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PART 2 EXPLORING COLLABORATION IN ARCHITECTURAL EDUCATION:

TOWARDS DESIGN-BUILD PROJECTS

What is the benefit of collaboration in architectural education and practice? The authors examine the concept for its ability to create well-balanced industry professionals, in part 2 of this article.

By: Hermie E Delport-Voulgarelis and Rudolf Perold, senior lecturers at the Cape Peninsula University of Technology

4. A SERIES OF DESIGN-BUILD CONSTRUCTIONS

The Design Build Research Studio has initiated a number of design-build constructions over the past few years. The aims of these constructions include exploring alternatives to the conventional studio, investing and making a difference in local communities, and embedding a sense of social responsibility in students while opening up the possibility of alternative types of practice.

THERE IS AN INHERENT FLEXIBILITY IN THE ARCHITECTURAL CURRICULUM THAT ENABLES EXPLORATIVE PROJECTS

These design-build constructions were executed within the existing academic paradigm, which is supportive of conventional studio and curriculum, not design-build. The constructions were not designed specifically with collaboration principles in mind, but with the idea that group work was implied, even if just from the perspective of a practical necessity. For the pedagogic design of the constructions, we could rely on our own experience of teaching and learning in the conventional studio and in practice, and on what was available in the literature. There is also a certain inherent flexibility in the architectural curriculum that enables the introduction of explorative projects (Brown, 2012: 228).

What emerged from the constructions was the inherent presence of opportunities for collaboration and a supportive environment, where some of the underlying rules for collaboration are already in existence. An exploration of these emerging patterns is presented below. The descriptions of the constructions are very succinct, and aim to contextualise and focus on the students' processes. Instances of individual and group work are mentioned. The projects were completed mostly in the second year, except if mentioned otherwise.

4.1. ST MICHAEL'S PROJECT

The St Michael's project was featured in *ARCHSA* (Nov|Dec 2012, Nov|Dec 2013). There were three separate constructions, each approached differently in terms of organisational and design process. St Michael's is a multi-grade rural school, and the aim was to improve the spatial teaching facilities and introduce students to a design-build activity.

4.1.1. ST MICHAEL'S 1 (STM1)

In February 2011 seventy students visited the site, discussed the project with the school community, gathered contextual information and collated this in groups. Until June, students individually studied and designed projects focused on timber-framed construction – part of the second-year curriculum. The design commenced with a collaborative brainstorming session in August. The ideas were consolidated during a discussion session, after which students had to individually prepare and submit ideas, including analysed precedent. Tutors identified resonating ideas and discussed this with the school's management team.

Ten students volunteered to take part in the final design process, while the remainder of the class was divided into groups for organisational aspects, including acquiring sponsored construction material.

An outdoor classroom space was built in two weeks in October/November 2011. On site, students worked in smaller groups of between five and eight. Sometimes, students moved between groups. Two professionals joined the project: a local architect-builder and a self-taught building specialist. The build part of the activity was finished on time and handed over to the school during a celebratory function. As a final part of the activity, students had to submit an individual reflective essay.

1

2

THIS MEANT TAKING ON SITE WORK THAT OTHERS HAD COMPLETED THE DAY BEFORE, WHICH WAS AN INTERESTING CHALLENGE

4.1.2. ST MICHAEL'S 2 (STM2)

In 2012, two further activities were undertaken. The first involved students of the extended curriculum programme (ECP)[1]. A group of 20 students completed a small project, in which they extended the deck and made a screen that defined a play area for the Grade R learners.

4.1.3. ST MICHAEL'S 3 (STM3)

In the second 2012 activity, a solar protection screen over the existing container and a library within the container were constructed.

During the year up to September, students did preparation work similar to that done in 2011. The design process started as a studio-based collaborative exercise. Students in groups of two designed and developed their ideas. Thereafter, the groups merged with other groups and ideas were combined. This exercise was repeated a number of times, each time reducing the number of proposals. The final three proposals were discussed with the entire group and the main ideas identified. These were consolidated into a conceptual design. This proposal was taken to site, where a scale model was started, design continued on a blackboard and students used the actual materials – consisting mainly of timber – to mock up and modify the design. Each day the alternative half of the class went to site, while the remaining half undertook technological exercises on campus. This meant taking on site work that others had completed the day before, which was an interesting challenge. Again, students worked in small groups. The activity was completed during the allocated time, mostly in the rain, and handed over to the school. ›


3

1 & 2 Second-year students, 2011, building an outdoor classroom. **3** *Second-year students, 2012, building a solar screen for the library.*

4.2. SUTHERLAND (S)

In 2012, the Sutherland 4x4 Route Overnight Retreat – involving eight students – was introduced to the third-year of teaching. Conceptual and technological development spanned eight weeks. Unfortunately, this project was not built due to funding constraints.

