

A COMMUNITY OF INQUIRY EVALUATION OF MEKONG e-SIM: AN ONLINE COLLABORATIVE SIMULATION

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ABSTRACT

This paper reflects on the effectiveness of the web-based simulation 'Mekong e-Sim' within a 'Community of Inquiry' conceptual framework of cognitive, social and teaching presence at higher education level. This role-play simulation project has been developed as a realistic international problem, which emphasises collaboration, cooperation and decision-making. The paper includes an analysis of the asynchronous discussion board activity and student debriefs of 86 Civil and Environmental Engineering students who undertook the e-Sim during 2004. The Mekong e-Sim is already recognised internationally as an innovative and quality learning environment within higher education. This paper further illustrates the extremely high level of discussion board interactivity, and more importantly the high degree of sustained critical thinking and discourse achievable in an e-learning environment.

INTRODUCTION

In a recent professional role-play workshop run for academic staff, the workshop leader commented that over the four years that he has been developing and facilitating the web-based 'Mekong e-Sim' role-play simulation into the curriculum, the consistent feedback from his students was that this was the most memorable, if not enjoyable learning experience of their entire undergraduate engineering studies. This supports recent studies into active, transformative learning, metacognition as well as the motivations of the digital generation (Sternberg 1998, Fannon 2003). One of the strategies (and challenges) of the University of Adelaide's Learning and Teaching Development Unit (LTDU) is to promote graduate attributes including problem solving, critical thinking, communication, teamwork, technical and lifelong learning skills through collaboration and a constructivist, inquiry approach to learning in an interactive, non-linear, changing fashion via its online learning management system (lms). This includes the use of the lms's asynchronous communication features of email, group pages and discussion boards as well as its synchronous collaborative features which are presently being endorsed at the University of Adelaide and which support Garrison and Anderson's contention that *the educational community has barely begun to appreciate the collaborative capabilities of e-learning and, as a result, these capabilities are greatly under-utilized* (Garrison and Anderson 2003, p. 23).

The Mekong e-Sim has received three national and international teaching awards, has featured as an exemplar on a number of national and international websites on teaching excellence and has formed the basis of role-play simulations developed at other universities. It has also had its learning design evaluated as part of a national university teaching grant. The LTDU is leveraging on this recognition in order to

promote role-play simulations to the wider academic community within the University of Adelaide which has further led to an indepth analysis of the Mekong e-Sim within a Community of Inquiry framework (Garrison and Anderson 2003). This paper reports on the results of this analysis for a group of 86 Civil and Environmental Engineering students who undertook the role-play simulation during 2004.

BACKGROUND

Before proceeding further, it is timely to clarify the difference between the Mekong e-Sim, which is a web-based role-play simulation, and a computer-based simulation.

There is considerable confusion between these two types of simulation. Simulation is commonly understood as the artificial creation of a real world system so as to teach us how it functions (Fannon 2002, p. 9). An example is a rule-based flight simulator. Web-based role-play simulations on the other hand are concerned with engaging learners *in a process of interpreting each individual's thinking and decision-making within a social context, and then respond effectively...they have no limitations on the participants' responses or initiatives* (Fannon 2002, p. 10).

Within the Mekong e-Sim participants adopt the roles of stakeholders and respond to proposed development issues in the Mekong River basin. Through research and interaction with other persona, participants build a case as to whether the proposed development should proceed or not, which they present and defend during an online public inquiry. Throughout the e-Sim, communication is via the interactive features of the online learning environment (including email, group and class discussion board forums).

The characteristics of the Mekong e-Sim role-play/simulation include interaction of multiple learners and stakeholders with different points of view, as well as interaction about an issue that does not have a correct outcome and contains sufficient conflict to spark debate.

The Mekong e-Sim was developed in 2000 and forms part of the coursework of Civil and Environmental Engineering at the University of Adelaide. Others universities that have collaborated in this role-play simulation include the University of Technology, Sydney, the University of Sydney and the Sepang Institute of Technology. The e-Sim has been fine-tuned and enhanced over the four years since its inception.

The Mekong e-Sim is constructed around four key stages including an initial briefing stage, followed by the release of the terms of reference for the public inquiries, interaction and group submissions, and finally a debriefing. As part of the briefing stage, students are assigned to various roles in groups of 2 to 4. They then familiarise themselves with the online learning environment, the various roles and the Mekong region, and develop a shared understanding of their persona. In 2004, two public inquiries were incorporated into the Mekong e-Sim simultaneously, including the proposed construction of dams and channelisation in Lao PDR and China (Nam Theun II and Lancang, respectively).

47 students were assigned to groups within the Lancang inquiry (Appendix A). This included 2 students in the decision making group and 7 who were in both the Lancang

and Nam Theun II inquiry. 40 students were assigned to groups within the Nam Theun II inquiry (Appendix A). This included 2 students in the decision making group and 7 who were in both the Lancang and Nam Theun II inquiry. Students in the media groups did not participate in either of the public inquiries.

