COLLABORATIVE PROJECT: CROSSING BORDERS BETWEEN ARTS AND ENGINEERING

Alain Desrochers
Department of Mechanical Engineering, Faculty of Engineering, Université de Sherbrooke
Alain.Desrochers@USherbrooke.ca

Jim Benson
Department of Fine Arts, Bishop’s University
jbenson@ubishops.ca

Abstract

The paper is about a collaborative project focused on the design and fabrication of a cauldron for the Canada Games 2013, involving students from engineering and fine arts, along with trainees in welding and machining. However, the subject of this inquiry is more about the process that led to the completion of the cauldron than it is about the cauldron itself. Indeed, the authors explore the cultural differences, the human relations, the management of authority and the moving limits of creativity relative to the client’s own vision of the artwork. No strong consensus clearly emerges from the analysis but it can be seen that the behavior variability between some students within a same group is greater than it can be between different groups in some instances. Hence, as wisdom would have it, goodwill, maturity and motivation can overshadow tension and stress caused by leadership competition and a constrained timetable.

Keywords: Collaboration, project, art, engineering, process, design, human relation.

1. INTRODUCTION

Purpose of this inquiry was to challenge students to work collaboratively with others outside their discipline in an experiential project with an actual client. The project came into being early in 2012. Initially Prof. Desrochers proposed to Prof. Benson a collaborative project in the design and fabrication of the cauldron for the upcoming Canada Games held in Sherbrooke in summer 2013. This project would involve both advanced sculpture students of Prof. Benson, the mechanical engineering students of Prof. Desrochers, in the design and planning phase, as well as students from Lennoxville Technical and Vocational Centre also located in Sherbrooke who would fabricate the cauldron, and finally the Canada Games committee who would accept or reject the proposed cauldron.

2. PROJECT DESCRIPTION

Before embarking on a detailed account of events relating to the process by which the cauldron became reality, it may be worthwhile to present the respective context and pedagogical objectives that were being sought by the engineering and fine arts professors through this original experiment.

2.1 Engineering context

Professor Desrochers holds an NSERC (Natural Science and Engineering Research Council of Canada) Chair in Design Engineering (CDE) whose objective is to improve the level and quality of design engineering activity within Canadian universities. To that general objective, the Chair on Design for Aluminum of Professor Desrochers adds a more specific one which is to encourage the use of aluminum in products from a cost/benefit/performance perspective. From that viewpoint, the Canada Games cauldron project meets both objectives and adds to them a collaborative dimension that is being sought in the Chair program. Most interestingly, is the fact that the project carries potentially conflicting objectives for the engineering and arts students regarding aesthetics and manufacturability within a fixed and limited common timeframe. Such a constrained work environment in a partially nonhierarchival organization, bear obvious challenges in the conduct of the project and the management of authority. Hence, from a professor’s and design chairholder perspective, the radically different background of both arts and engineering students created a unique opportunity to study collaborative work in a most unusual configuration. In other words, the process superseded the product (the cauldron) in this particular project.

2.2 Fine Arts Context

The rationale of the advanced sculpture course at Bishop’s University is to advance basic skills acquired in the first two levels of sculpture so as to challenge students to take on innovative projects chosen by Professor Benson. While students tend to focus on the course requirements to create a product, his interest is in the process of why and how the product came about. In other words, he is interested in the quality of the decisions taken by the student during the process of creation. Notwithstanding, fine arts students often see themselves as solitary creators, resistant to what they view as
giving up control in negotiating creative solutions in relation to both their fellow students and often their instructor. For these students the myth of originality is paramount. As such, in order to engage students in a more balanced understanding of artistic practice, Professor Benson often seeks opportunities for students to take on a more sociological view of artistic existence. That is as role-players and examine the social structures in which they are socially constructed. From his experience, the most effective manner he employs is collaborative work wherein no single individual has sole artistic license. He considered the cauldron project as it was proposed, as an occasion to take collaboration one step further by creating a situation where his students would be forced to find creative solutions outside the context of the art world which they naively understand it to be justified on the basis of the capricious will of the artist acting on individualistic impulses.

3. DESCRIPTION OF EVENTS

The Fine arts course related to the project took place in the fall semester of 2012. Initially there were 12 Fine arts students involved. Unfortunately most dropped off when the course ended in December. Two continued on in the winter 2013 semester for no additional credits. On the engineering side, after casting an advertisement for the cauldron project to the third and fourth year mechanical engineering students, several of them showed interests and three were chosen to enroll in a “specialty project” course in the 2012 fall semester. In addition to the course credits, these students were highly motivated by the project itself and the value and symbol that it bore. As a proof, all three chose to pursue the project for no credits in the winter 2013 semester. For the purpose of this paper however, the inquiry will focus mainly on the fall semester since that is when the design phase took place.

