | "I might have liked more guidance beforehand" |

| | | |
|---|---|---|
| Guides and help useful | Email Interview | "The prompts and little help when you clicked on each section was good as it was simple and laid out in short sentences." |
| More guidance required, but posts/reply from discussion forum sufficient | Email Interview | "A ten minute tutorial, or perhaps an accompanying video might have been useful. In fact, my problems were straightened out by a single post/reply" |

Table 5-5: Guidance Codes and Examples

**Design Suggestions:**

A number of design suggestions were made during the interviews. These ranged from alteration to the visual display to functionality alterations.

| Code | Data Set | Example |
|---|---|---|
| Alter display colours | Email Interview | "Make it lighter (also in colour)." |
| Specify whom to collaborate with | Email Interview | "To help overcome personal reticence on collaboration, it might be useful to allow users who put up validation items to specify who can collaborate. That way, the shyer folks could collaborate in pairs, and later add more collaborators as they became more confident." |
| User input into design process | Email Interview | "I think user input into the design" [when asked for recommendations] |
| Functionality change | Email Interview | "back button on browser keeps landing me back at log in page- when what I want to do is go back to discussions/ comments," |

Table 5-6: Design Suggestions Codes and Examples

**Ontologies:**

This theme is used to describe both the users reactions to the language used in the environment and their usage of the key-phrase inputs.

| Code | Data Set | Example |
|---|---|---|
| Key-phrase: Use of comma separation | memos | dance, how to we learn to dance, kinesthetic, interactions, feedback |
| Key-phrase: statement | memos | example of narrative withholding |
| Intimidating language | Email Interview | “Yes, for example 'associations, validations, integrations, appropriations’.” |
| Intimidating language (slightly) | Email Interview | “little bit. 'validations' not part of my vernacular..” |

Table 5-7: Ontologies Codes and Examples

## Answers to Research Questions

**Core Question:**

- Can a reflective and collaborative on-line environment be utilized to help make novice educational researchers’ individual beliefs and biases explicit?

This question ultimately remains unanswered; there are suggestions that collaboration will help make biases explicit and that the users do see potential in the environment. But due to time constraints this question could not be fully answered.

**Subsidiary Questions:**

- What are the first impressions of such an environment?

  Generally positive, but a lack of tutorials made some users a little frustrated, which may have affected their motivation to continue using the environment.

- How did they utilize the environment?

The utilization varied, but up to half the participants did not attempt any of the reflective processes.

- How did they use the “key-phrase” inputs?

There seems a preference to use commas to separate phrases when entering in tags/key-phrases.

- Were there cases of collaboration?

There were a few cases of collaboration. These included asking for help in the discussion forum and a number of validations, although these conversations only started to get going towards the end of the allotted time.

- What were the perceived impacts of the environment on the participants? i.e. did they asses their biases?

It seems that the users were preoccupied with other priorities and the environment did not help them assess their biases.

- What aspects of the environment would they alter and what would they recommend for future implementations?

There were a number of recommendations, but the primary one was that of tutorials before use. It also seems that individual preferences to display design (colour, text etc.) needs to be taken into the design process.

# Chapter 6: Discussion/Conclusion

## Unexpected Outcomes

No biases were made explicit. It is very possible that the time issues that the participants mentioned affected this result, a number of users suggested that using the system was not a priority to them, while others felt that the learning curve was too long to get reasonable results in such a short time. The lack of tutorials may have also contributed to this as it may have affected the motivation of the users.

## Discussion of Themes

**Time:**

This theme is reflected in the literature under temporal distribution of cognition. The lack of time and long learning curve for the environment that participants mentioned reflects how adequate time is necessary when attempting to alter ones beliefs systems. The suggestion by participants of introducing this environment when the course is covering reflection shows that the participants see the potential of the environment, but that the time of release did not allow them to pursue the processes involved.

It is therefore concluded that for this environment to be affective the participants must spend more time learning how to use the system, before any beliefs or biases will be made explicit.

**Perceived Potential:**

The general tone from the participants is that the environment has potential but that the time constraints affected their usage of the system and therefore hindered their progress. There was a participant, whom suggests that the environment would not be something they would use, but this participant also exhibited frustration at the system, it is possible that with more guidance this frustration may have been overcome.

**Collaboration:**

Although no major collaborations occurred during the duration of this project there were a number of comments made by the participants in relation to this topic, one confirms what the literature suggests, that collaboration helps make biases explicit. Guidance supplied

through the discussion forum also influenced the usage of the system, it was noted that after participants read “help” posts there usage of the system increased and became more active. Another participant states that collaboration helps improve their writing skills. These two examples may reflect the motivational affects of collaboration alluded to in the literature. Time was again raised as an issue; perhaps there was not enough time to develop a collaborative relationship.