The terms of reference of the inquiries were posted by the lecturer onto the class discussion board (Appendix B). Each group was given two and a half weeks to respond to the terms of reference in order that a final decision could be arrived at by each of the designated 'organisations' including a 3 day online public inquiry. Some of the organisations were for the developments, other against it, and yet others were neutral, including the decision-making groups for each public inquiry.

Communications within each group occurred via the group discussion board and email and/or in person in order to research and prepare their public inquiry submissions to the general discussion board. Statistics incorporated in this paper do not include the interactions within each group at the role profile strategy stage. However it was evident from initial submissions by groups at the public inquiry stage that they had undertaken comprehensive research into the terms of reference in order to arrive at their initial decisions, some for, some against and some neutral.

At the conclusion of the public inquiry stage, and after final decisions were reached by the allocated decision-making organisations, individual students prepared a debriefing report after a number of face to face debriefing sessions.

COMMUNITY OF INQUIRY FRAMEWORK

From an educational perspective, a critical community of learners is composed of *teachers and students transacting with the specific purposes of facilitating, constructing and validating understanding, and of developing capabilities that will lead to further learning* (Garrison and Anderson 2003, p. 23). Garrison and Anderson further contend that a community of learners *is an essential, core element of an educational experience when higher-order learning is the desired learning outcome* (Garrison and Anderson 2003, p. 23). This is based on the premise that *the teaching of high-level concepts inevitably involves a considerable amount of discourse* (Bereiter 1992, p. 353 cited within Garrison and Anderson 2003, p. 23).

An online learning environment has distinct advantages for a community of inquiry process – the asynchronous communication medium of groups, discussion boards and email is both *reflective and explicit*, and learners have access to *unlimited data sources*. This allows students to take responsibility and control of their learning through negotiating meaning, diagnosing misconceptions, and challenging accepted beliefs, which *are essential ingredients for deep and meaningful learning outcomes* (Ramsden 1988 cited within Garrison and Anderson 2003, p. 27).

The three key elements of Garrison and Anderson's community of inquiry framework include cognitive, social, and teaching presence. They define cognitive presence *as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry*. Social presence is *the ability of participants in a community of inquiry to project themselves socially*

and emotionally, and teaching presence is the *design, facilitation and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes* (Garrison and Anderson 2003 p. 28-29). The following Community of Inquiry figure (Figure 1) indicates the relationship of the three elements:

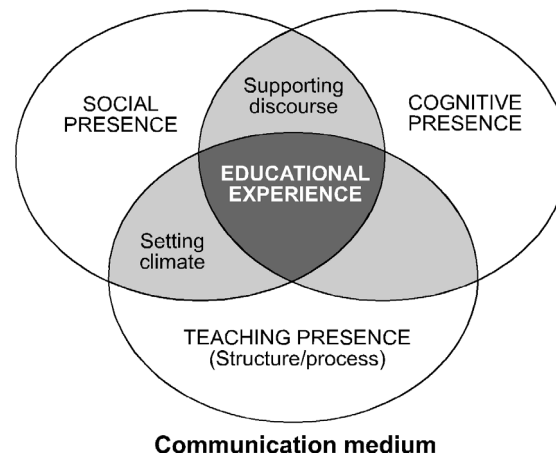


Figure 1 (Source: Figure 3.1 Community of Inquiry, Garrison and Anderson 2003, p. 28)

Mekong e-Sim and Teaching Presence

The Mekong e-Sim has a high degree of teaching presence in the form of design and organisation evident in the comprehensive curriculum and methodology. The role-play simulation includes a detailed Student Handbook which incorporates background information, introduction, practical tips for working in an online environment, outline of events, assessment tasks, role profiles, student tips from past students and extensive background reading including selected papers.

The Mekong e-Sim employs a blended learning approach. Students meet as a class face to face where they are orientated to the simulation, including a video of the Mekong region. Throughout the running of the simulation they attend lectures which relate to river management and rehabilitation, with particular focus on the Murray-Darling Basin, Australia, although case studies from China and the United States are also considered. Computer workshop time is allocated for groups to pursue their e-Sim activities and interactions.

One of the first online activity requirements is the completion of two online quizzes which are designed to familiarise participants with the various abbreviations and roles of the personae involved in the e-Sim and the issues they are responsible for, as well as assess participants' knowledge of the Mekong region. Students must obtain a mark of 80% in order to pass the quizzes and are able to attempt them as many times as they like until a pass mark is obtained. The multiple choice questions are randomly selected from a pool of available questions. In addition each group is required to develop a role profile strategy report to help the group to develop a shared understanding of the strategies they will implement throughout the e-Sim, as well as critically identify differences in their interpretation of the persona and the context they are working in. An example of what is required is included on the e-Sim website.

