Exploring Possibilities for Practice

7th Teaching Matters Annual Conference
Thursday, 4th November,
Launceston, Tasmania

Suggested format for citing papers:
(Eds.), Proceedings of the 7th Teaching Matters Annual Conference. 
Exploring possibilities for practice [online], Launceston: University of
Tasmania.

© CALT 2008. The works included in these conference papers are the property of their authors
and are used by permission. Readers should apply the same principles of fair use to the works
in this electronic journal that they would to a published, printed journal. These works may be
read online, downloaded for personal use, or the URL of a document (from this server) included
in another electronic document. The text itself may not be published commercially (in print or
electronic form), edited, or otherwise altered without the permission of the author. As with
printed materials, care should be taken when excerpting or referencing text to ensure that the
views, opinions and arguments of the author accurately reflect those contained in the original
work.
Measuring cognitive engagement in online discussions

Kel Jackson
Centre for the Advancement of Learning and Teaching
Kelvin.Jackson@utas.edu.au

Norman Lawrence
National Centre for Maritime Engineering and Hydrodynamics
Australian Maritime College
N.Lawrence@amc.edu.au

A series of online asynchronous discussions were analysed for students’ level of cognitive engagement using a categorisation scheme based on Garrison’s four-stage model of cognitive presence. The scheme proved relatively easy to use and generated meaningful and useful data. Differences in the level of engagement were found across the discussion topics, leading to exploration of factors that may have influenced that engagement. Differences in levels of cognitive engagement were also revealed between participating students, strongly indicating differing conceptions of the role of online discussions in learning, and consequent differing approaches to those discussions. Implications for online discussions design and their management are canvassed.

Keywords: content analysis, cognitive presence, asynchronous discussions

Introduction

Unit context and purposes of discussions

Online asynchronous discussions are often an integral part of e-learning based programs, and this paper explores the inputs of online discussions in a fully online postgraduate unit, Design of Marine Machinery Systems, offered by the Centre of Marine Engineering and Hydrodynamics at AMC. The unit is somewhat unusual in that the students were all drawn from the one organisation in South Australia, and the number of students small (five in all).

Despite the physical proximity of the participants to each other, asynchronous online discussions were incorporated into the unit for a number of reasons:

- To foster a sense of learning community, inclusive of teaching staff.
- To facilitate student learning through opportunities to share information and ideas, bring multiple perspectives to bear on aspects of interest, participate in joint problem solving, and generally reflect on their ideas and the ideas of others.
- To provide meaningful learning experiences grounded in practical applications and authentic (i.e., workplace-based) contexts. ‘Meaningful interaction’ is defined by Wo and Reeves (2007) as:

  not just sharing personal opinions. Instead the interaction must stimulate the learners’ intellectual curiosity, engage them in productive instructional activities, and directly influence their learning....It should include responding, negotiating meaning, arguing points, adding to evolving ideas, and offering alternative perspectives whilst engaged in real world tasks or situations.

That is, we wished to encourage critical, ‘higher order’ thinking and deep engagement.
These reasons are based on widespread understandings as to the value of such discussions to student learning (e.g., Redmond & Lock, 2006; Salmon, 2002; Meyer, 2003) and the need to provide the distant teaching staff (here in Tasmania) a window to monitor and assess students’ progressive understandings.

In all, eight separate online discussions were held across the teaching semester using the discussions tool in MyLO. Six topics used the Class Blog feature; the remaining two used the traditional threaded format. In a MyLO blog, participants post individual or small group presentations (findings, positions and the like), and invite readers to respond to the initial postings using the Comments facility. Each comment becomes a new message added chronologically to the primary presentation. By comparison, in threaded discussion, postings are weaved together according to response, as in the ‘to and fro ’of a conversation. A discussion starter can lead to numerous threads as the topic/question is explored, which may need tying back together again to reach some sort of resolution. The actual discussion topics are presented in the appendix.

To encourage student engagement in discussions, 10 percent of the overall assessment for the unit was allocated to the quality and level of engagement shown. In addition, 7 percent was allocated to one discussion, an online conference presentation, as part of the second assignment.