**Feelings:**

As affect plays a very large roll in initial impressions it was a key factor to be explored. It seems that reaction to the overall visual layout was, in general, positive with the one exception, some literature suggests that colour and appearance are key factors in making an affective environment (Benchetrit & Frasson, 2004). Frustration arouse from confusion on what was required, a tutorial probably would have solved these issues.

**Guidance:**

It is clear that not enough guidance was given to the participants before they used the system, but it believed that this approach highlighted the limitations of a stand-alone system. Some guidance was given within the environment, as suggested by the literature, those that utilized it found it well presented and easy to follow. The concepts involved are not simple or intuitive, therefore examples are probably necessary for the users to gain a better grasp of the processes involved, unfortunately such examples and tutorials were not pursuable due to time constraints.

**Design Suggestions:**

The option to change the text and visual display appeared a number of times; this again corresponds to the literature that suggests users have their own preferences to the environments composition. Another note worthy point is the suggestion that users should be able to select whom they collaborate with, this would in fact compliment the ideas found in the literature about trust building in collaborative environments (Jones & Issroff, 2005).

**Ontologies:**

The main aspect here is the idea of shared meaning or personal ontologies, a number of participants found some of the language used intimidating, this reflects the affective nature of language that was discussed in the literature. One participant comments that

the words weren't in his vernacular and that this disparity slowed his progress and damaged his confidence; this statement clearly shows the affective and motivational nature of language.

It was noted that the natural tendencies of users inputting key-phrases/tags is to comma separate the phrases, this will be useful for any future implementations where these phrases will be utilized for navigation and process display.

## Limitations

Time was the major limitation of this project; this includes the time allocated for the participants to explore the environment, the time for the research project to be researched and designed and the time of year that this tool was introduced to the participants. This coupled with individual researcher and designer bias meant that a number of features were implemented without consultation with the participants.

## Future Research

In any future implementations more reading is needed in the areas of developing collaborative relationships, affective environments and human-computer interfaces. An action research approach should be pursued in the design process, whereby there is continuous feedback from the participants, leading to iterative design cycles; this should help reduce designer bias.

The key to any future implementation will be sufficient time; this means time for the users to familiarize themselves with the environment, form collaborative relationships and finally make their biases explicit.

## Summary

We have seen how the affective nature of thought leads to biases and beliefs. These biases may then be challenged or at least made explicit, through a collaborative and reflective environment. Although no conclusions can be drawn as to whether this design will in fact work as intended, some insights have been made that should create a more affective environment for any future implementations.

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# Appendices

## Appendix 1: Design Table

| Requirement from the literature | Implementation | Implication |
|---|---|---|
| Facilitate Reflection to allow exploration of biases. | Ability to post reflections in an orderly fashion, using a memoing tool. These shall be stored in a MySQL server using PHP. | A guided reflective process should lead to higher order thinking skills that should enable the user in making their biases explicit. |
| Boud, Walker and Keogh's Reflection Steps | Steps incorporated into reflection/memoing tool. This can be seen in the Jotter tool. | These steps allow for different thought processes that allow the user to approach the single topic from different perspectives. |
| Process display | Ability to review past reflections in easy to use manner. The min-viewer makes display simple. These will extract and display data from a MySQL server. | This should help the user gain some perspective on what they have covered and allow them to re-asses there performance and procedure. |
| Process prompts | Open ended questions to help guide the reflective process. Guides are provided to instruct the user on what is necessary to complete each step. | To help guide the user, as it can be difficult to get started into the reflective process. |
| Collaboration is necessary for alternative perspectives to be introduced to the user. | Allows for the sharing of content through validations. Alternatively there will be a discussion section for more informal discourse. These shall be stored in a MySQL server using PHP. | This exposes the user to alternative perspectives and should help them probe their personal beliefs and biases. |
| Input of tags or key phrases/ basis of folksonomies | Key phrase inputs for particular steps, these will be stored in a MySQL database. | This is a step towards creating Folksonomies and personal knowledge-base. |