3.1 Cauldron concept evolution

A first logistic constraint arose from the fact that the artistic design phase needed to reach a certain level of maturity before the engineering students could start working. Hence, within the first two weeks of the semester, arts students were required to create and present “maquettes” so as to brainstorm possible solutions. Each student presented their own maquettes. Engineering students were not involved at this first meeting. Subsequently, in discussions which included the engineering students, distinct themes began to emerge. Second and third generations of maquettes included variations on human abstractions of and non-figurative possibilities. Some students began to collaborate amongst themselves and proposed groups possibilities. A common theme that emerged took the form of a rising vortex of curved planes. Also there was a proposal of incorporating individual leaves into a design. At this stage the Canada Games group was sought for their input. The Canada Games committee decided to base the cauldron design on the existing logo of the games, a circular ring behind a flowing maple leaf (Figure 1).

Figure 1: Canada Games logo as an artwork?

3.2 Collaborative work and project management

The Canada Games decision was the cause of some tension between the arts and engineering groups. The sculpture students expressed disappointment that the logo design as a graphic two-dimensional form, would not work well visually as a three-dimensional object. There was a concern that without their aesthetic input, the design would likely become nothing more than a three dimensional version of a two dimensional graphic design. They perceived the engineering students as viewing the Canada Games decision to create essentially a low relief of the logo as a satisfactory solution to the design. For the engineering students, it was indeed the signal they had been waiting upon before embarking in the structural calculations, manufacturing and assembly planning. From there, any subsequent proposition was to be viewed as a backward iteration and a threat to their work and progress. In short, the engineering students were seeing the arts students as being merely there to provide advice on aesthetic issues and thereby denying them the privilege of a proposing constructive evolution to the Canada Games approved design.

At the same time, a smaller group of sculpture students decided to use the logo as a starting point and try to integrate the common theme of the rising vortex. In order to open up the sense of movement the ring was eliminated and replaced by an elongated C shape (Figure 2). Also, the single maple leaf was replaced by a mosaic of smaller maple leaves while retaining the overall shape of the larger leaf, an idea from an earlier maquette. This initiative was a source of tension among engineering and arts students but also within the engineering team itself, as participants had diverging views of the arts student legitimacy to propose what they assumed to be a new concept. In second analysis, it appeared that those most insecure about the project planning had the more inflexible positions whereas, other, more confident participants (including the engineering professor), were more lenient in allowing the concept to gain maturity. As in many such situations, and with
a little goodwill from everyone, things untangled when a meeting was called, allowing engineering and art students to discuss the matter face to face. After some discussion, the engineering group together with the Canada Games committee compromised and agreed to the existing design.

**Figure 2: Virtual model by engineering students**

### 3.3 From virtual to real world

At this stage, the Lennoxville Vocational Technical Centre (LVTC) group was implicated in the project. The mosaic of leaves component could not be easily incorporated into the drawings as the aesthetic issues could only be resolved by the fabrication of a cardboard maquette that the sculpture students would have to bring to LVTC and work directly with the students in determining the precise placement of each leaf (Figure 3). Thus the nature of the project did not emerge as a clear sequence of stages from maquette to fabrication. All parties we consulting with each other throughout the process. At the time of this writing, the fabrication is in process (Figures 4 and 5).

**Figure 3: Authors, collaborators and cardboard model**

**Figure 4: Fabrication of Art work at the LVTC**

**Figure 5: From cardboard to aluminum at the LVTC**

### 4. ANALYSIS

Besides the fact that students delivered the design of a cauldron for the Canada 2013 Games, the pedagogical intent is more than a tacit demonstration of acquired skills.

#### 4.1 Theoretical background

Before turning to the specifics of the interaction between participants, the existentialist philosophy of Martin Buber can be utilized as a lens to identify the conflicting epistemologies that inform educational philosophies. For the purposes of this paper, Buber from his classic book I and Thou (Buber, 1923), distinguishes between two attitudinal positions between people: the It-It stance wherein the individual as the subject chooses to relate to another as a passive object; or the It-Thou stance wherein the individual as a subject chooses to relate to another as another active subject. Whereas simple subject to object
experiences are designated as I-It; significant interactions are designated as I-Thou. Moreover, whereas the world of the I-It is the conventional way of relationships, as it is essential for survival, the world of the It-Thou is what makes us fully engaged with both our intellect as well as our emotions.

According to Buber (1947), it is the I-Thou encounter that is the only type of relationships to develop with our students if the end results are to be considered successful. Buber distinguishes between educators informed by objective and subjective epistemologies, referring to the "old theory of education which is characterized by the habit of authority... (and the)... modern theory which is characterized by tendencies to freedom" (p. 115). The former emphasize the importance of "objective" education gleaned from examining great classic works of the past, as well as developing technical knowledge in order for individuals to find a place in society. The latter are those who emphasize "subjective" knowledge, who look on education as the development of creative empowerment in accordance with subjective need or interest. According to Buber, these two approaches represent different, incomplete aspects of a whole picture because they inhibit the potential for the I-Thou encounter to occur. In viewing education in terms exclusively of the dominance of the subject/object relationship between the teacher and the student these approaches regard it as either the transfer of objective tradition poured in from above and passively received (Buber's analogy is to a funnel) by the student as the object, or as drawing forth the subjective powers of the self (the pump) of the student, again as the object (Friedman, 1960, p. 177). In either case the result is the same, the dominance of the subject/object relationship results in student growth being stifled because the opportunity for subject to subject meeting (the I-Thou) is not present.

