Phases of intensive design and build workshops in architectural education

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ABSTRACT: Design and build pedagogic approach in architectural education allows for a an intensive workshop variety that according to students offers great perceived learning value in a short time. This paper discusses how this framework can be used, the notable omissions that follow from this model and the restrictions this puts on a project. While prototypes and simple temporary structures can be made in a short time span, making permanent, functional structures in the same time frame has not yet been explored enough in architectural education. Based on design and build workshops during 2010-2015 with masters level students, all resulting in built structures in 7-14 days, observation and student feedback, a set of guidelines for further development is proposed.

1.INTRODUCTION

A design and build workshop is increasingly utilised at the Faculty of Architecture and Fine Arts, NTNU Trondheim as an integral part of the architectural education. Beginning in 2000, the first year students still start their education with a full-scale built assignment, resulting in 20-30 built structures in the university area each fall. Since 2005, this mentality has resulted in both award winning student-driven projects (e.g. Basulto 2010, Trestykker 2013, Studio Beta 2014), a national recognition for its pedagogy (NOKUT 2015) and the use of workshops as a pedagogic framework in masters level courses in architecture. This study concentrates on the latter.

The design and build workshops in masters level courses evolve around a building task undertaken by the students and tutors, usually for an external client. While the courses last for a semester, the actual project can be organised in different ways. A long design period can be followed by a prefabrication period and finally assembly on-site, spanning the entire course. This study examines a short, dynamic variety, where students are required to both design and build the entire structure in the matter of 7-14 days, depending on the project. The workshop format is very intensive, often taking place in a remote location, requiring the students to set aside all other considerations and focus on the project. As an example, the Heggmoen Wilderness Shelter (Figure 1) was a 14-day workshop taking place at the Heggmoen, near Sjunkhatten National Park, Nordland, Norway. Finished in the fall of 2014, the students were required to live and build in the wilderness for the duration of the project, making their own food over a bonfire and sleeping first in tents, and as the shelter progressed, inside their own project. With no infrastructure on site, solving the basic living aspects of sheltering, cooking, drinking water, washing, bathing and recycling, based on their own experience and need, was the core issue informing the resulting architecture. The experience was understandably described as immersive by the students, but also a good learning experience, both professionally and personally.

Figure 1. Heggmoen Wilderness Shelter 2014 Student Project, Nordland, Norway. Photo: Pasi Aalto

During 2012-2015, the authors ran 9 master level courses in architecture at NTNU Trondheim that focused on intensive full-scale design and build. The work resulted in 10 built projects, of which 8 were permanent. All projects were funded by external clients with the exception of 2. The projects consisted of, in chronological order, a prototype house (Hut-to-Hut prototype, India 2012), a sales booth (Trondheim Christmas Market Booth, Norway 2013) wetland intervention (Path Intervention, 3 parts, Chile 2013), a housing fair installation (Jyväskylä housing fair observatories, 3 parts, Finland 2014), a Sauna on a pier (Fleinvær Sauna, Norway 2014), a wilderness shelter (Heggmoen Wilderness Shelter, Norway 2014), an outdoor staircase (Fleinvær Stair, Norway 2014), a trash hut (Kosmorama houses, 2 parts, Norway 2015), a bunker refurbishment (BunkerSauna, Norway 2014) and sleeping shelter for 30 people (Sandane Shelter, Norway 2015). The courses have been developed through trial and error, critical observation and exploration, and perhaps most importantly, frank and direct student feedback.

In this study, the observations of the tutors are compared to three theoretical frameworks for different aspects of the design and build workshop, looking at how they relate to each other and to propose a framework within which the intensive design and build workshops can be further developed. Appreciative Advising (Bloom et al. 2008) is compared to the observations made by the tutors during the beginning of the course until the first design consensus is reached. This leads to a comparison of the development of the social group as described by Tuckman (Tuckman 1965) and goes further to show that there is a good possibility of reaching the 3 psychological necessities put forth by Deci (Deci 1980) and that the intensive workshop format has a good foundation for positive learning outcomes.