Students visited the farm near Sutherland and, as a group, did site investigation and interviews with the client. After the immersion on site, the students went back to the studio and two additional students joined the team. It was a challenge to get the new group members to understand the physical site, but it did provide an opportunity for good group discussion.

POOLING OF DESIGN IDEAS WAS INITIALLY MET WITH APPREHENSION, BUT THE POTENTIAL FOR CREATIVE SOLUTIONS SOON BECAME CLEAR

During two interactive sessions per week, tutors acted as facilitators and soundboards. Key outcomes were established as a group, and the collaborative making of physical models of the proposals were much emphasised. The students first developed individual design models based on the collective concept statement. The pooling of design ideas with fellow students was initially met with apprehension, but the potential for a multitude of creative design solutions soon became clear. Individual idea models were discussed; strong and overlapping ideas were identified; and lastly these were formalised into collaborative idea models. Lecturers facilitated the establishment of guiding principles by asking questions and emphasising reflection, allowing each student to voice their opinions.

4.3. HANGBERG (H)

This project, undertaken in 2014, involved collaboration with design activists Stephen Lamb and Andrew Lord[2]. It entailed an access deck and a vertical food garden as an addition to the Light House. The Light House was designed by Stephan Lamb and is an alternative solution to the City of Cape Town's temporary relocation homes (Hoffman, 2014: 9).

This short, intense project, carried out over five days in November 2014, had as its main academic objectives the design of technology and learning about alternative practice. The completion of the work was not the main priority. The focus was on the quality of technical design resolution and participation. Students first met the client on site and then did an off-site collaborative design exercise, through drawing and model making. The exercise focused on the technical design of the timber-framed deck and vertical garden.

Over the remainder of the week, students worked in small groups on different tasks. Two additional projects were identified in conversations with the client: the construction of exterior concrete stairs and of interior timber shelving. Found and recycled materials were used. Each group took control of the design and building of a component. There was constant interaction with the client, who was a knowledgeable builder and maker himself.

On the final day, progress was so good that an additional small chicken coop was designed and built before lunch. The local brass band gave a performance to thank the students and, after a rather reluctant final clean up of the site, a worsbraai was held for all the participants.

4 & 5 *Second-year students, 2014, building a deck and vertical food garden.*

THE SIGNIFICANCE OF THE THREE ENTRENCHED RULES – VALUE PLACED ON COLLABORATION, COMMON GOAL, SHARED REWARD – IS THAT THEY POSITION DESIGN-BUILD PROJECTS AS COLLABORATIVE ACTIVITIES

5. REFLECTIVE INTERPRETATION

We used the proposed collaborative framework (Fig. 4 of part 1) to explore whether the underlying conditions and characteristics of collaboration were already present within these design-build constructions, while some of our interpretations for future implementation are discussed below. The quotes in *italics* are from the participating students.[1]

5.1. THREE INHERENT RULES

Three rules stood out as inherently integrated into the constructions:

- The value students themselves placed on the collaboration experience;
- A common goal; and
- A shared reward.

The value students placed on the collaboration-experience work was evident in their behaviour, as well as in their written and verbal reflections. Although group work is often frowned upon by students in the conventional studio, in the design-build constructions they engaged with group work head-on – realising that the execution of the project was not possible without it: *This project could never have been completed without the teamwork and [everyone's] willingness to work (11_60).* Students showed an understanding of the importance of teamwork for their future practice: *I am gaining more and more knowledge with regards to teamwork; this is a tough issue, as everyone has their own ideas and thoughts, yet [it] is very much a part of life and the working profession (11_42).* Students also acknowledged that group work was not positive all the time, but saw the value in the process: *I am delighted at how everything went [according to plan], even though some group members were unbearable at times; ... this was a learning process (11_40).* They realised that their individual contribution was important to the group function: *I like to think I played my part as a good team member (14_05).* They also enjoyed learning about group work: *... the best learning experience was working well in a group (14_04).* Group work is not only inherently part of design-build activities, but students realise the value on a variety of levels.

