Chapter Eight | Qualitative Analysis

This chapter presents the qualitative analysis of data from the laboratory experiments of participants using the design for pedagogy patterns. This qualitative analysis determines how pedagogically-based design patterns assist e-learning designers to be more aware of pedagogical issues when creating e-learning courseware – thus answering Research Question Four (R4).

One individual from each of the three user groups was chosen on the basis that the participant exhibited the most significant increase in pedagogical thinking when using the design for pedagogy pattern compared to the standard pattern. The individuals chosen and their expertise level are outlined in Table 8-1.

<table>
<thead>
<tr>
<th>Expertise Level</th>
<th>Participant Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital media design educators with experience in e-learning</td>
<td>Designer G</td>
</tr>
<tr>
<td>Experienced digital media designer</td>
<td>Designer J</td>
</tr>
<tr>
<td>Novice digital media designer</td>
<td>Designer D</td>
</tr>
</tbody>
</table>

Although the laboratory experiment did not always take place in a participant’s natural setting, there is nonetheless an emphasis on interpretation and meaning and on how the respondents made sense of their own activities. In this way the dynamic of the design activity from the point of view of the participants can be investigated. By examining three sources of data, the ‘think aloud’, the structured, open-ended interviews and the design sketches, a bricolage or multiple tactic approach will be employed (Groat & Wang, 2002, pp. 176-177).

It will be possible to build inductively from particular instances and examples from within the data to general themes to gain an understanding of the meaning of the data (Creswell, 2009, p. 4). To better comprehend the themes arising from the large amounts of data that have been coded using the ‘think aloud’ technique, methods of data visualisation will be used to aid the interpretation process. Throughout these visualisations, the words used will be colour coded according to the keyword categories (Table 8-2).
When a word displayed in the visualisation does not fall into one of the keyword categories it will be displayed in black.

Throughout this qualitative analysis quotes from the interviews will be used to illustrate and highlight points of interest. The criteria used in this evaluation were the same as in the evaluation instrument in Stage Four. The analyses are displayed in four different ways.

1. **Word Cloud**

The first criterion in the evaluation is:

Show the relationships between pedagogic strategies associated with the design elements and those linked with the general and abstract ways of thinking about education, including the social and the educational context, teaching practices and the tactics for engaging students.

The data visualisation tool that I used to illustrate these relationships is a Word Cloud, generated initially from IBM’s ManyEyes website (IBM Corp, 2011) using the ‘think aloud’ data, and coloured according to the categories (Table 8-). Word Clouds analyse how frequently words appear in a given text. The size of a word in the cloud is proportional to the frequency. To quote from the ManyEyes website:

...if your text consists of the words “apple apple apple banana banana papaya”, then "banana" will appear in a font size twice that of "papaya", and "apple" will appear in a font size 3/2 as large as "banana”. (IBM Corp, 2011)

Common words such as ‘a’ ‘and’, ‘the’ etc. were eliminated from the analysis.

The advantage of using the Word Cloud for this evaluation criterion is that by seeing the frequency of the words it is possible to see where the designer has focused attention during the design process. When seen in the context of the category colour coding, it is possible to

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Table 8-2 Keyword category colour coding

<table>
<thead>
<tr>
<th>Pedagogy</th>
<th>Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task Analysis</td>
<td>Purple</td>
</tr>
<tr>
<td>Navigation and Information Architecture</td>
<td>Blue</td>
</tr>
<tr>
<td>Visual Design</td>
<td>Red</td>
</tr>
<tr>
<td>System Design</td>
<td>Orange</td>
</tr>
</tbody>
</table>

8-2  
Design for Pedagogy Patterns for E-Learning
gain an understanding of what areas of design (i.e. pedagogy, task analysis, visual design, navigation and information architecture, system design) were being considered and emphasised. In this way it is possible to evaluate whether the designer is conceptualising about artefact creation (i.e. the object being created) or concept mapping (i.e. concepts surrounding the object, such as educational context, teaching practices and tactics for engagement). What I am looking to identify in the Word Cloud visualisations is evidence that pedagogy is being considered in the context of the design elements (i.e. red and green words having equal prominence), and that the meaning of the words indicate pedagogically-based concept mapping. The Word Cloud gives a snapshot of the words and phrases that dominate the designer’s thinking as evidenced through ‘think aloud’.

2. Phrase Wheel

The second criterion is:

Examine explicit use of pedagogy, in how it is articulated through image, text and interaction.

For this evaluation variable, I used a visualisation that I have called a Phrase Wheel. It is a visualisation inspired by the ‘Facebook Friend Wheel’ (Fletcher, 2011) and the ‘Eigenfactor Visualisation for Citation Patterns’ (Stefaner, 2011). The Phrase Wheels are radial relationship maps created using intra-utterance relationships between words and phrases. Each keyword appears along the circumference of the wheel. A line (link) is drawn between two words if there is an intra-utterance relationship between them, that is, if two categories are mentioned near each other in the same utterance. Using the keyword lists created for the content analysis, words are classified into one of the five categories and a link is drawn between the nearest words (or phrases). Only relationships within an utterance are used, except where an utterance only contains one word and the following utterance shows a relationship to the previous one. In this way it is possible to see the direct relationships between the pedagogy and the design elements – the Phrase Wheel only describes those that occur in the same utterance.

Two sets of Phrase Wheels were created for each ‘think aloud’. The first shows the intra-utterance links between and within the five categories (pedagogy, task analysis, visual design, navigation and information architecture, system design). The second shows only the relationships between the pedagogy category and the visual design category (e.g. the user interface, information architecture/navigation and content layout) mentioned in the ‘think aloud’ recordings. In this way the links between the teaching practices and how these are
articulated through the visual design elements can be examined with a focus on the areas of particular interest for this study.

3. **Phrase Net**

The third criterion was:

Examine the links between teaching practices with the resultant courseware.

The tool that I used for this evaluation is the Phrase Net (IBM Corp, 2011).

A phrase net diagrams the relationships between different words used in a text. It uses a simple form of pattern matching to provide multiple views of the concepts contained in a book, speech, or poem... The program has drawn a network of words, where two words are connected if they appear together in a phrase of the form "X and Y"... The result of this simple pattern matching scheme is a surprisingly coherent view of some of the concepts in the article. (IBM Corp, 2011)

The Phrase Net was generated from IBM's ManyEyes visualisation tool using the 'think aloud' data and colour coded to correspond with the keyword categories from the content analysis (Table B-). The Phrase Net outlines relationships between words. However, this visualisation differs from the Phrase Wheel in that links to non-categorised words are also included in the relationship network. The Phrase Wheel only displays a paired link, between two categorised keywords. The Phrase Net, in contrast, can display a string of words, all of which can form interconnecting relationships to each other.

The Phrase Net also uses a frequency indicator, in that words appear larger the more frequently they are used in the text. In these visualisations the relationship was set for the spaces between words, thus displaying words that sit beside each other in the text. The Phrase Net only displays the most frequently used 50 phrases in the visualisation, unlike the Phrase Wheel, which displays every categorised keyword. The Phrase Net therefore provides a general impression of the most important relationships and these relationships can be more two-way as in the Phrase Wheel. In examining the juxtaposition of words, and the meaning of the phrases it is possible to see the interplay between the words, with a particular emphasis on when teaching practices are mentioned with the resulting courseware.