The very nature of the design and organisation of this role-play simulation involves minimal facilitation of discourse or direct instruction during the interaction stage. Instead the lecturer is assigned to each online group in order to monitor the activity and where necessary send and receive emails from the groups as well as assess the participation. The level of participation is assessed by the lecturer and takes into account how effectively the persona was able to utilise appropriate information channels to advocate their role. A separate peer assessment process may be used if necessary to account for any differences in the performance of group members within a persona. News events are submitted to the media groups and are also sought out by the relevant media person. Persona are assessed on their ability to use the media to make announcements and further their cause. For the media persona, their ability to seek out newsworthy information relevant to their readership is also assessed.

The final stage of the Mekong e-Sim is the debriefing report, which each student is required to submit. Its purpose is to illustrate their understanding of the complexity of environmental decision-making and their professional skills. Students are instructed to draw on their own experience with the e-Sim and any face to face debriefing. Marked examples of debriefing reports are included on the e-Sim website. The assessment framework is based on the SOLO framework (Biggs and Collins 1982) which includes both concept differentiation and concept integration. To obtain high marks the debriefing report will incorporate the use of outside references (bring new phenomena under existing concepts), conclusions are related to a broader set of issues outside the discipline (generalise to new context), clear depiction of all aspects of the problem (differentiation) and their interactions (integration).

Peer participating evaluation is also carried out towards the end of the e-Sim and is used to moderate group participation marks. This consists of a compulsory online survey in which each participant is required to anonymously rate the impact and contributions of other persona, from the perspective of her or his own persona. Students are instructed to take into account the quantity and quality of emails and discussion group postings. Marks are not awarded for this evaluation survey but 10% of an individual's e-Sim mark will be deducted if it is not completed.

Notwithstanding this comprehensive evidence of teaching presence, feedback from 2004 students indicates that enhancements could be made to the Mekong e-Sim and these are reported on within Recommendations.

Mekong e-Sim and Social Presence

As Garrison and Anderson acknowledge, developing and sustaining social interaction within an asynchronous, non-verbal e-learning environment in order to promote collaboration and a community of inquiry, is a challenge for educators.

However, notwithstanding that each group of students adopted an anonymous role and a specified persona, a high level of social presence was evident within the Mekong e-Sim at the public inquiry stage and is supported within the individual debrief reports.

The level of interaction was extremely high, within the online discussion board feature. In a one-week period there were a total of **436 group postings** which resulted in a total of **16,197 readings**, an average of **188.3 readings per student** (Table 1).

Table 1: One Week's Discussion Board Readings

	Nam Thuen II	Lancang	Media
Terms of Reference	82	103	
Initial Postings	1012	1266	
Discussion	4109	6170	
Final Decision	92	87	
Total	5295	7661	3241

The very nature of the design and structure of the Mekong e-Sim allays concerns outlined by Garrison and Anderson that too much social presence can *inhibit disagreement and encourage surface comments and social banter* (Garrison and Anderson 2003, p. 53). However interest was piqued by the humorous postings of 'Chief Iron-Gut' of the Nam Thuen Villagers and the media helped 'stir the pot' and attract readers' attention by various media releases talking of bribery and corruption.

Groups were constantly required to *negotiate meaning and confirm understanding* in order for learning (cognitive development) to take place (Garrison and Anderson 2003 p. 49) and this is reported on more fully within Cognitive Presence later in this paper.

With reference to 'Social presence classification and indicators' (Garrison and Anderson 2003, p. 51), affective responses were limited. This may well have been due to the very nature of the role-play itself whereby each group assumed a persona, that is, they only had a brief time to become immersed in their roles and feel comfortable with self-disclosure. However communications were 'open' with numerous examples of continuing a thread, quoting from and referring explicitly to others' messages, asking questions, complimenting, expressing appreciation as well as agreement (and disagreement). There was also evidence of group cohesiveness which encouraged collaboration, including addressing and referring to other organisations by name, use of inclusive pronouns, as well as phatics and salutations. There was only one notable exception of lack of solidarity *within* groups where the decision-maker World Bank International Advisory Group (WB-IAG) posted the following:

Apologies are made for the last statement from the WB-IAG, it was hastily made without consultation by one of our members.

As outlined earlier, there was no teacher moderation during the collaboration phases of the Mekong e-Sim, however there was evidence of moderation amongst the student groups to ensure that the discussions remained focussed on the relevant issues. This is considered an important indicator of the high level of social (and cognitive) presence. In addition the students did meet face to face with the lecturer for an orientation session which supported the establishment of social presence and focussed the role-play on 'intellectually productive activities'.