Framework for content analysis
Given the importance attached to online discussions, it is critical that teaching staff have means to evaluate the effectiveness of those discussions in meeting desired outcomes. We, the authors, were particularly interested in determining whether discussions actually engaged students in critical thinking. One of the benefits of online discussions is the written record it leaves, making it amenable to analysis after the discussions have ended. We needed a theoretical model to provide a framework for the investigation and a means to analyse the postings in a reasonably objective, time efficient and straightforward way. A review of the literature unearthed a number of different perspectives, theoretical frameworks and associated discussion analysis tools, in the context of both face-to-face and online discussions. Ho (2002) reviewed 15 research studies on analysing participation in online discussions and found eight using Bloom’s taxonomy of objectives in the cognitive domain (Bloom, 1956) to interpret the discourse generated by learners. Ho also found that a majority of these studies used some form of content analysis. Meyer (2004) reviewed four different frames to analyse online discussions, two of which captured levels of thinking – Garrison’s four-stage critical thinking model (Garrison et al, 2000, 2004) and Bloom’s taxonomy of objectives. More recently, De Wever et al. (2006) reviewed 15 content analysis schemes applied to online asynchronous discussion transcripts, and found a wide variety of approaches and differences in their level of detail and the analysis categories used. Questions of validity and reliability of the different instruments were raised in this study. The level/unit of content analysis also varied from analysis of sentences in a posting, to paragraphs, to themes within a message, and finally to the individual posting itself, presenting different levels of granularity of analysis.

Content analysis has been used to evaluate not only cognitive aspects of computer-mediated communications, but other dimensions as well. For example, Ho and Swan (2007) used four maxims based on ‘Gricean cooperative principle theory’ – quality, quantity, relevance and manner – to assess discussion inputs. Garrison and his colleagues used content analysis to investigate development of participants’ ‘cognitive presence’ (Garrison et al., 2001), ‘social
presence’ (Rourke et al., 1999), and ‘teaching presence’ (Anderson et al., 2001), based on a ‘community of inquiry’ model of online engagement (Garrison et al., 2000). ‘Social presence’ refers to the ability of participants to project themselves socially and emotionally, ‘cognitive presence’ refers to ‘the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry’ (Garrison, Anderson, & Archer, 2004), and ‘teaching presence’ refers to the extent to which participants play a role in designing, facilitating or otherwise leading discussion.

Our interests lay in the development of critical thinking, and less so in the social and personal dimensions of discussion, so Garrison’s four-stage model of cognitive presence and associated coding scheme was chosen as the content analysis tool. Garrison’s coding scheme was reported by Meyer (2004) as relatively easy to use by the average faculty member without the need for specific training in coding, and reasonably reliable in the sense of different users agreeing on the categorisation of discussions, an important consideration raised by Garrison et al. (2006). One advantage is that the unit of analysis is the individual, easily identifiable posting, so the coder does not have to interrogate the message for multiple themes or sub-messages within, which adds to the complexity of coding in terms of analysis, judgement of length and content of the message ‘unit’, and recording. The majority of schemes reviewed by De Wever and colleagues (2006) also opted for the complete message as the unit of analysis. Two further reasons for choosing Garrison’s four-stage model and coding system were that it was specifically developed for computer-mediated communications, and that the stages of the model have close parallels with the conceptions and approaches to online discussions revealed in a number of studies (e.g., Ellis et al., 2007; Ellis & Calvo, 2006; Goodyear & Ellis, 2007).

Each stage in the Garrison model has a number of indicators of cognitive presence in the message (see right hand column of Table 1 below).

**Factors influencing cognitive engagement**

The level of students’ cognitive engagement in an online discussion is no doubt influenced by a number of factors:

- Perceptions of the discussion’s value, relevance, and its potential to contribute to learning, in turn influenced by the design of the task (topic focus, structure/framework for discussion) and its assessment. As Goodyear and Ellis (2007) point out, if the assessment regime rewards signs of engagement (e.g., number of postings or their frequency) over substance, students will quickly pick up that token participation is more cost-efficient than deep engagement.
- Conceptions regarding the role of online discussions in furthering and developing their learning; that is, what students think they gain by engaging in discussion. Perceptions and conceptions will determine the approaches students will take to their engagement in the discussion task.
- Events during a discussion may shape and redirect cognitive engagement. The role of the discussion moderator (teaching staff member, assigned student leader) is critical here.