4. **‘Think Aloud’ Narrative Summary and Design Sketches**

The fourth evaluation criterion:

Address issues of information architecture, content layout and interface design.
In addressing this criterion, a narrative summary of each session of the laboratory experiment was created: one for the e-learning forum design using the standard pattern and one using the design for pedagogy pattern, including an analysis of the differences in approach. In using a short narrative of each ‘think aloud’, I was able to illustrate and condense the flow of design thinking into a quick summary. In this way, it is possible to be placed in the ‘shoes’ of the designer, to comprehend not only the design process, but also to understand the aims of the wireframe sketches. It is in the ‘think aloud’ that the issues of information architecture, content layout and interface design are discussed in depth by the designer and each designer’s treatment of these issues will be examined. Phrases and concepts that appear to be linked directly to the design patterns are highlighted in bold text, so that the reader can see the influence of the pattern over the design thinking.

By placing the design sketches at the appropriate places in the narrative, it is possible to gain insights into the designer’s intent and to grasp the meanings behind the sketches. As the narrative summaries situate the reader in the centre of the design thinking, and inform the interpretation of the visualisations, these summaries will be placed first in the qualitative evaluation for each designer. This will facilitate the comprehension of the data visualisations. The full transcripts of the 'think aloud' and designer interviews can be found at the back of this thesis (Chatteur, 2011).

8.01 Designer G - A Design Educator

As with all of the chosen participants in this chapter, Designer G was chosen because the results of the content analysis of this participant's ‘think aloud’ data indicated an increase in pedagogical phrases when using the design for pedagogy pattern over the standard design pattern as can be seen in Table 8-2. This participant was also chosen because of marked differences in design approach when using the two different patterns, which was noted during the transcription process of the ‘think aloud’ data. These differences warranted further investigation in this qualitative analysis.
Figure 8-1 Designer G’s content analysis results show a clear increase in pedagogical (green) phrases. Figure 8-1 compares Designer G’s 'think aloud' results from the standard pattern and the design for pedagogy pattern shows that the percentage of pedagogical phrases (green) has greatly increased. The percentage of visual/screen design phrases (red) shows only a small decrease. There is a large decrease in the percentage of navigation/information architecture phrases (blue), and a slight decrease in the percentage of system design phrases (orange). Task analysis shows a slight increase in the design for pedagogy pattern.

8.01.01 Designer G Narrative Summary and Design Sketches
Designer G’s primary concern when using the standard pattern was navigation, even though that was not evident in the content analysis (Figure 8-1). The first design idea included clickable circles, which were modified to include pods as navigation, which enabled access to the forums. Considering server and privacy issues, a privacy button was added to each pod.

Reading about forum access via email client in the pattern, Designer G examined aspects of system design. RSS feeds and forum digests delivered via email client were considered. Moving from buds to a star pattern, Designer G decided to make forum access available via a wheel, which rotated with clickable rollovers on each spike with the forum title (Figure 8-2). Once the spike was clicked a new forum spawned (Figure 8-3). This comprised a new star shape with the centre taken out.
Of course we could also add another point behind so we could get a flower effect. Ah this would be interesting. So a closeup. This is the star pattern right here. (Designer G, 2009)

A keyword search field would also be provided to locate forums. The search term in the design sketch (Figure 8-2) is ‘Samba deer’.

The outside rotates, and Samba deer, the pointer would come forward. (Designer G, 2009)

Designer G then focused on the screen design for the individual forums. The spikes were inverted to provide access to privacy buttons, search, RSS feeds and email lists (Figure 8-3).
Forum threads were accessible on the outside of the flower. The inverted spikes started to look too much like teeth, which Designer G did not like.

![Figure 8-4 3D space pods (top right) for forum access with a circular forum. (Designer G, 2009)](image)

Returning to the original forum idea with 3D Space pods coming off a central point (Figure 8-4), Designer G focused on rounded objects, with circles going into the distance, and for the first time the design educator mentioned distance education – the purpose of the forum. The forum’s form turned circular, rounded, and three-dimensional. Intersecting circles then became Venn Diagrams (Figure 8-5). Navigation was at the middle, with categories radiating out from the centre, containing information on how to set up forums, FAQs and forum categories.

A slowly rotating series of semicircles on the outside of the interface allowed individual forum access. This focus on navigation and forum access is a transactional approach to the interaction between user and forum. This reflects the transactional approach taken by the standard design pattern (Chapter Six). As the forum conceptualisation is based on navigation, this explains why the frequency of these phrases drop for the design for pedagogy pattern (Figure 8-1).
Designer G evaluated the two designs: the star pattern and the circular idea. Both ideas enabled expansion. Users could configure group membership and information for recipients, by dragging and dropping a thread to include all pre-registered group members. Thread popularity could be measured with a glowing scale.

There is very little mention of pedagogy in the forum using the standard design pattern, despite the fact that the designer was fully briefed on the fact that its intended use was for e-learning. The highlighted phrases which map to the design pattern (in bold, above) focus on the designed object (i.e. the forum), forum access and system design issues. There is a strong emphasis on the structure of the forum, as outlined in the FBS framework (Gero & Kannengiesser, 2002). The high number of design sketches created for this forum is indicative of the high productivity expected when examining an experienced designer.

When using the standard design pattern, the predominant design approach was to create interface sketches of the forum’s visual design and navigation features. These sketches were modified and evolved over the design exercise, as the design educator experimented with and explored the various visual design screen concepts. When using the design for pedagogy pattern, in contrast, notes were taken.

Designer G read the design for pedagogy pattern completely before commencing. Unsure of how to proceed, a series of questions was asked about the exercise before starting. Designer G was reassured that the design need not be a finished design with all of the technical requirements worked out, that it was a conceptual design that should fulfil the requirements.
of being an e-learning forum while being able to facilitate learning. This encouraged Designer G to go ‘blue sky’ unconstrained by technical limitations.

The designer’s first thoughts were how to include social networking, to include a look similar to Facebook: light, airy, like a playground or an office. The designer considered how Muslims do not represent God, but instead have ‘lots of swirly patterns, and something mesmerific and natural’.

   Facebook meets Mandala. Nelson Mandala. Okay so humour. Don’t dominate discussions, one of the biggest issues, I think. With um asynchronous is the lack of humour. So we need to make this site humorous. (Designer G, 2009)

The designer toyed with the idea of a confessional, before rejecting it and moving on to a ‘dear diary’ paradigm, with space for student reflection, advisor feedback and role play (Figure 8-6). This use of note-taking is one of the differences in design approach when using the two patterns. In these notes, the design educator explored broad visual design and pedagogical approaches first, before beginning to crystallise these ideas into a design concept (Figure 8-7).

Peer feedback would be encouraged with rewards ‘just use behaviourism here’ using gold coins, using a database and string word count.
…you’ve got to keep your fish alive, so if you don’t keep replying you’re fish are going to die. So the teacher just looks at the fish tank. And the different fish have got names on them so if your fish is dead, Tamagotchi (Figure 8-7). (Designer G, 2009)

Designer G liked the idea of fish, avatar fish. The healthier the fish, the more they interact. The teacher could feed the fish and notify the fish via email if they were not doing well, ‘educating Nemo.’ The health of the fish would indicate how well the student is doing, to provide feedback.

Well you could generically I mean quite often feedback is similar to, you could set the feedback up in little treasure chests. So you could get those individual students to click on treasure chests that open up and information would come out in bubbles. (Designer G, 2009)

Keeping the interface free and easy, students could create their own avatar, build a social page, enabling social interaction. Bonding games could enable trust between students, feedback and reflection (Figure 8-8). The overall design concept (i.e. the fish tank with sharks) is examined in conjunction with the pedagogy, to create a learning environment, as mentioned in Figure 8-8. In this sketch, we see ideas such as ‘constructive profile bonding’, ‘social interaction’, ‘trust’, ‘transparency’, ‘feedback’ and ‘reflection’ are used in conjunction with ‘bonding games’, which allow the students to ‘explore the learning environment’ with ‘objectives represented by sharks’. Designer G considered challenges, learning objectives and the teacher to be like sharks, as learning is uncomfortable. The students could have a HUD (heads up display) overlaid on the screen with their profile at the bottom.
So I think you can use animation for **teaching strategies**, you could use this type of discovery, **experiential learning**, but it would be very expensive to set it up. (Designer G, 2009)

Customisation of the **learning** environment became one way of not alienating students who did not like the fish metaphor.