The idea of a common goal, that provides direction and motivation for the student as a unit/team, is expressed by this student in anticipation of the upcoming project (StM1): *This experience will help us ... [in] achieving a common goal, which is to make a success of the St Michael's design-build project (11_38).*

Students measured the success of the activities in the physical outcome of the built structure, but also through the social outcome. The contribution they made to the community provided a sense of pride and motivation, and became the shared reward that motivates collaborative activity. The importance and contribution of a shared reward was specifically evident in two activities (StM1, H), as both culminated in a proper ceremony that was celebratory as well as reflective and also involved the client/community. In both these activities, the client/community was also present during the building stage, providing a physical and visual motivation and impersonation of the social outcome – i.e. doing good to others. Garraway and Morkel (in Bozalek et al., 2014: 26), drawing on the work of Stetsenko, explain that where 'the purpose of activity ... is one of social upliftment or social justice..., [it] becomes the main driving force for engagement in the activity'. Johnson and Johnson (1994: 42) explain that an 'important aspect of both small-group and whole-class processing is group and class celebration. It is feeling successful, appreciated and respected that builds commitment to learning'.

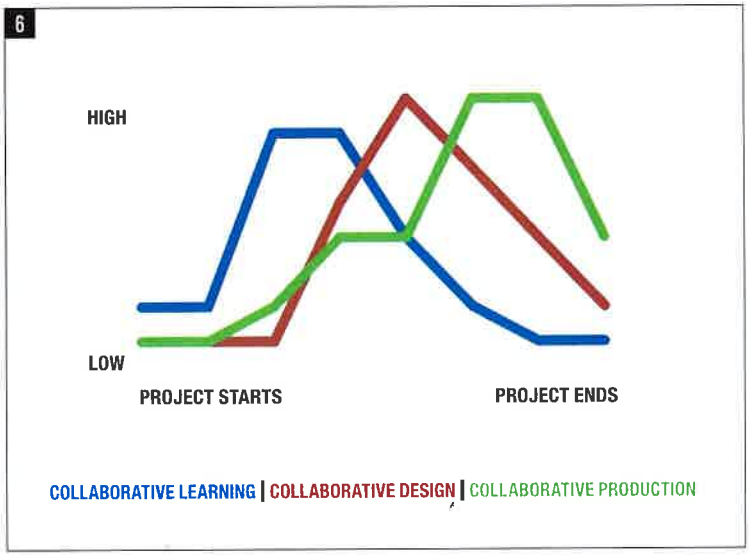
A student's reflection (StM1) supports this motivational feeling: *...one thing stands out for me: the little girl who thanked us, and painting everyone's hand to handprint the wall we painted. Now, the hard sweating on that ladder wasn't for nothing. That was the proudest moment of my two weeks; in fact the whole year. We were there and we made that change (11_40).*

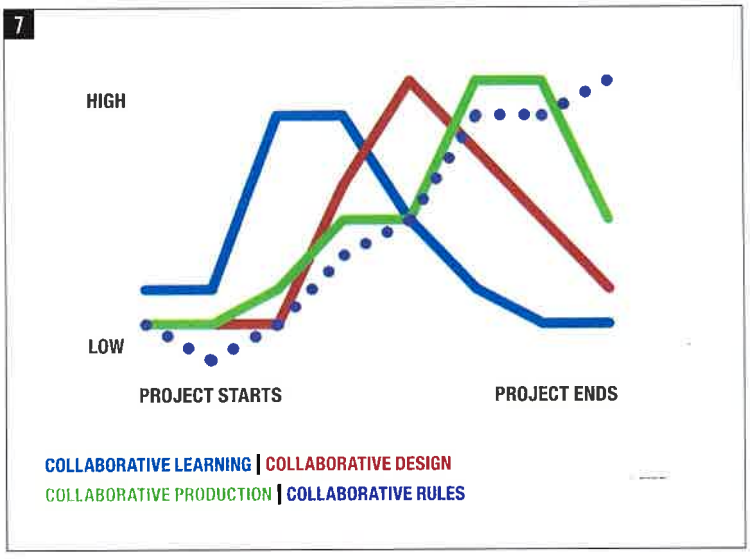
Students also experienced a sense of accomplishment in doing their work, which in itself is a reward: *[Being] on site was great... We did a good job and i (sic) am proud of my team. [It] feels good [to solve] problems on site instead of doing it on the computer... (12_51).* This all contributes to a very positive attitude on site: *The students' approach to this project was amazing (14_03).*