Mekong e-Sim and Cognitive Presence

In an educational setting, as with the Mekong e-Sim, cognitive presence is a critical component. Cognitive presence describes *the intellectual environment that supports sustained critical discourse and higher order knowledge acquisition and application* (Garrison and Anderson 2003, p. 55). Their Practical Inquiry model is specifically designed for online learning environments and includes four phases of trigger, exploration, integration and resolution (Garrison and Anderson 2003, p. 58).

Triggering Event

Within the Mekong e-Sim the triggering event was the posting by the lecturer of the two Public Inquiry terms of reference onto the class discussion board (Appendix B).

Exploration

Each group then researched (explored) their allocated terms of reference from the point of view of their persona in order to develop their Public Inquiry submission (PIS) guided by role-specific topics provided by the lecturer. Individual students collaborated within their own groups via their group discussion board and email, allowing for reflection and sharing. At group level there was also interaction, for example to form alliances.

Initial submissions within each of the two public inquiries illustrated a diversity of opinion (either for, against or not yet decided) as a result of collaborative research activity within each group. All initial submissions were comprehensive and showed evidence of indepth research.

As an example of the high standard of submissions, one group incorporated 14 different external website references into its initial submission in consideration of alternative types of power generation and summarised that *existing thermal power generation shall adequately meet the immediate needs of power generation within the Greater Mekong Subregion and that the most viable renewable energy source of the future is hydropower.*

Another group mirrored the general concern about the proposed construction and made specific mention of the effect on fisheries, nutrients, displacements of large populations, earthquakes, as well as social and environmental consequences. Yet another group summarised its well articulated and researched submission by taking a 'neutral position' ensuring that it would *make every effort to ensure all perspectives on the proposal...are tended by CDB [China Development Bank – decision-maker] towards achieving a feasible development plan.*

A submission stating that *construction [should] begin as soon as possible* contrasted sharply with another which considered that the proposed development *will put a 'Band-Aid fix' on Thailand's demands for additional energy.*

Another group gave conditional approval for one of the developments based largely on fisheries concerns including:

- *Increased outflow downstream from Nam Theun II to an amount comparable to at least dry season average flows*
- *Reduce diversion to Xe Bang Fal River from 85% to 30%*
- *Heat diverted water to average annual water temperature of the Xe Bang Fal.*

whilst another group articulated their conditional approval *provided that adequate considerations are made for the continuation of fish migratory routes within the tributary*, including the use of denil fishways.

Integration

The integration phase saw the posting of the group public inquiry submissions onto the relevant public discussion board forum. As indicated in Table 1, this resulted in a high level of readings. Scott Wilson International Consultancy's initial submissions attracted the highest amount of interest, totalling 290 readings. Cambodian Ministry of Agriculture, Fisheries and Forestry (MAFF), Towards Ecological Recovery and Regional Alliance (TERRA), World Commission on Dams (WCD) and Nam Theun Villagers (NTV) each attracted over 100 readings for their initial submissions.

These initial submissions for both the Lancang and Nam Theun II public inquiries 'set the scene' and were followed by a high degree of interactivity (reflection and critical discourse) amongst organisations with the objective of influencing the final decision makers.

Organisations communicated with each other within the social context of the public discussion board as well as privately within the group discussion boards and email. The reasons for the interactions were various - to support, to persuade, to form alliances, to request further clarification, to argue against the stance taken, to provide further evidence via research, as well as to moderate to ensure that the discussions remained focussed on the relevant issues.

This resulted in a very rich exchange of information and views from different stakeholders, and importantly allowed cognitive development and higher order learning to take place, within a community of inquiry social setting.

Some examples of the interactions within the Lancang public inquiry include: Groups responded to each other's initial submissions disagreeing with some of their statements, supporting others and requesting further information to back up their views. This included indicating environmental concerns that a group *has not carefully enough considered the negative impacts* and that while cognizant of Thailand's increasing need for electricity, they *strongly consider the use of the other viable sources of renewable energy*. Organisations were critical of certain submissions - *You mention in your own PIS (Public Inquiry Submission) that you are taking a neutral stance on the Lancang project, yet you seem to be biased toward the projects going ahead irrespective of the costs*. An international consulting group was requested to provide further information on adequate prevention measures for the Mekong River Basin, citing the problems faced by the Tarbela Dam in Pakistan, Indus River Basin. Another group was prompted to put forward their views regarding the impact of other issues apart from the ecosystem and fish migration; another the impact of earthquakes and agricultural yields, citing the recent Pak Moon Dam disaster. Another group queried an opinion that *sediment is extremely good for the downstream areas*.

Groups indicated in their postings that their stance was based upon the submissions made by other organisations and others requested specific feedback on major issues. This included a request for more information on alternative methods of producing electricity, including wind power, as well as the predicted associated costs and compensations, and responses were received which overviewed solar, geothermal and wind energy sources as non-viable alternatives.