I think you’ve gotta put people in a position where they feel safe and not threatened by education. That’s the tricky bit. So one of the things you have to engender is **trust** and faith that you can help them out. Really they need to once they get, once they feel confident, then they need to help each other. (Designer G, 2009)

The design educator conceptualised the design for pedagogy forum in terms of social networking, reflection and feedback, all aspects of social constructivism theory. This was contextualised by mention of student reflection and advisor feedback – an early and clear indication of pedagogy being at the forefront of the thinking. These phrases map directly to issues discussed in the design for pedagogy pattern. The designer did not sketch in the early task analysis stage. The output is textual – the thinking was about the ideas around the forum, the pedagogical **function**, rather than the design, or **structure** of the forum (Gero & Kannengiesser, 2002).

**8.01.02 Designer G Word Cloud**
The different emphases on visual design (structure) and pedagogy (function) are also reflected in the Word Cloud visualisations. Figure 8-9 and Figure 8-10 are Word Clouds for
the ‘think aloud’ for the standard and the design for pedagogy pattern laboratory experiments for Designer G.

Figure 8-9 Word cloud for standard design pattern, Designer G. (after IBM Corp, 2011)

In looking at the two Word Clouds, the conceptually different treatments of the design become apparent. In the standard design pattern (Figure 8-9), the words focus on the object being designed. The main phrase is ‘forum’ and the associated words deal with navigation, ‘search, access’ with ‘information’ being of equal emphasis. Next in prominence come words dealing with the user interface: ‘design, threads, pattern, central’ and so on. What is markedly absent is the consideration of pedagogical issues. This lack of pedagogical thinking was highlighted in the structured interview after the ‘think aloud’ for the standard design pattern. When asked ‘How do you think people will use this forum to learn?’ Designer G replied:

Oops. Oh the forum. To learn. It’s one of the key points that I didn’t actually focus on I was too caught up in the structure of the forum I just created. How would they use it to learn? Well. They learn by accessing the information. So if you can find the information then you can communicate with each other about that information. Therefore the communication can be disseminated easier and theoretically you should be able to learn from it (tongue in cheek expression). (Designer G, 2009)
In contrast, Figure 8-10 shows that for the design for pedagogy pattern the picture is quite different. The words indicate a change in focus to concept mapping – a ‘school’ of ‘fish’. In this 3D online environment, words such as ‘students’ and ‘learning’ gain equal prominence with ‘forum’. Correlating with the content analysis frequency data, a marked increase in pedagogical phrases can be seen, and the frequency of use has also increased as seen in the relative sizes. In the structured interview after the using the design for pedagogy pattern, Designer G answered the same question quite differently:

Well hopefully I’ve provided an environment where they actually are going to have some fun. And I think if you have fun and it’s humorous and it’s social they’re more likely to... I find with education they can be very uncomfortable so if they can kind of relax and see it as being fun, they might actually take on stuff and find it a lot easier... For older people it might work better, because younger people might be cynical. Yah, so I think creating...a humorous, social space that is transparent so that people can learn to trust each other, that will encourage them to learn. (Designer G, 2009)

The organising schema around the design for pedagogy-based design is around the pedagogical conceptualisation, and this is an important difference between the two designs.

8.01.03 Designer G Phrase Wheel
The Phrase Wheel visualisations examine the explicit use of pedagogy and how it is articulated via the various design elements. Figure 8-11 shows the Phrase Wheel for the standard design pattern forum for Designer G. In this visualisation, the relationships between the design elements are clearly seen, the emphasis on the word ‘forum’ is clear. The linkages between the design elements are quite dense, reflecting the designer’s strong focus on the object being designed, and the large number of designs that were generated.

The lateral transformations which are also evidenced by the large number of designs are indicated by the high number of task analysis words associated with the design elements. In generating multiple designs, the task analysis or conceptualisation occurs throughout the design process. This is typical of an experienced designer, as cognitive capacity in experienced designers continues to rise, whereas in inexperienced designers, it tends to peak and then decline.

In the 368 utterances illustrated by the 180 category items on the phrase wheel in Figure 8-11 there are only seven instances where relationships between design and pedagogy occur in the same utterance. These seven relationships can be seen in Figure 8-12, indicated by the red lines.
The word ‘discussion’ shows the most linkages, with associations with the words ‘forum, circles, petal’. Distance education shows linkages to ‘rolling hills, horizon’. When asked in the interview whether there were any particular strategies in the design for teaching and learning for the standard pattern, Designer G replied:

You know I can’t believe I didn’t. I was more interested on an interactive website... The only strategy I employed was transparency and being able to see the information and pick information that you thought was important to what you know about. I didn’t use anything like Experiential learning uh I was focusing on a community situation where you can learn by accessing other members of the community, so it’s more fundamental than that, before the theories begin I guess, having access to information. (Designer G, 2009)
In the forum created using the design for pedagogy pattern, the Phrase Wheel reveals clear differences (Figure 8-13). The linkages are more diffuse, with densities evident in the linkages occurring between ‘students’, ‘could/should’, ‘forum’ and ‘design’. Multiple and strong linkages occur between design and pedagogy. This diffusion of emphasis indicates a broader approach when designing, a more balanced consideration of issues surrounding the forum – a de-emphasis on the designed object or structure itself.

In Figure 8-14 these linkages can be seen more clearly. In the 366 utterances from the design for pedagogy ‘think aloud’, illustrated by 179 categorised phrases, there are approximately 63 links between design and pedagogy.
Figure 8-13 Phrase Wheel for Designer G design for pedagogy pattern shows a more even spread of linkages. (Chatteur, 2011)

When asked whether there were any particular strategies employed in the design for teaching and learning in the design for pedagogy interview, Designer G said:

I like experiential learning so that you will get a sense that if you investigate some of the challenges social challenges you will become healthier. It’s not behavioural, I think. The reflection ones, would be, probably the experiential learning would come through the feedback to each other peer confessionals. Having people giving advice and then reflecting on that. Or maybe I am a horrible fish a spiky fish. So experiential learning I really like but I don’t know if I’ve covered that at all. Behaviouralism pretty standard, yes. Oh constructivism too. So they’re constructing themselves, constructing their environment too. (Designer G, 2009)
When asked in the same interview ‘How did you go about the planning of your application?’ Designer G said:

The well, I ... looked at the sheet that talked about the learning theories and thought, okay. If I look at the theories that you want to, at the back of your pattern, basically the atmosphere, the objectives of the learning before I looked at the structure for the learning. I thought I’d get into the sort of environment to set up first before you look at the details of what happens to people in there. (Designer G, 2009).

From these two interview snippets, the design for pedagogy pattern helped guide the planning and provided insights into how to design with teaching and learning in mind. The designer was able to integrate the learning objectives into the planning and implementation.
of the forum, prior to considering structural (design) considerations. The above quote indicates that the learning objectives informed the creation of an environment (the fish tank) in which the learning could take place. The teaching strategies in the design for pedagogy pattern prompted the designer to think about pedagogical theories and this conceptualisation aided a tighter integration of pedagogy into the design.