4.2 Educator’s perspective

While both Professors Desrochers and Benson as educators, set the goal for students to work towards, they are primarily interested in the quality of decisions that takes place during the process of working towards the goal, the design project. They both recognize that development of skills is an on-going process that requires that students should often choose to confront their assumptions in order to refine their skills. They chose this project as it had the potential of stretching their students beyond the isolation of an academic environment so as to provide an experiential learning environment much like they would find outside academe. A measure of success would be evidence of an educated student who willingly chooses to bring to bear both his/her intellectual as well as his/her affective capacities in confronting themselves their assumptions when faced with an opportunity to learn.

4.3 Arts versus engineering educations

From this common context, there are distinct traditional constraints inherent within the nature of each discipline that left unchallenged, hinder the quality of education of the engineer and the artist. These include the notions of what it is to be a professional engineer or artist, as well as what constitutes effective practice for both. For example, consider the notion that student engineers should be primarily concerned with the development of their intellect by the acquisition of objective knowledge rather than individual creative initiative that can be applied to problem solving. The curriculum should follow a logical progression from individual skill acquisition to group activity. Individual initiative is not emphasized. Collaborative student projects in engineering will often involve logically splitting the workload into work-packages along disciplinary lines as long as those lines are clearly delineated.

Likewise, consider the notion that artist should be primarily concerned with the development of their emotional capacities that can be applied to seeking problems to solve. Concurrent with no clear consensus as to the nature of excellence in artistic activity, and a gradual erosion of objective criteria in assessing artwork, students tend to resist the acquisition of traditional skills. Increasingly artists self-generate a theory of visual idea, which is applied to a material, without even minimal experiential understanding of the nature of the material and how that material has been used by artists in the past. Whereas in the past artwork came into being as a result of students gaining visual proficiency and skill acquisition first, before expressing their own ideas. Today artists celebrate individual creativity, rather than aspiring to find their place within the established traditions. As such, arts students often see themselves as solitary creators, resistant to giving up control in seeking creative solutions.

Thus there are differences in how students from each group approach a group problem. Whereas the education of engineers takes place within an objective tradition, the education of artists takes place within a subjective tradition. Put simply, whereas engineers tend to think rationally, artists tend to emote. Challenging these one-sided constraints was the rationale for this collaboration.

4.4 Collaboration hurdles

From an operational point of view however, there is a perceived impression that both engineering and arts groups worked in “silos” in the project, each providing the output of its work to the other without really discussing the process by which they achieved their results. Several factors may have accounted for that: 1) Both groups were geographically separated; 2) The course schedules of both groups did not necessarily matched; 3) The large cultural gap between the groups fostered a wrongly believed assumption that the other group would not necessarily bring “value” to their own work; 4) The project definition for each group did not explicitly include cross-disciplinary constraints (such as cost) which would have forced a closer collaboration between both teams or groups; 5) The client cauldron specifications and expectations were rather loose and did not require much follow up and progress meetings. In any case, as in life in general, those most open-minded created their own opportunity to share and learn from the others. They decided to step into unchartered territory by seeking to confront their assumptions founded on objective and subjective epistemologies. Moreover, even in these most imperfect conditions, the result of this collaborative work is a testimony to the combined added value of each group and to the benefits of mixing emotions and pragmatism.
4.5 Assessing the project success

The question then becomes notwithstanding the traditional constraints and expectations, to what extent did our students choose to engage others as active subjects, equal stakeholders with differing strengths and weakness in the successful outcome of the project? Indeed there were significant challenges including setting up a project with students from different levels (secondary versus post-secondary), languages (French and English) and background (humanities, science and vocational training). Adding to the challenge was the conduct of the project where each institution and program was pursuing specific learning objectives and achievements, each in a schedule of their own. Coordination, planning and communication then became paramount for the project to succeed and deliver the monument in a global timeframe established by the client, the Canada Games.

5. CONCLUSION

From our perspective, some students embraced the challenge, others did not. Certainly the number students dropped off as the project developed. This could be that they lost interest after the end of the semester, or that other schedule conflicts did not permit them to continue. Time will tell in what manner this experience will be of benefit to the participants. All of these questions point to the need of further research.

For the few that remain with the project, among the hurdles that have been overcome are the definition and ranking of the monument requirements, the recognition and respect of each partner’s role and responsibilities, and, to some extent, the abilities to make compromises for the benefit of the project above all. From this experience, lessons have been learned, but most significantly the spirit of the Canada Games and the collective ownership of the project have inspired people to go beyond the simple requirements of the various courses in which the students had enrolled. Their response was a phenomenological balance between both their intellect and the emotional capacities.

Acknowledgement

The cauldron will be used for the next ten Canada Games, therefore becoming a legacy and insuring the continuity and the visibility of the symbol it is representing. The realisation of this artwork has been made possible, thanks to the support of the Canada Games Council, the Aluminum Association of Canada and NSERC.

References