The two decision-making organisations for each public submission were reasonably active in their postings, taking the role of moderators. This included a posting reminding all groups that *deforestation is not relevant to our public inquiry*, as well as seeking further information on other postings. Further evidence of self-moderation was concern by one group that another had appeared to have *abandoned many of its initial ideals in order to unjustly harass other organisations*. A further posting chastised some groups' *misconceptions* and recommended that they *should review elementary economic textbooks for a definition of 'marginal costs'*, while another requested that an organisation *reread the literature* on denil fishway calculations.

Other organisations also reflected the role of moderators, including one sternly worded posting stating that *simply condemning the NT2 [Nam Thuen II] does nothing to progress the debate, we would prefer if you could offer constructive criticism and ideas*. And another organisation respectfully requested that groups *do not overstep the bounds of their expertise*. Another group took the initiative just prior to the end of the public inquiry interaction period to summarise the discussions for the benefit of the decision-making group, as well as recommending conditional approval of the development.

There were obvious 'flamings' during the interactions in one of the public submissions involving one of the village groups, with 'Chief Iron-gut' strongly voicing his *continued disgust* and suggestions of *smear campaigns*.

The four media organisations had dedicated online discussion board forums and their media releases were actively examined with a total of 3,241 readings. These releases showed evidence of communications between the media groups and the public inquiry groups which allowed yet a further forum for all parties to voice their opinions, seek support, present their research, and debate. The media groups themselves had their own opinions, which were often strongly made, for example,

The World Commission on Dams tip-toes around such suggestions by initiating 'an independent multinational taskforce' to 'conduct an extensive global review of existing large dams.' What will this achieve for those already affected by current developments?

There was conflict within the media organisations themselves including accusations of corruption and incompetence, as well as a *major backflip* along with suggestions of boycotting. One media group was responsible for the organising of a rally where

Approximately 7000 people attended a rally outside CDB's [China Development Bank] headquarters in an attempt to sway the bank's decision against funding the Lancang development.

Resolution

Resolution was in the form of the decisions made by the decision making organisations for each public inquiry which were posted onto the discussion board. These 'solutions' did not meet with universal approval and there were recommendations made by students that the Mekong e-Sim could have been extended to allow for further interaction at the decision-making (resolution) stage. This aligns with Garrison and Anderson's observation that *Inevitably, results of the resolution phase raise further questions and issues, triggering new cycles of inquiry and, thereby, encouraging continuous learning* (Garrison and Anderson 2003, p. 60).

The China Development Bank (CDB) was the Lancang inquiry decision-maker. It was clear that they had taken carefully note of all the discussions and debates with regard to the proposed Lancang development. This could be considered as an informed compromise between all views expressed and without the various submissions and responses it would not have been able to make such an informed and rational decision. CDB further identified that *relatively little attention was made with regard to the effects of improving river navigation*, or suggestions of alternative navigation.

The final decision submission was detailed and carefully outlined the issues and proposed solutions identified during the debate. CDB decided to grant the funding to build one additional dam of the proposed six dams, but would not finance another further dam for a period of five years in order that some of the impacts downstream can be assessed. CDB also imposed several conditions upon the loan before it was granted as well as identifying that it would continue to fund improved navigation routes, again with certain conditions attached.

The World Bank International Advisory Group (WB-IAG) was the decision-maker for the Nam Theun II inquiry. Based on the information acquired during the public inquiry, it recommended that the World Bank go ahead with funding the Nam Theun II project as it was *the most feasible electricity generation source*. Unlike the Lancang final decision, few conditions were imposed, apart from the setting up of a third party not affiliated with the Laos government to distribute the compensation funds to the displaced villagers as they had *concerns as to whether the people would ever see the promised funds*. It approved Transfield's Denil Fish Way migration solution and the monitoring and temperature control device installation at an approximate cost of \$4.2 million.

DEBRIEF REPORTS

At the conclusion of the public inquiries, each student was required to provide a debrief report. Fifty (50) 2004 debrief reports from University of Adelaide students

have been analysed within a Community of Inquiry framework. The following incorporates feedback on the e-Sim dynamics and whether it accurately reflected the complexity of natural resource management.

One student's comments illustrates the general reflection by the majority of students: *I feel the e-sim represented the complexity of natural resources management realistically in some aspects and unrealistically in others.*

Teaching Presence

The design of the Mekong e-Sim was considered realistic in that there were a large number of diverse organisations with different aims and the decision-making process design was complex and time consuming.

However, several unrealistic aspects were identified and the following was reflected by the majority of students, which is also relevant for both the cognitive and social presence aspects of the Mekong e-Sim within a Community of Inquiry framework.