8.01.04 Designer G Phrase Net

The Phrase Net diagrams are relationship visualisations, but they differ from the Phrase Wheel in that it is possible to see networks of relationships between words. Figure 8-15 shows the relationships between utterances from Designer G’s standard design pattern 'think aloud', where words next to each other are examined by relating the spaces between words. In this mapping, it is difficult to ascertain instances where teaching practices and the resulting courseware occur together, as it is very difficult to ascertain any teaching practices. The only pedagogical (green) phrase that was used frequently enough to be displayed in this visualisation is 'discussion', seen next to 'open'.

![Figure 8-15 Designer G’s Standard pattern Phrase Net shows associations between visual and system design. (after IBM Corp, 2011)](image)

In this visualisation (Figure 8-15) an intricate network is visible between the visual design words (red) surrounding ‘forum’ and the ‘central server’. There is another network of words describing navigation issues: ‘users’ can ‘access’ ‘information’ by using ‘keyword’ ‘search’ ‘functions’. A third network relates to ‘circular’ ‘design’ and ‘good’ ‘idea’. This reflects the circular shapes in the forum design sketches, for example Figure 8-4.
The design for pedagogy Phrase Net (Figure 8-16) shows clear relationships between design elements and explicit use of pedagogy in ‘easy social interaction’ (green) occurring next to ‘page elements’ (red). There is a focus on a ‘collaborative learning environment’, seen next to ‘student’ ‘profile’. It is possible to see ‘bonding’ and ‘games’ together, both pedagogical phrases. One can see ‘teaching strategies’, ‘bonding games’, ‘gold coins’, ‘friendly atmosphere’, even ‘discussions make people understand students’. Unlike the standard pattern, where visual design and system phrases dominate, pedagogy (green) dominates the forum created with the design for pedagogy pattern.

Unlike the Phrase Wheel, this Phrase Net allows an understanding of the core concepts surrounding the forum. In this map is becomes clear that ‘learning’ ‘environment’ are two words that are frequently used together in the design for pedagogy ‘think aloud’ transcription. When asked in the design for pedagogy pattern interview ‘What did you take into consideration when you decided what to include in your application? Designer G said:

Well the brief, and also the metaphor of an online forum is to replicate the sense of what’s happening in the classroom but it in a slightly, in an asynchronous way. So I took into account the macro view that if you’re going to simulate an online classroom, then you want to simulate the classroom, what sort of classroom do you have. Therefore you have all sorts of things happening in the classroom. (2009)

This is in contrast to how Designer G replied to the same question for the standard pattern interview:

(Pause) What did I take into consideration what to include in my application? Well the problem was delineated the problem was delineated and the solution, the way I took it
was that these are the things that need to be resolved in the design. So I just looked at the clients’ requirements and applied them to this design. (2009)

Even though the designer knew that the standard forum was for e-learning, the pedagogical issues surrounding the design did not appear to be conceptualised.

**8.01.05 Analysis Designer G**

Designer G exhibited a broader approach to the design when using the design for pedagogy pattern over the standard design pattern. Not only were there more frequent uses of pedagogical phrases, the interconnections between the phrases broaden to show a more considered approach when designing. An example of this is the designed object embodied in the word ‘forum’. For the standard pattern, it forms the main word in the Word Cloud visualisation, has the densest connections in the Phrase Wheel, and exhibits strong relationships between design and system design in the Phrase Net. By contrast in the design for pedagogy Word Cloud it has dropped to third largest, sharing prominence with ‘learning’. In the Phrase Wheel for the design for pedagogy forum, it appears to share equivalent density of linkages with ‘design’, ‘students’ and ‘discussion’, being of lower importance to those of the ‘fish’ and ‘could/should’. In the design for pedagogy Phrase Net, ‘forum’ shares linkages with ‘online’ ‘status’ ‘display’ and has been diminished in importance behind ‘learning’ ‘social’ ‘fish’ and ‘tank’. In all instances of the design for pedagogy visualisations green increases in prominence, replacing design *structure* with pedagogical *function*.

**8.02 Designer J - An Experienced Designer**

Designer J was selected for qualitative analysis due to the content analysis results of the ‘think aloud’ indicating an increase in pedagogical thinking (Figure 8-17). The experienced designer also created high quality design sketches, but the primary reason for selection was for the insightful comments made during the interviews, which was noted during the transcription process.

Designer J exhibited a lower incidence of utterances: the standard design pattern ‘think aloud’ only contained 72 sentences and the design for pedagogy pattern 113. Designer G, by contrast, made 368 utterances with 179 category items. A number of reasons for the lower number of utterances present themselves: this designer had English as a second language and on both occasions finished the design sketch exercise prior to the time allocated. The lower number of utterances and the reduced vocabulary results in fewer phrases in the Phrase Wheel visualisations.
Figure 8-17 shows nearly a trebling of pedagogically-based phrases. The percentage of task analysis exhibited by this designer fell when using the design for pedagogy pattern. One interpretation of this drop could be that it indicates a reduction in cognitive load during design. System design phrases increased slightly when this designer used the design for pedagogy pattern, which is in contrast to Designer G, whose system design phrases reduced. This is despite the fact that the standard pattern places a strong emphasis on system design issues. The increase in system design issues are largely due to the inclusion of live chat in the forum using the design for pedagogy pattern, which will be outlined in the Narrative Summary in the section below.

**8.02.01 Designer J Narrative Summary and Design Sketches**

After reading the standard design pattern, Designer J created a banner, with a title and graphics. Beneath the banner, inside a rectangle, a search function was added. Above the banner a line with forum signup and login was created. Another rectangle was added to contain forum information. To the left a rectangle contained access to private messages (Figure 8-18). A box to the right provided access to forum topics which could be clicked if the user did not wish to use the search function. The box would contain the forum topic, and sub-topics.
Underneath the **forum list** Designer J created an area where users could access other multimedia assets, such as video or other interactive media. A search function allowed the additional media assets to be searched. This rectangle was divided into sections for access to flash or director assets or tutorials with sound.

When asked later in the structured interview ‘Were you employing any particular strategies in your design for teaching and learning? If so, what were they?’ Designer J answered:

> Teaching and learning, oh the part of multimedia. Some people actually learn by doing stuff and some people actually learn by watching videos, some people actually learn by reading tutorials. I’ve seen some. So there’s different kind of things for anyone. (2009)

At this stage Designer J re-read the pattern and decided it would be fun to alter the **theme** of the **forum**, with different graphics.

> So in the **forum** there have to be something that shows how many people are watching that specific topic. And how many responses there are so the user knows if it’s a popular topic. (2009)

Scroll bars for each of the boxes were added. **FAQs** and access to help was added. An icon was added so users could create a new **topic**. Designer J then re-read the pattern and waited for the exercise to finish.
Designer J’s design using the standard forum pattern was polished but limited in scope. There was only one page designed (Figure 8-18). Pedagogy was considered when designing for this forum, which was evident in the inclusion of multimedia elements. What is lacking in this design is an integration of learning with the forum. The transactional approach evident in the standard pattern is again evident in the forum - presentation rather than inclusion, impersonal and alienating. This forum affords no opportunity for dialogue between teacher and students, for teacher-led communication or announcements. There is also no real sense of community in this forum, other than forum posts, the users have no opportunity to get to know their fellow students.

When using the design for pedagogy pattern Designer J again began by drawing a rectangle for the forum header. Below this rectangle, a menu was created with all the information, such as FAQs, search and login.