There have been some interesting Australian studies of the relationship between students’ conceptions of online discussions, the approaches they take to those discussions, and their level of academic performance, in a range of teaching and learning contexts (Ellis, Goodyear, Brilliant, et al., 2007; Ellis, Goodyear, O’Hara, et al., 2007; Ellis & Calvo, 2006). These studies found qualitatively different conceptions, intentions and approaches. For example,
students who conceived discussions as simply a means of checking whether their ideas were right or of meeting extrinsic course requirements approached discussions in line with those conceptions. They engaged to identify problems with the content of their postings and/or read postings to avoid repetition of comments. In contrast, students who saw discussions as a way of challenging ideas and perspectives in order to arrive at a more complex and deeper understanding of the topic approached discussions in a quite different way: they provided feedback to improve collective understanding, and generally critically reflected on their ideas and the ideas of others. These diametric approaches are synonymous with surface and deep approaches to learning, respectively. Ellis and his colleagues (2007) identified four levels of conceptions of learning through discussions, and four corresponding approaches, from surface to deep. This four-level hierarchy has strong parallels with Garrison’s four-stage model of cognitive presence, and the suggested relationships are mapped in Table 1.

**Table 1: Mapping of conceptions, approaches and cognitive engagement**

<table>
<thead>
<tr>
<th>Level/stage</th>
<th>Conceptions of online discussion (Ellis, Goodyear, O’Hara et al., 2007)</th>
<th>Approaches to online discussion (Ellis, Goodyear, O’Hara et al., 2007)</th>
<th>Garrison’s 4-stage model of cognitive presence</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level/stage 1</strong></td>
<td>Discussion as a way of checking your ideas are right; meeting extrinsic requirements</td>
<td>Engaging in online discussion to read postings to avoid repetition and/or identify problems with the content of postings</td>
<td><em>Triggering event</em> – problem recognition, asking questions</td>
</tr>
<tr>
<td><strong>Level/stage 2</strong></td>
<td>Discussion as a way of collecting ideas</td>
<td>Engaging in online discussion to use postings to add to ideas</td>
<td><em>Exploration</em> – information exchange, brainstorming, presenting ideas</td>
</tr>
<tr>
<td><strong>Level/stage 3</strong></td>
<td>Discussion as a way of challenging and improving your ideas</td>
<td>Engaging in online discussion to evaluate postings to challenge ideas, to integrate feedback on the topic to improve understanding</td>
<td><em>Integration</em> – converging understandings, making connections, synthesis, positing solutions</td>
</tr>
<tr>
<td><strong>Level/stage 4</strong></td>
<td>Discussions as a way of challenging ideas and beliefs in order to arrive at more complex understandings</td>
<td>Engaging in online discussion to receive and provide feedback on the topic to improve collective understanding; to evaluate postings to reflect on key ideas</td>
<td><em>Resolution</em> – applying new ideas/solutions to the real world, testing and/or defending solutions</td>
</tr>
</tbody>
</table>

**Aims of this study**
The purposes of this study were then to seek answers to the following questions:
- Can cognitive engagement in the context of this subject’s suite of online discussion tasks be objectively and meaningfully measured using content analysis tools that are relatively easy to use by ‘non-expert’ teaching staff?
- What patterns of cognitive engagement were evident in the range of discussion tasks, and across the student participants in those discourses? Were the patterns as intended/desired?
- What factors might be at play in shaping the patterns revealed, and what are the implications in terms of improving learning outcomes for the design and management of online discussions, and for general student support?

**Methodology**

**Content analysis**

Transcripts of the discussions were compiled using MyLO’s compilation tool. Each message was then coded using Garrison’s 4-stage model of cognitive presence, with identifier codes assigned to individual participants. The authors sat together and independently coded the messages, negotiating where discrepancies in coding occurred, using two heuristics suggested by Garrison et al. (2004); namely, code down if it is unclear which stage is reflected, and code up to the higher stage if clear evidence of multiple stages are present in a message. The proportion of each stage in the eight discussion topics was then calculated as a percentage of the total number of postings to the topic. In addition, participants’ cognitive ‘profiles’ were developed by calculating the percentage of their postings relating to each cognitive level across the eight discussion topics.

**Other data gathered**

Participants’ cognitive profiles revealed in the discussion were compared with their overall grades in the unit, and anonymous responses to questions about their online discussion experiences on an end-of-semester survey were collated and referenced to the content analysis data.