- There was a lack of cultural diversity of participants. All of the participants were from a western style education background with similar types of thinking. Students considered that the role-play setting could be locally based in order to overcome this imbalance.
- A common observation was the unrealistic accessibility and ease of communication between all groups. There were no communication or language barriers – including unrealistic equal access to all to media releases.
- Further, there was an inaccurate 'level playing ground' for groups with varying amounts of power.
- No emphasis was placed on how the relationships between personas would be affected after the public inquiry. *In the real world, more emphasis would be placed on reaching a compromise.*
- The issue of time constraint was also considered unrealistic – real life debates on similar issues can take a decade or longer to resolve.

Social Presence

Students reflected that they learnt the need to develop constructive arguments rather than emotive, derogatory comments, and that they need to be willing to compromise. *The ability to communicate with conflicting parties is one of the most important lessons I will take from the e-Sim.*

Whilst commenting that a designated persona may hold a conflicting value system with the individual in real life one student reflected: *This is not necessarily detrimental, it is important to go outside and challenge our own experiences against those of others to see what its like when the shoe is on the other foot.*

One powerful group attempted to coerce smaller organisations into liaising only with them regarding their concerns and any information. This was after futile efforts by one powerful organisation to form an alliance with another powerful organisation. *I found this aspect interesting and enlightening as I have little knowledge of politics.*

Cognitive Presence

From a cognitive perspective, there was overwhelming qualitative evidence that students considered that effective learning had occurred, especially with regard to decision-making and they were able to recognise the relevance with their future engineering careers. Some examples:

- *I believe that as a learning tool, the e-sim was a spectacular success. It conveys the multi-dimensional aspects of decision making and its inherent difficulty far better than standard lectures, tutorials or research groups ever could. It achieved this by being, above all, interactive.*
This student also reflected on the transferability of knowledge gained, citing Australia's Murray-Darling river system as well as a local fun park which controversially is about to be demolished.
- *This simulation has probably been the most beneficial task in teaching me ideas that will be useful to me as a professional engineer for years to come.*
- *The e-sim was a tremendous opportunity to be given an insight into 'the real world' of engineering. We do so much theoretical work that it puts light at the end of the tunnel to see a practical sense to it, and know that the class work we do has a strong relevance to actual engineering jobs.*
- *I had no idea before this just how much went on [in] major engineering projects. I learned skills in researching, debating and deal-making which should help me throughout my engineering career.*
- *The e-sim was an excellent learning tool and experience. It has changed the way I look at engineering and shown that its challenges go far beyond technical issues.*
- *The simulation showed the complexity of the decision making process, especially when we realised that we were deciding the future of other people's lives.*
- *Participation in the e-sim highlighted the complexity of environmental decision-making. It enabled me to identify and relate to the political, economic, social and scientific dimensions to decision making in the context of natural resource management conflicts.*
- *Before starting the e-Sim, I had no idea how many problems would arise with a project like the one we worked on, and how much work was involved to solve those problems.*
- *The issue of uncertainty also made the project more complex.*
- *The one thing that made me realise most of all the complexity of natural resource management decision-making, was that even in the relatively short amount of time we had, the number of issues and problems was astonishing. It made me see that a project like this in real life would have to be so much more complex....*
- *The e-Sim is a very good tool for allowing students to experience the complexity of decision making processes we will probably be faced with in our line of work after completing our degree.*
- *I believe the most valuable lesson that has come from this exercise is the need for compromise to resolve a solution in real life decision making.*
- *When I started the e-sim I pictured it as being like one big group project, with the different groups bouncing ideas off each other until we came up with a satisfactory answer. It wasn't long before I realised that this would not be*

possible, there was simply no solution that could please all stakeholders. As an engineering student, who is used to assignments with clear cut numerical answers, I found this a little disconcerting.

- A comment from a member of one of the decision-making groups in relation to searching for alternatives which achieved the same positive outcomes of development with as little negative impact as possible:
Organisations that provided alternative suggestions and solutions were more useful to us and therefore often given more credibility. However, this then created a danger of deliberately looking for any solution, without making sure that it was first feasible and correct. This then created an added learning experience of the complexity and difficulties of decision-making which I think only the decision-making groups would have had.
- *This leads to the key factor to have come out of the e-Sim, how is monetary value placed upon environmental and social costs and benefits.*
- *Before commencing the e-Sim, our experiences of decision-making had always been limited to project groups of no more than four people. We expected to find the task a complex one, but were still surprised by the strength of arguments against us, and by our own lack of understanding early in the process.*
- *This simulation has given us an important reminder that the world is much bigger than our home country.*
- *One of the issues highlighted through the e-Sim was the importance and complexity of media relations.Distortion of the truth by the media occurs every day in real-life and hence the misrepresentation experienced by some personae, while seemingly unfair, was an accurate representation of real-life interactions.*
- *[This] difficulty in presenting opinions to opposing parties represents one of the complexities of many aspects, including environmental decision-making, in real life. In real life it is often necessary to convince opposing parties of your views simply because they hold the greatest power.*
- Several students reflected that in the future, they would take a more neutral stance, show environmental problems, offer suggestions to minimize the impact of the problem.
- Students influenced cognition development of other students:
Economic advantages carry more weight than social and environmental disadvantages. While I believe this is unfortunate, this realization will affect the way I approach environmental decision-making problems in the future. Through the e-Sim, I have learnt that organisations that present obstacles without proposing solutions are given very little regard. In order to make your voice heard it is necessary to view the project from the bigger picture, consider the opinions of opposing parties and above all take into account the desire for monetary gain that drives the western world.
- Many students considered that the Mekong e-Sim could be applied to many large scale projects around the world in both developed and developing countries. As one student commented: *When many countries are affected by a decision, the complexities multiply* and cited similar situations with the Euphrates incorporating countries from Turkey to Iran