Table 1: Design Table

# Appendix 2: Login Capture Protocol

| id | name | date_posted | time |
|---|---|---|---|
| 20 | sharpeg | 2007-05-11 | 14:43:26 |
| 21 | sharpeg | 2007-05-11 | 14:47:32 |
| 22 | mcdermm1 | 2007-05-11 | 19:25:53 |
| 23 | mcdermm1 | 2007-05-11 | 19:27:26 |
| 24 | mcdermm1 | 2007-05-11 | 19:28:01 |
| 25 | mcdermm1 | 2007-05-11 | 19:38:03 |
| 26 | mcdermm1 | 2007-05-11 | 20:06:47 |
| 27 | mcdermm1 | 2007-05-12 | 00:14:28 |
| 28 | sharpeg | 2007-05-12 | 11:55:24 |
| 29 | sharpeg | 2007-05-12 | 11:56:03 |
| 30 | sharpeg | 2007-05-12 | 11:56:42 |
| 31 | campbepf | 2007-05-12 | 16:43:20 |
| 32 | mcdermm1 | 2007-05-14 | 00:17:41 |
| 33 | adrienne | 2007-05-14 | 10:18:37 |
| 34 | adrienne | 2007-05-14 | 10:19:52 |
| 35 | adrienne | 2007-05-14 | 10:39:09 |
| 36 | ebkelly | 2007-05-14 | 13:55:21 |
| 37 | rifforts | 2007-05-14 | 17:05:09 |

Table 2: Login Protocol Collection

## Appendix 3: Data Handling

| Codes | **Posted:**<br><br>22:09 -- 12 May 2007<br><br>**User:**<br><br>mcdermm1<br><br>**Article ID:**<br><br>52 | Themes |
|---|---|---|
| Positive reaction<br><br>Sees potential for use in other projects | **Title:** Comment to date **Category:** None<br><br>**Key Phrases:**<br><br>**Content:**<br>Hi Jake,<br>Finding this vey useful for impressions and associations as I wade thru' my data - its been a genuine help<br>I'm finding that I'm not returning to it to record in the higher categories, that tends to go straight into my meta paper<br>I think if we had a larger project(God forbid!) or our real thesis, then these higher categories would come into play, as intermediaries to the final result - the thesis<br>However, I'm not finished yet... | Feelings<br><br>Perceived Potential |

Table 3: Discussion Data Handling

| Codes | E<br>**Date: Thu, 24 May 2007 07:31** | Themes |
|---|---|---|
| | What were your first impressions of the environment? | |
| Negative reaction<br>Negative reaction to colour layout | I felt my first impressions were quite negative. The information was too crowded and the dark blue was too depressing - examining one's bias should not be so gloomy. | Feelings<br>Feelings |
| | Do you feel you had enough guidance to the environment and tools? If not, what would you recommend for improvements? | |
| Not enough guidance<br>Earlier release date (in terms of academic year)<br>Tutorial needed<br>Negative towards colours | No, but that's understandable. I feel such an environment would have been interesting if introduced easlier in the year - possibly around the same time as "reflection" was introduced.<br>Ideally, a class introduction where students could try it out might also be an idea.<br>Change the dark blue and the black writing. | Guidance<br>Time<br>Guidance<br>Feelings |
| | Was time an issue when using the environment? | |
| Time was an issue,<br>Earlier release date (in terms of academic year)<br>Biases made explicit | Yes, - I felt I would like to look at my biases at another time of year. I have been aware on a number of occassions of my biases during the year - these biases normally appeared to emerge during group | Time<br>Collaboration |

| | | |
|---|---|---|
| during collaboration<br><br>Sees potential | discussions - hence this type of environment may have been a good opportunity to examine or reflect on them. | Perceived Potential |
| | Do you feel that the environment would be of more use if introduced at a different stage of your research project? If so, could you expand? | |
| Earlier release date (in terms of academic year)<br><br>Project time constraints | Not sure about the research project stage - as already mentioned I feel it should be introduced earlier in the year. Because the research project, with work commitments, is a heavy time of year, I'm not so sure that one wants to examine their biases as well as deal with feedback on different 'hand-ins'. | Time<br><br>Time |
| | Was the language used to describe the process intimidating? If so could you give examples? | |
| Language intimidating | Yes, for example 'associations, validations, integrations, appropriations'. | Ontologies |
| | How did you feel about collaborating in the environment? | |
| Tutorial needed<br><br>Confidence in system | Were the whole process explained beforehand, this may be ok. However, not really knowing what you were expected to put in doesn't | Guidance |

| | | |
|---|---|---|
| affected collaboration | encourage collaboration. | Collaboration |
| | What were the perceived impacts of the environment, if any? Did it help you assess your biases? | |
| Bias not explored due to lack of confidence in environment | I'm afraid not .But I put that down to my own frustration with the environment. | Feeling |
| | What aspects of the environment would you alter and what would you recommend for future implementations? | |
| Alter display colours<br><br>Tutorial needed or expanded guides | Make it lighter (also in colour).<br>Reduce the amount of text on the first page. Provide some sort of tutorial or template or guided steps. The rest has already been mentioned. | Design suggestions<br><br>Guidance |

Table 4: Interview Data Handling