**Results**

The results of the content analysis appear in Table 2 and Figures 1-5. In regard to the discussion series overall, **Exploration** was the predominant type of cognitive engagement, followed by **Integration. Resolution** on the part of students only appeared twice. **Triggering events** (e.g., ‘starter’ questions) were largely provided by teaching staff, except in discussion 8, where student messages were the primary triggering event.

In terms of cognitive engagement in the different topics, from Table 2, differences are clearly evident, with some topics far more successful than others in eliciting higher order critical thinking and knowledge construction. For example, in discussion number 2, a blog, around 70% of the postings fell into the higher categories of cognitive presence. In comparison, in discussion number 8, also a blog, less than 20% fell into the higher categories. A number of topics generated little engagement of any kind, with participants largely posting a single message each in response to the starting question/problem/instruction.

The cognitive presences of the five student participants are shown in Figures 1-5. Differences in profile are evident – for example, participant 04 largely limited his/her inputs to the first two stages of cognitive engagement, whereas participant 01 contributed across all stages, with a significant percentage of postings at the two higher stages.
## Table 2: Cognitive presence levels across discussions

<table>
<thead>
<tr>
<th>Discussion No.</th>
<th>Type</th>
<th>Triggering event</th>
<th>Exploration</th>
<th>Total postings:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Students</td>
<td>Students</td>
<td>Staff</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Blog</td>
<td>0</td>
<td>4 (80.0%)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 (20.0%)</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Blog</td>
<td>0</td>
<td>5 (29.4%)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 (58.8%)</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Threaded</td>
<td>0</td>
<td>4 (66.7%)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 (33.3%)</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Blog</td>
<td>0</td>
<td>5 (83.3%)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 (16.7%)</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Threaded</td>
<td>0</td>
<td>5 (83.3%)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 (16.7%)</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Blog</td>
<td>0</td>
<td>5 (100%)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 (0%)</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Blog</td>
<td>0</td>
<td>5 (100%)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0 (0%)</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>Blog</td>
<td>5 (11.1%)</td>
<td>32 (71.1%)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8 (17.8%)</td>
<td>0</td>
</tr>
</tbody>
</table>

| Totals        | 5 (5.4%) | 62 (67.4%)      | 23 (25.0%)  | 2 (2.2%)       |

**Note:** Figures in brackets show the percentages of student postings.
Key to figures:
- T = Triggering
- E = Exploration
- I = Integration
- R = Resolution
Discussion and implications

The content analysis tool
The first question of this study related to the useability of content analysis tools for online discussions. Both coders in this study lacked prior coding experience and training, but found little difficulty in applying Garrison’s model and coding system at the level of individual postings. In addition, there was little need to negotiate between ourselves as to the level, indicating a deal of inter-rater reliability in the tool. All up, 92 messages were coded in less than two hours for each coder, including time taken to practise applying the tool and negotiate with the fellow coder as required.

The data generated by the tool revealed qualitatively different levels of engagement both across the discussion topics, and between individual participants:

- Differences between participants were broadly in line with their relative assessment performances overall in the unit. (For example, participants 01 and 02 obtained high distinctions; participant 04 a pass).
- Differences between topics could clearly be related to the nature of the discussion tasks (discussed further below).

Garrison’s coding scheme, then, seems to be a most useful tool for the non-expert teacher interested in deciphering the levels of cognitive engagement in online discussions, supporting the views arrived at by Meyer (2003, 2004). The data has highlighted deficiencies in discussion design and/or its management, and thus has been of high diagnostic value.

However, one aspect of concern relates to the tool’s application in messages containing multiple levels of cognitive presence, and which were simply categorised at the highest level. This practice ignores the lower levels in the analysis, and focussed use of the tool would seem predicated on providing clear guidelines to participants on keeping their postings relatively short and succinct (1-2 paragraphs – Garrison et al. 2006; 120-150 words – Ho & Swan, 2007). This way, there is more likelihood of a single, rather than multiple level input, not to mention more likelihood of other participants reading and responding to the posting (Ho & Swan, 2007).