RECOMMENDATIONS

As a result of the analysis of both the discussion board interactions and the individual debrief reports, the following student recommendations (with authors' comments in brackets where relevant) have been identified within the category of teaching presence in order to enhance the Mekong e-Sim's social and cognitive presence.

- *The number of group members should be determined by the size and amount of power of the real life organisations. Larger groups should have more members and allocation of space on the discussion board than smaller groups. I believe this would give students a better understanding of the diversity of power distribution amongst groups and help to demonstrate the complexity of decision making.*

- *Work on an older real life project where a solution had already been developed. Compare our solution with this in order to reflect on what we could have improved.*

(Knowledge of real-life solutions may compromise the quality of the role-play. Instead consideration could be given to modelling the e-Sim on a similar project where a solution has been reached. And, as recommended by a student, incorporate a post public inquiry outcome review and compare decisions made with real life decisions and how they were conducted. This would allow for better development of the resolution stage of cognitive presence, which is presently lacking in the Mekong e-Sim.)

- *Incorporate a face to face public debate or round table discussions where all parties present their case, ask questions and respond. Or an 'intermission' public forum. Some students considered that real time meetings and discussions would more likely ensure persona involved in the e-Sim could not easily avoid questioning and criticism.*

(This is possible for on-campus students but in the case of distance students or students from other discipline areas and universities, consideration could be given to incorporating the 'virtual classroom' - a synchronous chat room – which one student observed was not functioning and which would have been 'invaluable' with his group.)

- *The Group Profile/Strategy feature is 'essential' and needs a more in depth role adoption process and more marks allocated to briefing stage including incorporation of questions regarding the organisations' policies.*

(The following student's comment reflects a common feeling that more preparation time could have been allocated prior to the Public Inquiry submission stage: *Everything we learnt from the e-Sim, we learnt from being thrown in the deep end with little to cling to, and being forced to find our own means of survival.* Further feedback indicated that:

Perhaps there could be more emphasis placed on giving students extensive background information prior to e-Sim so that there is a greater understanding and motivation of what needs to occur during the interaction stage.

And further that briefing dossiers on each organisation should be expanded to include definite attitudes, opinions, likely affiliates and viewpoints. *These briefing notes should provide a background on the organisation, and be a launch pad for the e-Sim.*

One solution to this could be to make the e-Sim available to students at the beginning of their course for background information purposes as well as

examples of submissions from previous e-Sims, without activating the groups, discussion board forums or public inquiry topics. Several students indicated that they required more orientation and were unsure of the expectations of the e-Sim regarding quantity of submissions, level of factuality required and timeframes to complete tasks.)

- *Involve students from other disciplines eg Geography, Finance, Journalism, as well as from other countries, especially Asia.*
(Diversity of input has already been recognised by the lecturer with attempts to collaborate with other discipline areas. One of the major stumbling blocks is timetabling and scheduling constraints.)
- *The set up of the public inquiry discussion board forums could be separated in order to better distinguish different submissions and threads.*
(Enable the new thread feature to allow students to respond to specific subjects rather than the original public inquiry submissions.)
- *The scope of the Public Inquiry is too large. Instead identify the stance of each persona so that they would only have to argue their case against three or four personas, rather than ten or more. Allow each persona to do a large amount of consulting with relatively few groups.*

And in a similar vein

To improve the e-Sim I feel the arguments in the discussions need to be held under stricter guidelines like debating with a cap on the number of responses any group can have to another group. I think three responses from any one group in any argument strain would have made the discussions more interesting and made alliances much more important. It would result in groups having to use their alliances to get their points across once they have used up their three responses. This would result in briefer, well defined discussions with greater increase in probable outcomes.

(There were further recommendations that group submissions could be staggered with different timelines in order to alleviate student concern that simultaneous timelines meant a great deal of information to absorb in a short time frame.)