The significance of the three entrenched rules [above] is that they position design-build projects as collaborative activities; they provide a context that lends itself to collaboration. The three rules are also very much interdependent, especially [as regards] activities set in a social upliftment context (StM1, StM2, StM3, H). A physical context that promotes positive interdependence resonates with what Johnson and Johnson (1999: 100) term 'environmental interdependence'.

5.2. COLLABORATIVE LEARNING, DESIGNING AND PRODUCTION

Collaborative typologies (learning, designing and production) were all visible in these constructions (Fig. 8 on next page). During the last stretch of each, where conceptual design became prototyping and prototyping became building, collaborative production became the dominant mode. This was also where collaborative principles were most explicitly seen (Fig. 9 on next page). >





5.2.1. COLLABORATIVE LEARNING

Collaborative learning opportunities presented themselves at the beginning stages of the constructions, during project initiation, introduction, administration and research. These are the stages of construction that are also closest in experience to the conventional studio, where research is often done in groups. While the presented constructions were not designed with collaborative principles in mind, it is interesting, but probably not surprising, that the least resonance with the collaboration rules was observed in the part of the activity most closely resembling the conventional studio.

It seems that students were still in [an] individual mindset at this point, [and were] drawing on previous studio-learning experiences. They were, however, able to identify their own goals (StM1, S) during research and to self-manage [the] process, but [still appeared to be] learning more alongside each other than [they were able to learn] collaboratively.

To enhance collaborative learning in design-build constructions, it could help to keep the overall common goal – with its physical and social outcomes – in mind. This could be achieved by having more interim meetings with the community or client, and making sure that the other rules of collaboration are [put] in place.

5.2.2. COLLABORATIVE DESIGN

Designing collaboratively draws on previous individual design knowledge, but designing collaboratively is quite foreign to most students. Surprisingly, students were quite positive about the experience of developing ideas, both conceptual and technological, together: *...[conceptual] designing in a group was a good exercise (12_51). [It was] interesting to discuss the various detailing options (12-12).* Students found value in identifying strong ideas from individuals and smaller groups, and then sharing these together to create one design: *Overall, putting all our 'pros' together, to create a masterpiece was the most exciting part (12_16).* They felt they had learned something new: *It [taught] us different ways of thinking (12_51).* And this student described the advantage of collaborative design as follows: *...the ability to exploit each other's strengths, while simultaneously building one's own skills where they may be lacking (12.1_04).*

Students were critical of the time allowed for the design exercise: *I feel that [it] was not enough, but some good designs came from [the] exercise (12_51).*

A student described the process of not just laying the different-sized recycled roof sheets, but making decisions on site regarding overlapping and positioning to achieve the best visual result, and then stated that design: *... doesn't stop till the work is done (12_50).*

Social and communication skills are demonstrated within the collaborative design process, [which] this student explained [when she witnessed] her group [reaching] consensus on the final design: *We ... gave each other adequate time and a chance to speak so that we [could] reach a fair decision (14_05).*

The group design exercises were mediated by tutors – specifically during a particular construction (S). During this project, the most time was spent on the conceptual design stage and tutors had time to mediate both the design task and the group function – a rule that made collaborative design more accessible to students (Tucker & Abbasi, 2012). The amount of time 'allowed' for conceptual design, in particular, [tends to] vary according to construction and its integration into the curriculum. Spending adequate time on conceptual design prevents design-build from becoming [a set of] mere construction exercises. ›

6 Collaborative typologies; observed incidence. 7 Collaborative rules; observed incidence.

FOR POSITIVE INTERDEPENDENCE TO EXIST... 'EACH GROUP MEMBER'S EFFORTS ARE REQUIRED AND INDISPENSABLE FOR GROUP SUCCESS,' AND 'EACH GROUP MEMBER HAS A UNIQUE CONTRIBUTION TO MAKE TO THE JOINT EFFORT'

Because students [tend to] focus more on physical and social outcomes than on their own grades, it seems they are more willing [than expected] to share ideas; individual and competitive modes of interaction (Johnson & Johnson, 1994) [can then be] replaced by the idea of collaboration towards a bigger goal.