Analysis of discussions
At the outset, it is important to recognise that the transcripts of online discussions did not reveal the full breadth and depth of discussions in this fully online unit. We were not privy to the numerous face-to-face discussions held between the participants in their place of work, both informally in the tea room, or more formally as members of small groups assigned to prepare responses for presentation through the discussions tool. The transcripts are thus an incomplete picture of the students’ cognitive engagement with the discussions tasks. Given that caveat, we can make a number of tentative statements about the processes and outcomes of online discussions, the second question of this study.

Cognitive presence across the individual discussion postings
Patterns of cognitive engagement across the discussions clearly varied, with a number of possible factors at play:

- Nature of the discussion tasks and, in particular, the sort of triggering event/question set to initiate discussion: As Meyer (2003) concluded, the type of triggering question or instruction shapes the level of response from students. Questions targeted at
eliciting information do so. For example, discussion number 6 asked students to research an incident and provide a brief account and its implications for design. Similarly, questions targeted at higher-level analysis stimulate responses at this level; for example, discussion number 2 required students to prepare in small groups a very topical position statement with clear reasons for that position, and the underlying assumptions made. That this discussion was meaningful, relating closely to upcoming decisions regarding future replacement of the Collins class submarines, is also likely to have contributed to the higher engagement. Meyer (2003) argues that moderators can play an active role in setting the discussion agenda and steering its progress towards higher cognitive levels.

- **Link to assessment**: Related to the nature of the task is the link the task has to assessment. This clearly impacted on the number of postings; for example, discussion number 8 was presentation by virtual conference of the students’ second assignment, weighted seven percent and generated by far the most postings of any discussion. It also shaped the nature of these postings. As for most conferences, attendees are more likely to be engaged in raising, clarifying and exploring aspects of the presented papers, but have less opportunity, both in terms of time and background knowledge, to fully integrate that information. This again demonstrated the link between the nature of the task and response generated.

- **Time on task available**: Despite the seemingly cognitively challenging task associated with discussion number 7 (effectively an online debate with teams allocated a position to advance), little input beyond rudimentary stages was made by participants. This had much to do with the timing of this topic, held across a period when students were busily preparing a major component for their end of semester examination. Participants made their priorities clear!

**Participants’ profiles**

Notwithstanding the influence of task design and positioning in the learning schedule, the different profiles would seem to indicate qualitatively different conceptions and approaches to online discussion. One might expect that participants who see discussions as a way of challenging their ideas and seeking deep understanding, and who therefore approach their discussions with a view to evaluating and reflecting on their postings and the postings of others, will exhibit cognitive presence at the higher stages in Garrison’s 4-stage cognitive model. For students who dwell at the lower stages, in order to move them to higher levels of cognitive engagement, two complementary actions may need to be taken:

1. Make clear expectations of discussions and the assessment rewards for quality involvement, through provision of criteria and the like. Make clear the benefits to learning that can accrue, and provide models of engagement to exemplify those requirements. In other words, shape conceptions and thereby alter approaches.
2. Moderate discussions more proactively to probe and redirect discourse to higher cognitive levels. This in turn means providing teaching staff with the knowledge and skills to function as effective moderators.

**Students’ conceptions and approaches to online discussions**

Conceptions and approaches to discussions were not directly measured in this study, although a number of instruments have been developed for this purpose by Ellis and colleagues at Sydney University (Ellis, Goodyear, O’Hara et al., 2007; Ellis & Calvo, 2006). However, the manifestations of these conceptions and approaches are clearly evident in the cognitive
presence profiles revealed in this study. The responses on the end of semester feedback survey shed some light on those conceptions, although the anonymity of responses precludes any association with individual profiles. Two responses suggest different views as to the purpose and value of online discussion:

- ‘…provided me with broader knowledge of the topic covered ….. allowed me to learn from fellow students as well …. Each individual has a different approach to the same problem’, suggesting a level 3 conception in Ellis et al.’s hierarchy of conceptual understanding of discussions – see Table 1.
- ‘….produces the necessity for participation and to keep up with the workload. But also interesting and a valuable source of knowledge.’, suggesting a level 2 conception.

Interviews and/or questionnaires would have been needed to clarify these conceptions, and any association with their actual engagement in discussions.