The rectangle in the middle is going to have all the information about the news, what’s going on in the forums, it’s going to have some announcements. The rectangle on the right is going to have the most viewed topics in the forum. The most active discussions. (Designer J, 2009)

![Figure 8-19 Designer J’s main page, design for pedagogy pattern. (2009)](image)

At this stage Designer J assumed that the forum would be for a design course, with different news items for design and animation. On the left a box would contain username, messages and chat. Below this a rectangle that showed which users are online. Below the rectangle with the latest discussions is another box with links to pages with tutorials – help links (Figure 8-19).
The **forum page** (Figure 8-20) would be divided into different sections, **announcements**, **topics**, e.g. **design**, animation. It would **show** how many **topics** in the **forum** and the **date modified**. All of the **topics** would lie beneath each other on the **forum page**.

The **profile page** (Figure 8-21) has the same **menu** and header to the rest of the **forum**. It **shows** if any images had been uploaded in the portfolio. The top rectangle shows the date of **registration**, username, how many **replies to messages** that have been made, and a **search** function. It also shows an inbox and last sign in. If the portfolio **section** is empty, it will display a grey box.
The final section that Designer J created was the chat (Figure 8-22). Here users can talk to others who are online. Divided into three, the bottom rectangle contains the area to type in, which will show in the main page. To the right, online users are shown. To send a message to one person, their name is clicked and a message can be sent to their inbox on their profile page.

The approach taken in the forum using the design for pedagogy pattern was broader in scope, with the inclusion of numerous communication and social networking facilities. Social constructivism appeared to be at the core of this design. A student profile was added, which allowed students to tell their cohort about themselves. A portfolio area was included, where
students could display their work. Links to learning materials containing rich multimedia resources was a feature in common with the first forum. In addition to the asynchronous forum, a live chat function was added for socialisation. The news section allowed teacher-led exercises to be tightly integrated with the online community, with the ability to embed the rich media elements. The forum design was conceptualised with integration of online learning materials with the forum system, where announcements in the news section linked clearly with other e-learning resources, and integrated tightly with the forum topics.

8.02.02 Designer J Word Cloud

Two Word Clouds created from Designer J’s ‘think aloud’ transcriptions reflect the results of the content analysis in that there is a higher frequency of pedagogical phrases when using the design for pedagogy pattern. For the design for pedagogy Word Cloud, the word ‘going’ used in the context of ‘it’s going to have’ or ‘I’m going to put’ dominated the visualisation, so for the purposes of analysis this was removed for clarity. The dominance ‘going’ and ‘actually’ appears to be a trait of the designer’s speech style, and has common high usage in both ‘think aloud’ transcriptions.

Figure 8-23 Designer J standard pattern Word Cloud shows strong visual design elements. (after IBM Corp, 2011)

Figure 8-24 Designer J Word Cloud design for pedagogy pattern (the dominant ‘going’ is removed) with ‘show’ dominant. (after IBM Corp, 2011)
For the standard design, the ‘search’ provided the primary navigation schema and navigation elements have a higher prominence. The design for pedagogy forum used ‘section’(s) navigated via a ‘menu’. In the context of this forum ‘animations’ were not a visual design or interface element, but rather a pedagogical topic for discussion – the forum was for a design course online. Tactics for student engagement are encapsulated in the use of ‘multimedia’, ‘graphics’, ‘topics’ and ‘information’.

The word ‘show’ dominates the design for pedagogy pattern ‘think aloud’ – students ‘show’ their work in the portfolio, the front page will ‘show’ news items, the profile page will ‘show’ messages and so on. The prominence of this word is embedded in the integration of the interactivity between forum users, incorporating multiple levels of feedback to the student. It tightly integrates forum activity with interface design – allowing the individual user multiple pathways of interaction with the learning within a social context.

Tactics for student engagement for the design for pedagogy forum are illustrated by the use of ‘announcements’, a ‘student profile page’, ‘discussions’, ‘chat’, ‘portfolio’ and ‘news’ items.

### 8.02.03 Designer J Phrase Wheel

In order to examine the explicit use of pedagogy through image, text and interaction, two Phrase Wheels for Designer J were created. Despite the low density of categorised utterances that this designer exhibited when using the standard design pattern, intra-utterance clustering density appears around the words ‘search’, ‘forum’, ‘rectangle’ and ‘multimedia’. Figure 8-25 also exhibits a high density of interconnections within the design phrases (red words), with strong linkages to ‘search’. This reflects the findings from the Word Cloud.
Figure 8-25 Designer J Phrase Wheel for the standard pattern shows interconnections between design phrases. (Chatteur, 2011)

Figure 8-26 highlights the fact that there are only three categorised pedagogical phrases in the ‘think aloud’ for the standard pattern. From these three phrases, only four linkages occur between pedagogy and design, ‘interactive media’, ‘posted’, ‘forum’ and ‘director’. In this context ‘director’ refers to an interactive authoring package used to create e-learning, which outputs the shockwave file format, which is used for online e-learning modules. Although no explicit links occur between these phrases and the pedagogy phrases, the inclusion of ‘video’, ‘flash’ and ‘multimedia’ elements in the forum design also indicate a consideration of rich media elements which contribute to the learning in the forum.
Figure 8-26 Designer J’s (Phrase Wheel) standard pattern usage exhibits four linkages between design and pedagogy. (Chatteur, 2011)

Figure 8-27 by contrast displays the linkages in the Phrase Wheel for the design for pedagogy pattern. Design elements (red words) feature in this visualisation with clustering density occurring around ‘forum’, ‘page’ and ‘rectangle’, ‘messages’, ‘reply’ and ‘show’. There is a significant increase in the richness of the pedagogical phrases (green words), with a clustering visible around ‘profile’ and ‘discussion’. An increase in ‘section (of site)’ linkages and a corresponding reduction in ‘search’ phrases in comparison to the standard design pattern also correlate with the findings from the Word Cloud visualisations.
When examining the explicit linkages between design and pedagogy for the forum created using the design for pedagogy pattern, there is a visible increase in connectivity (Figure 8-28). Frequent connections occur between ‘forum’ and ‘announcements’, ‘rectangle’ and ‘profile’, ‘forum’ and ‘discussions’. This is consistent with the introduction of a news section where announcements could be made, and the introduction of a user profile page. Even accounting for a possible bias where the course topic is also design (thus removing two of the connections), there remain significantly more relationships than displayed in the forum created using the standard design pattern. The number of pedagogical phrases show a five-fold increase over those contained in the standard pattern’s ‘think aloud’.
In examining Figure 8-29, the Phrase Net for the standard design pattern, there are no evident instances where teaching practices occur next to courseware design. However, if ‘multimedia’ is considered a teaching tool, in this design it is being used on conjunction with the ‘forum’. Similarly, ‘flash’, ‘animations’ and ‘interactive’ ‘media’ are all tools used in creating online learning. What is lacking in this Phrase Net are the links between design elements and pedagogical thinking, the concept mapping between the elements and their use.