5.2.3. COLLABORATIVE PRODUCTION

Within collaborative production, a high incidence of positive interdependence and promotive interaction [was] experienced by the students.

Positive interdependence seems intrinsically linked to the common goal. For positive interdependence to exist, there are two aspects to consider. The first is that 'each group member's efforts are required and indispensable for group success', and the second that 'each group member has a unique contribution to make to the joint effort because of his or her resources and/or role and task responsibilities' (Johnson & Johnson, 1994: 38). To complete even a simple physical building task relies on different individual skills coming together at the same time.

A student describes below how, during the building phase, the act of simply moving construction material from one point to another necessitated simple task interdependence through a division of labour: *We worked well as a group, forming a chain, with everyone [being assigned] a specific task [in order] to get it done faster (11_60).* Other students commented that it requires [the whole team] to make the physical building work succeed: *It was great learning about the coordination, commitment and effort needed from all members of the team to allow a flow of construction (14_03).*

In the prototyping phase (StM3, S, H), either large-scale physical models or full-scale modelling with actual materials informed design decisions. Making mock-ups with the actual materials required constant discussion and feedback between members. Tasks were shared, including [record-keeping] (sketches, photographs); physically manipulating materials; and viewing results from different elevational perspectives. Students realised that each individual has a part to play in the whole: *...everyone has there (sic) own duties on site, as everyone [is] an expert on some or other part of [the] construction (12_51).*

Promotive interaction supports positive interdependence. [It] requires mutual accountability for team performance and shared responsibility for each other (Tucker & Abbasi, 2012), and encouragement and facilitation between members to execute the tasks that will lead to the realisation of shared goals (Johnson & Johnson, 1994: 4). During the prototyping (StM3, S, H) and building phases (StM1, StM2, StM3, S, H), students reflected concern and care for each other: *We need to take into consideration how we will function in a safe and healthy workplace and [look] out for each other during this process (14_04).* They were also encouraging [of] each other on site: *Regardless of the bad weather... we made the best of the moment, singing all the way... (11_40).* And on social media: *Well done group B, we did a gr8 job... So far so GOOD! (11_61).*

Caring about others you work with increases commitment, responsibility and persistence, even in taking on difficult tasks to achieve the common goal. [Also], 'long-term and persistent efforts to achieve do not come from the head; they come from the heart' (Johnson & Johnson, 1994: 47).

The challenge would be to construct the experience [so that] promotive interaction [could] be present in more stages of the project, not just in the physical building [stage]. In the two constructions (StM3, S) where group work was used during the design process, including the full-scale mock-ups, [promotive interaction] contributed considerably to positive interaction. All students could take an active part in the design development, beyond the initial conceptual exercise.

To a minor extent, collaborative production was present in the fundraising, material sourcing and administrative aspects of one construction (StM1). Students had to share this work, as it [added up to] a substantial amount of work.

TUTORS TOOK AN ACTIVE PART IN ORGANISING REFLECTIVE FEEDBACK AND PLANNING SESSIONS IN THE AFTERNOONS AND/OR MORNINGS

During collaborative production, the small groups were able to self-manage tasks independently of supervision: *...it was left completely [to the group] to reach the goal of that particular day, thus [enabling them to learn] the value of time and task completion (11_16).* The bigger group needed guidance for reflection. Here, tutors took an active part in organising reflective feedback and planning sessions in the afternoons and/or mornings. To function optimally on a building site, this type of meeting is a necessity and, again, [an] inherent opportunity to practise self-evaluation and reflection [is provided]. It would be possible to give control of these meetings over to students and to minimise the role of the tutors. However, they provided an opportunity to model good teamwork through team teaching (Tucker & Abbasi, 2012: 7). The question as to whether to model or give over control to students [depends] very much on where in the curriculum each construction is situated. ›

5.3. A FEW OTHER INHERENT PRINCIPLES

5.3.1. THE ROLE OF THE TUTOR

- **Mediation of the task**

Collaboration requires the tutor to adapt their role, and take an active part in managing collaboration by mediating both task and group function. In design-build projects, the tutor is not just a knowledge informer but also a facilitator, consultant, mentor and adviser (Tovivich, 2009; Chiles & Till, 2004; Van der Wath, 2013). Mediation of the task [occurs] in the collaborative production stage simply by [virtue of] the tutor being present on site and, [of necessity, requiring] some sort of control [over] the built object, outcome and safety of students and community.

