Unit 10 – Tutors
Culture in Professions and Trades

Fitting It All In

This activity is based on an earlier design called "Lux Luther" devised by Jeff Kinder and Mark Luther and first published in Leigh, E. and Kinder, J (2001) *Fun and Games for Workplace Learning* McGraw Hill, Sydney

Introduction

Each profession and trade has its own sub-culture. And together all the professions and trades associated with building construction share a culture based on both the differences among them, and the vital necessity of working out how to collaborate to complete the erection and fit-out of each new building.

This collaborative/competitive relationship creates a unique 'culture' on each building site. To help understand how this culture is created and developed this activity is a chance to explore how such a culture is first established, and what might need to happen along the way to ensure that the final result is a satisfying new building. The focus is on the need for – and the difficulty of – collaborating across a large project where each individual set of requirements must be adjusted to allow consideration of every other set of requirements.

As with other activities in the Engineering Across Cultures program, this one can be used in a variety of contexts. While the focus is on the building and adjusting of a specific workplace related culture, the observations and experiences are relevant to a wide variety of engineering settings and collaborative tasks.

The activity is conducted in two stages. The first stage can be incorporated into an online learning resource system, or explained towards the end of a prior class. The second stage is a fast-paced activity involving negotiation about, and assignment of, key variables to designated relationships before building of a large-scale metropolitan building can begin.

The Learning Focus

For the purposes of this activity five stakeholder groups are identified and students are assigned to research and enact each group. These groups are representative of the professions and trades involved in the selection and design of building services in a large scale metropolitan building including –

Design of space
External and internal appearance
Heating
Ventilation
Fire
Electrical
Communication (phone, internet, cable/fibre optic, satellite dishes etc)
Water
Transportation (lifts escalators stairs hallways)
Plumbing
Air conditioning

Resources

Print resources for this stage detailed in Appendices 1 and 2 are

1. Role statements for each group of participants
    a. 6 packs of cards – see appendix 2
        - Pack 1 – client/owner cards
        - Pack 2 – Contractor/Builder
        - Pack 3 - Architect
        - Pack 4 – Services consulting engineers – electrical, transport, communications
        - Pack 5 – Services consulting engineers – heating, air conditioning, ventilation, water, plumbing, fire
        - Pack 6 – Observers. Distributed on the day of the activity – not beforehand

2. Handout detailing the process for Phase Two.

3. Other resources - large coloured rings e.g. hula-hoops or other solid material hoops that are painted in different colours.
   For a transportable and reusable pack a set of large coloured chalks and a robust eraser will also work. You will need to ensure that you can use chalks in the assigned settings.

Process

Phase One

About a week prior to Phase 2 you will assign students to 'working teams' to research their roles in order to effectively represent their stakeholders' interests. Introduce yourself as the Project Portfolio Manager (PPM – see the Engineering Across Cultures materials at Unit 13) and explain that you will be facilitating the meeting they are preparing for – but have no authority to override suggestions or decisions made by the teams individually or collectively.
If you are using an online Learning Management System the research resources can be provided to each group online. Otherwise the role descriptions and print resources are distributed along the a general overview of the entire process at the end of the lecture or tutorial preceding the scheduled activity.
To participate effectively students must complete research on their assigned roles. To do this they review their role description, agree how to complete the tasks listed there, and become familiar with everything they can find about how to begin a major construction project, and become familiar with the concept of "*the failure of optimisation as a design strategy*" [see Appendix 2 for an explanation] prior to Stage Two.

NB - There is a 15 minutes preparation phase in Stage Two – but this is only to introduce the tasks. If their preparation is not sufficient they will be severely disadvantaged during the action. You may want to remind them of the 6P's of good planning: "Prior Preparation Prevents P—s Poor Performance." Emphasise the importance of being ready for the meeting. For example point out how it relates to the graduate qualities and engineering capabilities/competencies relevant to the larger unit of study of which this is a part. Each of their cards must be completed prior to Phase Two with clearly stated stakeholder needs written on its reverse side. For example a consulting engineer contractor may list "responsible for erecting elevators" and "electrical supply".