The low density of utterances and richness of phrases is also evident in this Phrase Net. Normally when this visualisation is generated, complex linkages between words occurring next to each other allow a network of phrases to be built, allowing main themes to become apparent. The only network of word juxtapositions in this Phrase Net is ‘forum/multimedia’ ‘information’ and ‘settings’. The direction of the arrow indicates that the words ‘forum/multimedia’ occur next to ‘information’, which is logical, and there are ‘information’ ‘settings’, which refers to the panel on the left-hand side of Figure 8-18. As the main forum navigation device was a ‘search’ ‘function’, the prominent size of this phrase correlates with the density in the Phrase Wheel visualisation around ‘search’ seen in Figure 8-25.
Figure 8-30 reveals navigation featuring in one network, with ‘links’ to the ‘actual’ ‘forum’ ‘main’ ‘page’. A phrase network between ‘design profile’ ‘section’ and ‘chat’ allows us to see how the designer sequenced the design activity, having moved from working on the design profile to the chat section. There is also a network between ‘online’ ‘portfolio’ and ‘talk’, which is encouraging, as the designer is considering how other users can talk about a student's online portfolio. This indicates a higher level of inter-student interaction, with a focus on the student’s work. What is evident in this Phrase Net is the consideration of pedagogical (green) terms such as ‘vector’ mentioned with ‘images’ and ‘upload’, which tie in with the inclusion of an online portfolio for student work. This Phrase Net places less emphasis on interactive media elements, but in this visualisation, course topics begin to show prominence (animation, 3D, vector), with ‘active’ ‘discussions’ one of the minor themes.
Chapter 8: Qualitative Analysis

8.02.05 Analysis Designer J

Pedagogy was barely considered by Designer J when designing using the standard pattern. There are only three pedagogical phrases, as seen in the Phrase Wheel. None of the pedagogical phrases were mentioned in a high enough frequency to become evident in the Word Cloud visualisation, which also shows a transactional approach to the design, in the emphasis on visual design elements and navigation. The Phrase Net shows the pedagogical phrase ‘tutorials’ occurs next to the word ‘plain’, which is unrevealing.

Social constructivism comes to the fore in the design for pedagogy forum, with the inclusion of a profile page, a student portfolio and chat. The ability to see news and announcements enhances the tool’s ability to be used as a teaching tool. The focus moves from ‘information’ in the standard forum (Figure 8-29), to discussion of the learning topics, and a sharing of student work; ‘upload’ ‘images’, ‘show’ ‘pictures’, which facilitate peer feedback and social learning (Figure 8-30).

Reflecting the design for pedagogy pattern, this forum allows strong links between social knowledge building and collaboration. When asked in a non-structured part of the interview about impressions on the TEACHING PRACTICES part of the design for pedagogy pattern, Designer J said:

I think that was the most useful part. (The MOST useful part?) Yeah, I think so, because yeah. For example, it gives you all the characteristics of each thing. So if you want to create something, it has to be like, really clear... For example, in this part ensure each message has a reply. So you have to create something if it has no reply, why do you have it there. To create like the structure of the page and the sections. And I think it worked.  
(Designer J, 2009)

8.03 Designer D - A Novice Designer

Designer D also exhibited an increase in pedagogical phrases in the content analysis of his ‘think aloud’ (Figure 8-31). In this instance there appeared to be no large differences in the results from the other categories and it was for this reason Designer D was chosen for further analysis. Another factor was the quality and completeness of the design sketches. The ‘think aloud’ for the standard pattern resulted in 134 utterances, the design for pedagogy pattern resulted in 80 utterances. The reduced number of utterances for a novice designer for the design for pedagogy pattern could be indicative of cognitive overload. It could also indicate that the designer did not talk while reading the larger eleven page document.
8.03.01 Designer D Narrative Summary and Design Sketches

Smooth flowing communication was Designer D’s first consideration when starting the standard pattern’s forum design. Central server issues, such as access, creating forums, managing and interacting with the server were a fundamental concern (Figure 8-32). Reading and writing in the forums, creating a chronological list with a tracking mechanism of tags, along with how many posts per page, viewing posts, message snippets and message selection were subsequently discussed.

Figure 8-32 Designer D flowchart/structural sketches for standard pattern. (2009)
There should be a list of forums as well. So I guess each forum has to have a unique name to identify it amongst the listings. So the name of it will be the subject, because it will be subject-based forums. So for a particular topic, so then people can track through the listing as well. (Designer D, 2009)

Forum access would be via a database with unique user logins. Presets would allow access to the forum via email as outlined in the pattern. On logging in to the forum, the user would go to the directory (Figure 8-33). The directory would lead to the forums, searchable by category, date or searchable criteria. The directory would have public access, and from there access to the forums could be subject to restrictions.

Pages for the design were Directory, Forum and User. Directory contains a list of the forums, User contains user details, forum membership lists and related forums. Forum information would also include subject and relevant tags. The user page would also contain messages and a forum activity level, indicating recent activity on that forum.

There would be two types of messages: messages in the forum and messages from the forum (Figure 8-34). To view the forum messages, each message would display, and a shrunk down version of the forum, having reference to the forum while viewing the
message itself. Down at the bottom would be a space to reply to the message. For ease of navigation there would be a link to the home (directory) page.

The Directory page would include an 'A to Z' listing of the forum topics, a search and the main topics being used. Important items would be at the top, with forum moderators able to direct users to relevant sections of the forum. Forums could also be sorted based on recent activity, a frequently updated active section versus a static alphabetical listing. Each section on the page would need a title, with a minimise button next to the title.

The search field would enable searching by subject, tag, user and date. Users could edit their own details from a button at the top of the Directory. The User page (Figure 8-35) would contain handle, interest levels, membership list, name, basic details, address, contact details. There would be two ways to view the user page: the user view (private) and public view, for anyone who is not that user. This page would also enable subscriptions posted to the user via email, either using individual emails for every new message, or a daily or weekly dump. Moderators could tag (or star) certain discussions and a subscription could be made of those messages also. The users could determine which of their details are displayed, via a tickbox option. This would include affiliation lists, like Facebook, with restricted lists.

Figure 8-34 Designer D (standard pattern) forum and messages page. (2009)
Turning to the forum page (Figure 8-34), Designer D suggested different templates or themes could be used for the different forum pages, containing the forum title, page name and thread. Each message would have subject tags, activity level and message. An area for user avatars would be to the left of each message. There would be the name of the person who started the thread or the forum. A link to the user page would be at top right. This concluded the 'think aloud' for the standard pattern.

![Figure 8-35 Designer D user page for standard pattern. (2009)](image)

When examining the design for pedagogy pattern, Designer D considered key pictures that should be seen were moderator messages, announcements and send messages from the students. A single bar at the top would contain announcements, which would remain empty until an announcement was made (Figure 8-36). A light bulb would appear which, when clicked on, would roll out the announcement. A second click would scroll it back up. A lit light bulb acts as a visual indicator for new content, and would be grey once viewed.

The forums could be on tabs, like a filing system, with index tabs marking the different forums, which would slide out to show the forum topics, then threads. The different tabs would roll out progressively. Scroll bars would then allow navigation through the messages.

Designer D then read page three of the pattern. This forum, Designer D explained, operated by having sections opening up in the same screen space, rather than opening up as new
pages. This opening up is not on top of the page, but within it, allowing for ease of navigation.

The tabs could contain reminders which indicate when new content is present. This is a visual as well as textual navigation, each higher level indicates where the new message occurs. A maximise button allows for full screen message reading.

To encourage discussion and feedback, Designer D thought a simple reply button would not fulfil the objective to ‘ensure each message gets a reply’. When a message does not have a reply, the reply button changes to a ‘What are your thoughts?’ to encourage feedback. A question section would generate more discussion, so a live feed with recent questions that frequently update related to forums that the user is interested in would be available. These questions would relate to things in a broader sense than just the forum of interest. Anonymity is a good thing when asking questions, to inspire answers. A text box for asking questions and a submit button would be at the bottom. Questions, therefore could be asked in both spots, in the question field and in the threads.
In the teaching strategies, in order not to dominate discussions, and to support student-to-student interactions, being able to see who is online would be important. So stick figures at the top would indicate people logged in or out. The folders could also indicate how many people are in a discussion at any time. This allows a more lively discussion to happen. From Designer D’s experience, users tend to congregate in particular spots of a forum.