**Conclusions**

Analysing the content of online discussions for cognitive engagement is within the realm of the average ‘non-expert’ academic in terms of both useability of the tools and time required for analysis of individual messages. The exercise can generate data of value, firstly in terms of assessing the effectiveness of a particular discussion event and thereby informing content and interactive design improvements. Secondly, the data can signal the need for teaching staff to more proactively assist students to engage in online discussions so that higher order critical thinking occurs, and to address any ‘shortcomings’ in relation to the conceptions and approaches students may have to these discussions.

Clearly, the small number of participants in this study allowed us to analyse the content of all discussion topics and construct profiles for all participants. In larger classes staff may need to restrict analysis to targeted topics such as those specifically designed to encourage critical thinking and problem solving. Similarly, if cognitive quality of participants’ contributions to discussions is to be assessed, content analysis may need to be limited to representative samples of messages posted.

The tentative links we have made between conceptions and approaches to online discussions, and their actual manifestation as cognitive presence seems worthy of further exploration. It would be fascinating to compare participants’ cognitive presence profiles as revealed by Garrison’s content analysis tool with their places on the hierarchies emanating from their responses on the Conceptions and Approaches questionnaires developed by Ellis et al. (2006).

It would also be useful to extend this study to other more typical online units where students are more geographically dispersed, and such that the online component of discussions is the predominant means of social interaction. A larger number of participants than the five in this study would also create greater ‘critical mass’ and a richer environment for sharing information and perspectives, and for general knowledge construction. A greater number of overall postings per topic would also provide for more finely focused analysis of cognitive engagement engendered by the topic.
References


Appendix: MyLO discussion topics

Discussion 1: Your background (Class blog)
Post a short piece to our class blog in answer to the following questions:
1. What previous experience have you had (if any) in design of machinery systems?
2. What reasons led you to choose this unit as an elective?
3. What has been your worst/best nautical experience so far?

Discussion 2: Propulsion system options (Class blog)
As a small working group, you are to research one of two options as a propulsion system for the proposed Collins Class replacement submarine:
- nuclear
- diesel electric with air independent propulsion.

Your group is to post (no more than 300 words) summary of the appropriateness or otherwise of the system. Your subject is the chosen propulsion system.

As a starting point, make a working assumption on the mission and size of the vessel based on the limited information released so far. (See for example The Australian online 26 December 2007) You might also want to visit the Federal Government’s (Defence) web site for any further information.

Your response should include the reasons for your judgment and the working assumptions that you made.

Discussion 3: Biofuel blend with NATO F-76 (Threaded discussion)
Experts are suggesting that beyond 2030, supplies of petroleum based diesel fuels will be significantly diminished. Investigate and discuss the likely effect of incorporating a blend of 10% Biofuel and 90% NATO F-76 fuel on the design of fuel oil systems used the Australian Naval Fleet.

Discussion 4: Lessons learnt from past engine room fires (Class Blog)
What have we learnt from past engine room fires? Research an engine room fire incident of your choice. Prepare a brief summary (no more than 300 words) of the incident and its causes and the implications that it has for marine machinery systems designers. Cite your web sources.

Here are two web sites that can get you started.

http://www.maib.dft.gov.uk/home/index.cfm


Discussion 5: AC versus DC for diesel electric submarine propulsion motors (Threaded)
Is there any future for the next generation of electric propulsion motors for submarines to be AC? To answer this question, your collective task is to brainstorm the relative advantages and disadvantages of each system and any other factors (e.g. technology changes) that might figure in the final decision
Discussion 6: Electrical incidents (Class Blog)
Research one electrical incident reported in the open literature (Web, print, etc.). Post a brief account (no more than 300 words) of the incident and the implications for electrical systems design. Cite your reference sources.

Discussion 7: Centralised fresh water cooling system for naval vessels (Class blog)
Centralised Fresh Water Cooling System is widely used in commercial vessels. What are the potential advantages and disadvantages for adopting such a system in naval vessels? You will be allocated to one of two teams:

- Team A is to research the potential advantages and post them to this blog,
- Team B is to research the potential disadvantages and post them to this blog.

The team with the most convincing arguments will be declared the winner :-)

Discussion 8: Online Conference: Current Issues in Marine Machinery Systems (Class blog)
[Assignment 2; 25% of final assessment]
You are to submit a paper for the conference (see attached details) and at least two questions that your study raises. Part of the assessment relates to the questions you raise and how well you respond in the conference discussion.