Stage Two

Setting

For this Phase you need an area where resources can be moved around and you can draw on a large board or preferably on the floor with chalks, and teams can sit and discuss without distracting each other.

Process

Welcome the teams to the first meeting of the construction project [Provide a Name for the Project} and assign them to clearly defined spaces around the room. Announce that this meeting is so important that you need one member from each team to become an observer who will be involved in noting the progress of the meeting and reporting back on their observations of strengths and weaknesses of the process as it unfolded. Teams can draw lots, appoint a representative or call for a volunteer.
Once each team has nominated their observer give them the Observer cards and send them to their assigned space to review their role and prepare for action.

Briefing

Step One

The teams first select their coloured hoop [or chalk] and then have 10 minutes to consider and discuss the needs they have listed on their cards. Now that they are at the meeting where their collaborative efforts will

be on show, they need to be clear about the impact and consequences of getting these needs met. They have to consider both the overall goal of completing the building and the needs and expectations of all the other teams as well. This won't be an easy task and they will need good reasoning and analytical capabilities to give all the needs adequate consideration and discussion. If teams all seem ready in less than 10 minutes move on to the other next step, but insist on the 10 minute time limit.

Step Two

Call *Time* and invite each team to take their ring and place it beside, next to, or overlapping with others rings. As PPM do not give advice or direction - leave it all open to interpretation. This emulates the usual condition at the beginning of such a meeting in real life, where all the participants are coming together and learning to understand how each other will work, as well as how to navigate their way to a successful building project.
Allow 15 minutes for this process. If everything is in place sooner move on the other next step, but be specific and insistent on the 15 minutes time limit.

Step Three

Teams withdraw to their meeting space and discuss where to place the first of their five stakeholder cards ***within*** the rings as they see appropriate. At this time they can only place one card as this is a time to appreciate that their needs may impact on others and that the consequences of their decisions may also affect how others can operate.

NB - If the teams want to adjust the relationships among the rings they can do so now.
Allow five minutes for this 1st attempt.

Step Four

Once the first cards are all placed the teams have a final 5 minute discussion session. When you call *Time* the teams must place all their remaining cards. Free form discussion, negotiation and action are all allowed. Further adjustment of the rings may be needed.
Allow 10 minutes for the completion of this step.

Step Five

Call *Time* one final time and invite everyone to bring their chairs and sit – in their teams - around the 'sculpture' they have built. As a whole group the task is to consider first the sculpture as a whole, then the placement of the rings and finally – and in more depth – the placement of each card. This conversation can include the observers – but their specific contribution comes in the debriefing that follows.
Questions you can ask at this time include –

- Does the final product of their work look tidy and achievable as a road map of the future work together on the project?
- If they were to suggest changes to the 'whole structure' what would they be? Why?
- How did the rings arrive at this final arrangement?
- Were they moved several items? Only once? Not at all after the first placement?
- What does the arrangement signify?
- Will it be a helpful guide to future cooperative work on the project? Or might it lead to arguments as stakeholders begin work on the construction?
- Are all the cards 'essential' 'needed' 'unable to be forfeited' or only 'preferred' and therefore negotiable?

Debriefing

Allow at least 15 minutes for this discussion about the practicalities of the activity and then invite everyone to stand up and walk a short distance away from the 'sculpture' before returning to their seats.

Tell everyone that this signifies the shift away from the practicalities of the activity and that the discussion will now focus on the 'culture' they developed during their exchanges around placement of the rings and cards.
There is an inherent complexity in making the kinds of decisions required to begin projects of any size, and they have been actively creating an example of that complexity.
As it is usually easier to see the habits and behaviours of 'culture' from the outside say that you will conduct the debriefing in three stages.
First Observers report what they saw during Step Two and Step Three. Then team members comment on their thoughts and feelings as they worked.
Then Observers describe what they saw in Step Four. Team members report what their thoughts, feelings and observations during this time.
Finally there is a general discussion about how all this relates to what they know of construction projects, or other large scale activities where there are differing goals and priorities that have to be negotiated to achieve a coherent outcome.