The folder system would allow 0-10 forums, the next scroll allows 3-10 topics, which would not take up much vertical space. 1000 threads would have to be managed with a set of columns and a vertical scroll bar as horizontal would be too much. At this point the laboratory experiment ended.

On examining the design sketches for the different forums, Designer D does appear to have considered the teaching strategies section of the design for pedagogy pattern in the provision of the ‘your thoughts’ option on first reply to a thread posting; in the use of a live question section with indicators for other users who are online; and in the provision of the announcement section with light bulbs at the top of the forum page.

However, equally important but lacking in the design for pedagogy forum design was the User page that was included in the standard pattern design. This allowed for customisation of public view settings, access to email subscriptions, personal details and forum membership management. Allowing students to create a profile so that other users can get to know a little about fellow students is one way to promote social interaction.

8.03.02 Designer D Word Cloud

The Word Cloud visualisation for the standard design pattern shows a dominance of the designed object, the ‘forum’ and ‘forums’, indicating the most frequent use of these words. The creation of a ‘directory’ page is reflected in this being a high frequency word, which is classified in the content analysis as a navigation term, but in this instance is also structural. There is a prominence of the words ‘user’ and ‘details’ in the Word Cloud. From this one can extrapolate that the designer’s focus on the structural requirements of the forum was dominant in the conceptualisation.

Apart from ‘forum’, navigation (blue) appears to have a high priority. Phrases such as ‘search’, ‘access’, ‘go’ map to user behaviours. Less evident are the functional characteristics, the use of pedagogy, system functions and verbs.
By contrast, the design for pedagogy Word Cloud exhibits an emphasis on communication: the most prominent words are ‘discussion’, ‘message’ and ‘questions’. The focus has shifted from the structure of the designed object as seen in the standard pattern, to the pedagogical function of the forum. There is a higher frequency of pedagogical terminology (green words) and these appear to have an equal emphasis with the visual design words (red), as seen by their relative sizes. The pedagogical strategies (questions, discussions, announcements, student) can be clearly seen in the context of the designed object (message, page, forum, thread, button), but what is encouraging is that neither dominates. This indicates that both
design and pedagogy are being given equal consideration in the design process. This more balanced approach to design is also shown by the size of the words, both the pedagogy (green) and visual design (red) words have similar proportions, which reflects similar frequency of utterances.

**8.03.03 Designer D Phrase Wheel**

The ‘think aloud’ for the standard pattern resulted in 134 utterances, resulting in 102 different categorised terms for inclusion in the Phrase Wheel. There are three pedagogical phrases, forty visual design phrases, nineteen system design phrases, twenty eight navigation phrases and twelve task analysis phrases. The three pedagogical phrases are indicative of a lack of pedagogical thinking while designing this forum. This forum shows an increase of system design phrases over the forum for the design for pedagogy pattern, which is consistent with the emphasis on system design in this pattern.

Figure 8-39 shows a density of linkages between ‘forum’, navigation and task analysis phrases. ‘Forum’ ‘access’, ‘forum’ ‘lists’ and links between ‘forum’ and ‘directory’ are clear. These correlate with the Word Cloud analysis of the standard pattern which indicated an emphasis on navigation in this forum. There is also a density of linkages to and between ‘forum’, ‘messages’, ‘thread’ and ‘page’.

Very few pedagogical phrases are evident, but those that exist show linkages between ‘discussion’, ‘forum’ and ‘posts’ (Figure 8-40). The explicit links between pedagogy and visual design elements rest mostly with the discussions within the forum and in forum posts. Few alternative pedagogical strategies are evident.
Figure 8-39 Standard pattern Designer D Phrase Wheel shows few pedagogical phrases, with strong links between discussion and forum. (Chatteur, 2011)
The design for pedagogy pattern resulted in 80 utterances resulting in 103 categorised utterances (Figure 8-41). There are fifteen pedagogical phrases, a fivefold increase. As with the standard pattern, there is a density of utterances around the word ‘forum’ and ‘discussion’. The clustering surrounding ‘forum’ is not as dense as in the standard pattern. In this Phrase Wheel, the density of the linkages appears to be more evenly spread around the wheel.
The linkages between design and pedagogy in this Phrase Wheel are also more widely dispersed than the standard pattern (Figure 8-42). There are twenty six links between design and pedagogy, with the highest densities occurring around ‘forum’, ‘messages’, ‘discussion’ and ‘announcements’. This spreading of explicit use of visual design elements and pedagogy indicates a broadening of thinking, indicating that the participant understands the multiple relationships between pedagogy and design. One interpretation of this is that pedagogy is being considered not only more frequently, but in different ways in relation to visual design than in the forum using the standard design pattern.
Figure 8-42 The links between design and pedagogy (Phrase Wheel) for Designer D indicate a more considered pedagogical approach to design. (Chatteur, 2011)

8.03.04 Designer D Phrase Net

Examining Designer D’s Phrase Net for the standard pattern (Figure 8-43) in order to establish the major themes, it can be seen that the words ‘user’ and ‘details’ occur next to each other frequently. The inclusion of a user detail section facilitates social communication in that it assists users to get to know each other. ‘User’ also sits next to ‘information’, which is also mentioned with ‘forum’ ‘creation’. This network forms the longest chain in this Phrase Net.
There is a high incidence of system phrases being used together: an example of this can be seen where 'activity' 'level' indicates where users congregate, and this can help communication and community building. Word pairs that occur most frequently together are 'central' 'server'. This reflects the use of this phrase in the standard pattern document; it is also mentioned frequently in the 'think aloud'. Pedagogical phrases are also evident in the use of 'subject' 'tags', which facilitates search functionality. 'Smooth' 'flowing' 'communication' is a minor string which is the main strategy for teaching and learning evident in this visualisation.

The forum created from the design for pedagogy pattern (Figure 8-44) shows a network containing two pedagogical words, 'question' and 'discussion'. This string of words indicates a focus on social communication with information architecture a supporting concern. These show student engagement with the community, as the design allows for questions to be posed live or in the thread section.

For this forum there is a high incidence of visual design elements visible, with a network existing between 'forum', 'listing' 'multiple' and 'threads'. 'Unlit' 'light bulbs' occur together, which in the forum indicate new teacher-led announcements. Key features in the Phrase Net are the 'filing' 'system' navigation.
8.03.05 Analysis Designer D

Designer D considered more pedagogical issues when using the design for pedagogy pattern over the standard pattern, turning the focus from the structure, the ‘forum’ to the function ‘discussion’ as evidenced in the Word Cloud visualisations. The Phrase Wheel correlates this, with a clustering around ‘discussion’ and a fivefold increase in the number of the pedagogical phrases. The Phrase Wheel also sees a lessening of concentration around ‘forum’ and a broadening of emphasis. The Phrase Net visualisations show that words occurring together move from system design in the standard pattern forum to visual design in the design for pedagogy forum, an enabler to the new focus on ‘discussion’ and ‘questions’.

When asked ‘How do you think people will use this forum to learn?’ for the standard pattern, Designer D said:

Through communicating ideas with each other through what they know and they could present things on it, diagrams and drawing or whatever of their ideas. And through that communicate and discuss what their ideas are. (2009)

When asked the same question for the design for pedagogy pattern, Designer D said:

By talking to each other.
(Anything else?)
If they have graphical capabilities by drawing pictures for each other. Maybe take photos. Videos. (Designer D, 2009)
These two quotes indicate that there does not appear to have been conscious strategies for the inclusion of teaching and learning in the design for pedagogy forum, as these responses are almost identical, with the exception of the use of videos. Rich media elements are emphasised in the design for pedagogy pattern. What this indicates is the designer did not consciously consider pedagogy when using the design for pedagogy pattern, but used pedagogy nonetheless.