- **Mediation of the group function**

Canizaro (2012: 33) says that 'architecture students are... unaccustomed to working in groups, and [during] any group projects, their interpersonal dynamics must be managed'. More mediation of the group function might require more tutor presence, depending on whether students are able to learn from one project to another how to manage these dynamics themselves.

COMMUNICATING TO ACCOMPLISH A COLLECTIVE TASK IS AN IMPORTANT SKILL [BECAUSE] 'NEGOTIATION... (CAN BE)... THE OBJECT OF TENSION BETWEEN INDIVIDUALITY AND COLLECTIVITY'

The input [of tutors] on group function [has already been experienced] and acknowledged by students: *When we had communication problems ... a simple action from one of the lecturers ... [helped us to resolve the matter more rapidly] (14_02).* It is thus important to explain the value of teamwork, [in order] to help students with collaboration. This [can be shown] in the collaborative production phase (H): *From my lecturers I learned that group work is best to get more work done (14_01).*

5.3.2. COMMUNICATION AND SOCIAL SKILLS

Communication and social skills need to be actively taught. Although this was not formally done in any of [the above] activities, students acknowledged that communication is important and some experienced learning in this regard: *Teamwork and communication are key when working in groups (14_02),* and *I have learnt that through good communication a lot can be achieved (14_04).* Communicating to accomplish a collective task is an important skill [because] 'negotiation... (can be)... the object of tension between individuality and collectivity' (Türkkan et al., 2012: 8).

5.3.3. ASSESSMENT

One of the principles of successful collaboration is the assessment of the individual and team, for both the collaborative process and the physical outcome. Collaboration is one aspect that was not assessed formally during any of the design-build activities. Active participation and reflection were evaluated, but not in a manner that gave feedback on whether students acquired collaborative knowledge and skills during the process.

[Curriculum flexibility] allowed design-build activities to be introduced into the course, even if [this was done] in an ad hoc manner. This same flexibility could introduce a formal assessment of collaboration, even if the current curriculum [did] not specifically mention [it] as a key competency.

5.4. CONCLUSION

The authors posit that evidence indicates design-build constructions – and the physical space they occupy – provide a receptive environment for collaboration. Although [such] projects inherently offer opportunities for group work, group work does not necessarily constitute collaboration. Even though the constructions explored in this paper were not designed specifically for collaboration, instances of collaboration were observed and opportunities identified. Three rules of collaboration – i.e. a common goal, supported positive interdependence and a shared reward – are all inherent in design-build activities, making them ideal contexts for teaching collaboration.

Whether we need to embed all three collaborative typologies in each stage of the project is debatable. What is significant is that most of the inherent collaboration observed, [occurred] in the collaborative production phase. Would it [then] be possible to posit physically making together as the underpinning support of the strong collaborative potential observed here?

Brown (in Harriss & Widder, 2014: 57) states that the 'greatest opportunity presented... is not that it is a place to reflect on one's own learning, but that it is a place to share that learning and reflection with others'. Sharing and reflection are as important to the tutor as to the students; the design-build construction becomes a collaborative place, an immediate present space for students, but also retrospective space for staff to share and build knowledge.

In the conventional architectural studio, 'conflicts in negotiation processes are seen as matters to be put down, settled and absorbed in order to reach a final [outcome] as soon and as seamlessly as possible. It is important to question what is at stake when modes of collectivity are rigidly formed into a determined singular path, and what might have been triggered by more vigorous negotiations ... [at] every level of the design process' (Türkkan et al., 2012: 7). [Without question,] we need to make active use of the inherent opportunities to embed aspects of collaboration throughout design-build constructions. ■

[Please refer to references in Issue 77, Pg 46 to 47, and online at www.businessmedialive.co.za/arch-sa.]

[1] The extended curriculum programme offers intense support to students from disadvantaged backgrounds in an additional pre-first year.
[2] Stephan Lamb and Andrew Lord are artists/activists of Design-Change (previously of Touching the Earth Lightly), and have extensive experience in hands-on sustainable community work.
[3] *Italics* are verbatim quotes from students – with the number in brackets referencing the year of the project, followed by a number referring to a specific student.