Questions to help guide the discussion include –

1. What steps did each team take to develop their strategies?
2. How much attention did teams pay to the existence of other groups?
3. What problems did they encounter in developing their understanding of the task?
4. How well did they work as a team?
5. Were there changes in strategies and actions through the various phases?
6. Are there differences between the Observers reports and what the participants report?
7. How did participants manage the negotiations? Were some teams more successful in achieving their aims? What did they do?
8. What kinds of issues arose that parallel events and actions on real building sites?
9. What are some of the issues that surprised participants as they worked through the process?
10. How does this relate to what participants know about – or think they may know – about construction sites?

Appendix One

Resources to collect when preparing for "Fitting it all in"

1. Appendix 2 - Extract from "How buildings Learn"
2. Web links for discussions of optimisation and sub-optimums as better than attempts to optimise it all see for example
    a. http://www.infoq.com/articles/agile-sub-optimal
    b. http://en.wikipedia.org/wiki/Satisficing
    c. http://www.constructors.com.au/publications/rc_general/Relationship%20Contracting%20Optimising%20Project%20Outcomes.pdf
    d. http://www.nrcresearchpress.com/doi/abs/10.1139/l99-031#.UJIylGmH6ls

    and any other resources on this topic that you find useful

3. Items about conflict on construction sites
    a. http://www.forconstructionpros.com/article/10117359/conflict-resolution-for-construction-crews
    b. http://www.academia.edu/246338/Conflict_in_construction_constructive_conflict_
    c. http://www.ekt.bme.hu/CM-BSC-MSC/HowToReduceConflicts.PDF

    and any other resources on this topic that you find useful.

Appendix 2

The Failure Of Optimisation As A Design Strategy

Brand, Stewart (1994), *How Buildings Learn,* Penguin Books, New York, pp. 170-171.

When information technology took off in the early 1980s, many of the highrise office buildings of the previous two decades were found to be absolutely incapable of adapting. Their floor-to-ceiling height was too low. There was no room for both a dropped ceiling and a raised floor, and no way to fix the problem. Blocks of new buildings in London's data-intense financial district were suddenly obsolete, and since the problem was structural the only cure was demolition. Some of the buildings that replaced them erred in the opposite direction. The "smart building" boomlet of the early 1980's was based on the idea of electronically integrating all the control systems of a building and offering tenants a full menu of built-in information services. Both failed. Climate control, fire suppression, security, lighting, and communications – all were supposed to be managed by a bank of computers tracking on time of day, day of week, who was in the building, and detailed sensing from all over the building. Integrating all the complexity in one bundle meant that only a specialist could understand or handle the system, and a problem in one area could infect the others. Seeking to improve control led to loss of control. One night at the headquarters of Bechtel, the worlds' largest construction firm, a group of senior executives met in the dark because none of them knew the phone code to turn on the lights.

Since all these pre-installed information services cost the developer […] extra, higher rents were charged. It turned out that no one wanted to pay extra, and "smart buildings" died in the market in just a few years. There was a contradiction at the heart of the idea, according to Steve McLellan, a telecommunications regulator in Washington state: "We found that any user sophisticated enough to seek out a 'smart' building was also sophisticated enough to home brew a more flexible system." Tenants universally preferred to install their own communication systems.

What do the linked debacles of deep office buildings, sealed office buildings and 'smart' office buildings have in common? Each was a clever and comprehensive design solution, but each tried to solve just one primary problem and acted as if the problem would hold still over time. These were classic cases of overspecificity, overcentralized control, and "tight fit." Each took a conspicuous trend of the moment – open offices in the 1960's, energy efficiency in the 1970's, information technology in the 1980's – and at astronomical cost, shaped whole buildings tightly around it. When the trends moved on, the buildings were left standing, good at something that no one wanted any more. Their failure is the failure of optimisation as a design strategy.

Questions to Consider

Why would 'optimisation' fail as a design strategy?

What factors need to be considered to ensure that engineering projects do not fall into the trap of relying on 'optimisation'?

What would you need to know to recognise that this might be happening?

What factors might cause people to 'push' optimums for their own particular profession or trade?