The standard pattern’s had a strong emphasis on the use of email; presets would allow forum access via email subscription. For the standard pattern, the novice designer did not provide any specific strategies for social interaction:

I didn’t narrow it down for a social area. I thought for the areas, there was the moderated areas that were places that people were meant to go for educational purposes. And place where people do go, so the highly active areas and then there was whatever they searched for. So if they want to socialise, they can, it just depends on the forum, I guess. (Designer D, 2009)

When asked the same question when using the design for pedagogy pattern, Designer D said:

In a way they can anonymously socialise in the question section; that would be just in the navigation of every page. And that would be to inspire further discussion in the threads.

The provision of the live question section affords more opportunities for social interaction, student-to-student communication and student-teacher communication, all principles outlined in social constructivist theory.

8.04 Differences between Novice and Experienced Designers

The high level of productivity in the laboratory experiment exhibited by the design educator is indicative of an experienced designer. Designer G read the standard pattern aloud and began to sketch while reading. This time saving strategy is typical of expert designers, who tend to exhibit structural organisation in concurrent design activities (Kavakli & Gero, 2002).

The design educator, expert designer and the novice designer exhibit a correlation in the focus on the designed object ‘forum’ when using the standard design pattern. This could be seen in the prominence of the word ‘forum’ in the Word Clouds and in the density of linkages in the Phrase Wheel visualisations. The forum represents the structural part of the FBS ontology (Gero & Maher, 1997). What is interesting is the shift from structure to function – in the design educator, the design for pedagogy pattern enabled a change from structural to concept mapping – placing the ‘fish’ (structure) in an environment for ‘students’ to ‘learn’ (function). This was evidenced in both the Word Cloud and the Phrase Wheel visualisations.
The experienced designer (Designer J) focused the design activity on visual design elements, with the word ‘rectangle’ being prominent in both Word Cloud visualisations. In the design for pedagogy Word Cloud the word ‘going’ dominated to such a degree that it needed to be removed in order to see the relative sizes of the other words. The experienced designer was ‘going’ to ‘show’ more frequently when using the design for pedagogy pattern, as seen in the Word Cloud (which had the dominant word ‘going’ removed for clarity). And what Designer J was ‘going’ to ‘show’ was increased pedagogy, indicated by the words ‘announcements’, ‘discussions’ and ‘profile’.

Designer J’s standard pattern forum reflected the transactional approach that was noted in the standard pattern document itself. This was also evident in the standard forum design created by the design educator, Designer G. These forums do not examine or explore the relationships between pedagogy and the forum, and because of this opportunities in learning are missed. This appears to because the focus is on the designed object – the forum itself. The novice designer did not appear to exhibit this trait in their standard pattern design, with thoughtful use of user profiles. However, none of the three designers included teacher announcements and community features in their standard forums.

The novice designer also exhibited the swap, from structure ‘forum’ to pedagogic function ‘discussion’, ‘questions’, ‘answers’. This is seen in the Word Cloud visualisation where pedagogical (green) phrases become apparent. What is encouraging in the design for pedagogy forum ‘think aloud’ is that neither visual design (red) words nor pedagogy (green) words dominate, there are only slightly more red words than green. This evening out of emphasis indicates that visual design is supporting the pedagogy (or vice versa).

In observations of all nine designers it was noted that the novice designers tended to use the patterns as a checklist. This was evident in two of the three novices and also in the most junior design educator, who all re-read the pattern towards the end of the design exercise, highlighting features from the pattern and indicating if this was completed. All novice designers exhibited fewer lateral transformations, which resulted in fewer design options being explored. The two most junior designers, those with a year or less experience, exhibited a difference in the use of the two patterns. The standard pattern resulted in preliminary screen designs, and in the case of one designer, extensive note-taking. This note-taking was also evident in the junior design educator. When using the design for pedagogy pattern, both designers created elaborate information architecture flowcharts. All three novice designers created areas for teacher-led announcements, and the two most junior designers both included student profile pages, forum home pages, FAQs, log ins, as well as the discussion board with threads.
The experienced designers created designs, with detailed design sketches, as seen in Designer J’s forum sketches, to, in one case (Designer F) Photoshop layout documents with finished header designs. The designers who exhibited the most unusual and original design concepts were the two experienced design educators, of which Designer G was an example. Designer G and Designer I both created (in my judgement) innovative designs, which explored the forum concept in terms of a virtual space for interaction – a learning environment – rather than dealing with the ‘page’ metaphor for screen interaction.

Another observation of all designers was that many preferred the design for pedagogy pattern over the standard design pattern. This was investigated in the unstructured interviews after the design for pedagogy session. Novice Designer A preferred the design for pedagogy pattern, whereas novice Designers D and H specifically mentioned a preference for the teaching strategies section at the end of the pattern.

Yeah I did like the teaching strategies because it did help me understand what they wanted the site to be. They didn’t want a stark institution they wanted a friendly level place where students could interact. (Designer H, 2009)

Of the design educators, Designer G said that the design for pedagogy pattern provided more scaffolding, and Designer I thought the teaching strategies would be valuable to novice designers. The most junior design educator (E) had these thoughts:

It succeeds in a couple of points, by pointing out things like outlining learner activity goals, make discussion objectives clear and emphasise reflection, you guide the designer towards allowing the students to express themselves rather than just asking about problems, and that way to address these learning goals in the design... (However) the design document is not going to replace actual experience. (Designer E, 2009)

Experienced Designer B in general loathed the design for pedagogy pattern, feeling that it was a cross between a use case document, a design pattern and a technical specification document. Despite his dislike for the design for pedagogy pattern, he did say:

What it succeeded in was pointing out that one of the key things to come in the design was the educational principles that the educator was trying to get across would be incorporated into the design. But that did come through but I think that there is still a really big gap in the technology. (Designer B, 2009)

In each of the three cases examined in this chapter, it is clear that the design for pedagogy pattern produced not only an increase in the frequency of pedagogical utterances, but added a richness to the consideration of pedagogy during the design process, as indicated by a five-fold increase of pedagogical terminology, evidenced by Designers G and J. Table 8- shows how each visualisation technique displays the same pedagogical data quantitatively, with
significant differences in the variety of words between the two patterns. The Phrase Wheel shows the most complete data.

<table>
<thead>
<tr>
<th></th>
<th>Phrase Wheel (all displayed)</th>
<th>Word Cloud (most frequent displayed)</th>
<th>Phrase Net (top 50 displayed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designer G</td>
<td>11</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>standard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Designer G</td>
<td>60</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>DPP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Designer J</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>standard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Designer J</td>
<td>12</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>DPP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Designer D</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>standard</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Designer D</td>
<td>15</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>DPP</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What is noted in the Phrase Wheel visualisation is a ‘spreading’ of emphasis in the forums designed using the design for pedagogy pattern, over that of the standard pattern. This is indicated in the multiple connections between the categorised elements, with a de-emphasis on the word ‘forum’ in all cases. The focus of the thinking shifts from ‘forum’, but the emphasis does not necessarily transfer directly onto pedagogical thinking. The Phrase Wheels for the design for pedagogy patterns for all three designers indicate this de-emphasis and increased linkages between categories, with the design category in particular showing an increase in the variety of links between the words, rather than linking to one particular word ‘forum’. This redistribution in the visual design words, favours the word ‘message’ with increased links to the pedagogical phrase ‘discussion’. The exception to this is Designer G, where the change of emphasis benefits the word ‘fish’, but nonetheless, this Phrase Wheel displays a greater variety of connections in the visual design (red) area.