- *Apart from the decision-making groups, give participation mark directly for how well the groups' final decisions reflected their policies and objectives. This would result in more constructive comments in the PIS.*
- *Decision making groups should begin the public inquiry with a submission of their own, to publicly indicate their goals and priorities.*
- *Include a judicial overseer – someone to adjudicate in a legal way.*
(This could be implemented via the online virtual classroom whereby the involved parties simultaneously present their case to the adjudicator - ideally involving law students - and have a decision made.)
- Many students reflected that the only viable solution was compromise. And as one student said: *If the inquiry had run for longer we may have had the opportunity to begin compromising more as we realised arguing would not solve any problems.*

(In a similar vein students considered that the time of the e-Sim could have been extended after the final decisions were made in order to allow groups to report on the results. They considered that this would enable a better understanding of the feelings of other organisations about the results and would support an earlier observation that the resolution stage of cognitive development is not sufficiently incorporated at present).

- *The e-Sim cannot properly represent the power of human emotions. Include media such as pictures and videos to create emotion.*

CONCLUSION

The web based Mekong e-Sim is already recognised as an innovative and quality learning environment within higher education. The analysis of this role-play simulation within a Community of Inquiry framework further demonstrates the high level of sustained critical thinking and discourse achievable in an e-learning environment. In addition the constructive student recommendations highlighted in this paper illustrate in depth student involvement and deserve further consideration.

In the last few weeks since the commencement of this analysis, the University of Adelaide's Burns Unit within Clinical Nursing has developed a disaster management e-sim along similar lines to the Mekong e-Sim. The design of this is already receiving accolades within the medical and academic communities and incorporation of the Community of Inquiry framework is expected to provide further evidence of the development of deep and meaningful learning within an online role-play simulation context.

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APPENDIX A

Role Profiles – Nam Thuen II

Type of role	Abbreviation	Name of Persona	Area
Government	MAF	Ministry of Agriculture & Forestry	Lao PDR
	MIH	Ministry of Industry and Handicraft	Lao PDR
	STEA	Science, Technology & Environmental Agency	Lao PDR
	EGAT	Electricity Generating Authority of Thailand	Thailand
Development	WB-IAG Decision maker	The World Bank International Advisory Group	Based in USA
Non-Government	TERRA	Towards Ecological Recovery and Regional Alliance	Thailand
	Oxfam	Oxfam International	Mixed
Academic & Research	PROBE	Probe International	Canada
	WCD	World Commission on Dams	World
Media	Watershed	Watershed: The People's Forum on Ecology	Thailand
	Vtimes	Vientiane Times	Lao PDR
	CNN	Cable News Network	World
Village group	NTV	Nam Theun Villagers	Lao PDR
Engineering	Transfield	Transfield	Australia
	SWI	Scott Wilson International Consultancy	Malaysia

Role Profiles – Lancang

Type of role	Abbreviation	Name of Persona	Area
Government	CNMC	Cambodia National Mekong Committee	Cambodia
	MAFF	Ministry of Agriculture, Fisheries and Forestry	Cambodia
	LGWRC	Leading Group For Water Resources and Water and Soil Conservation	China
	EGAT	Electricity Generating Authority of Thailand	Thailand
	NPC	National Planning Committee of the Peoples Republic of China	China
	MARD	Ministry of Agriculture and Rural Development	Vietnam
Development Organisations	CDB Decision maker	China Development Bank	China
	TCTID	Transport, Communications, Tourism and Infrastructure Development division of the UN Economic and Social Commission for Asia and the Pacific	UN
	MRC	Mekong River Commission	Cambodia, Lao, Thailand, Vietnam
	UNDP	United Nations Development Program	UN
Non-Government	OXFAM	Oxfam International	Mixed
	IRN	International Rivers Network	USA
Academic & Research	PROBE	Probe International	Canada
	WCD	World Commission on Dams	World
Media	Watershed	Watershed: The People's Forum on Ecology	Thailand
	Vtimes	Vientiane Times	Lao PDR
	CNN	Cable News Network	World
Village group	TLSF	TonLe Sap Fishers	Cambodia
Engineering Organisations	SWI	Scott Wilson International Consultancy	Malaysia

APPENDIX B

TERMS OF REFERENCE

Nam Theun II Public Inquiry

The terms of reference of the inquiry included:

- (1) The extent to which alternatives to the Nam Theun II dam will meet the proposed development goals of the project.
- (2) Whether the social impacts of the Nam Theun II dam are acceptable or require mitigation
- (3) Whether the environmental impacts of the Nam Theun II dam are acceptable or require mitigation.

Lancang Development Public Inquiry

The terms of reference of the inquiry included:

- (1) The extent to which the proposed development meets its goals and benefits the Mekong River Basin as a whole.
- (2) Whether the goals of the development could be satisfactorily met using alternative solutions.
- (3) Whether the social impacts of the developments are acceptable or require mitigation.
- (4) Whether the environmental impacts of the developments are acceptable or require mitigation.

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