2.METHODS

2.1.*Workflow and framework description*

In our experience, intensive, full-scale, design and build workshops, especially if the end result is permanent, require a holistic workflow from the tutors to create a framework that accommodates for the necessary dynamic process during the workshop itself. The workflow itself can be divided

into (a) preparatory work, (b) work during the workshop and (c) parts which necessarily need to be finished after the building itself is complete.

2.2.Preparatory work (a)

In addition to administration at the university to run a course, the tutors gathered a pool of suitable clients and projects before each course and evaluated them to find "the best bet". Still, 4 of the 10 projects had significant changes from the first framework of the project.

Once a client was established, the budget, placement and function of the project was always similarly clear. At this stage, the tutors would normally select the necessary material types, make an assumption of the size of the project as well as solve the main hurdles of the logistics framework. This included establishing a viable option for the procurement of materials, acquiring necessary tools either within the university or near the project site and setting up a viable travel and work timetable, including a possible free day in the middle for workshops extending over 10 days.

A significant part of the preparatory work is to acquire a building permit from the municipality with the understanding that the project can not, and should not be, described fully beforehand. In the 10 cases, the tutors found several solutions to this issue, depending on the municipality, type of project and time-frame. Of the 10 projects, 2 projects were exempt of building regulations in that they could be argued to be landscape elements and not buildings, similarly 1 project was considered an interior refurbishment and by local law not requiring a permit. For 3 of the projects, the solution was to prefabricate the entire structure and make as-built drawings afterwards for the client to apply for a building permit for the final placement of the structure. For the remaining 4 projects, either the tutors or the client got an acceptance with the local authorities that they could work within a given, loose, description of the project and apply for a building permit after the structure was built.

All projects discussed here were completed as a part of a masters level course with 12 to 28 participants, always including students at NTNU Trondheim and exchange students, but also students from other universities and even volunteers, both students and architects, who participated for the sake of learning, without receiving credits. In total, 107 people have participated in the projects.

The courses started with an introduction session following a similar format for the first 3-5 days. During the first day, the tutors introduce themselves and the course, followed by the students introducing themselves. This was usually followed by an inspirational lecture that in some way reflected on the focus and theme of the course and a discussion on course content. The tutors always stressed that the project should be undertaken as a team with a flat structure, everyone working as an equal. In most cases this would be followed by a discussion about how to participate in a team, how to utilise everyones strengths and also how to maximise ones own learning in the group. This discussion was led by the tutors. In the end of the first day or in the second day, the course engaged in a social learning activity in an informal setting to start developing the social structure of the group. As an example from the BunkerSauna project (Norway 2015) the student attended a short lecture about the Norwegian wood species, followed by a 24 km wandering walk through the city and park areas to identify trees, discuss their uses and to see the use of wood in the local architecture. The walk ended on the project site where the students got their first impressions of the location and discussed the opportunities that the site and task offered at a first glance.

During the last days of the introduction work, the students would be engaged in woodworking in one manner or another, usually through a small preliminary project. This helped the tutors determine the level of proficiency each student had working with hand-tools and machines, which in turn informed the design and build workshop process as well as the necessary health and safety precautions and tool training that would be necessary. In some of the cases, the students also required a pool of knowledge about the local conditions before starting the main design task. As examples, this could be solved either by writing an essay where each student researched about a specific topic and shared their findings, such as before the Path intervention in Chile 2013, or by inviting experts to a 3-day seminar about the local climate, history, permaculture and infrastructure, as was the case when working on the Hut-to-hut project in India 2012.

2.3.Design and build workshop (b)

In general, the workshop period starts with an intensive site registration and sketching session with whatever means the students feel comfortable with. Within 2-4 hours, the students should have their concepts ready to be communicated to the rest of the group. At this stage the tutors were always looking for similarities between concepts and good solutions for specific challenges on site. After the first review, the students are encouraged to further develop their design and also to discuss already at this early stage the amount of materials, tools needed and the overall approach of realising the designs. The goal is to reach a preliminary consensus on a concept within the first day or the beginning of the second, at which point foundations could be produced and necessary materials procured, in addition to building extra work spaces if needed and begin producing elements.

The design and build approach from this point on is mixed. The students are expected to develop the design while they build the parts that are already decided in consensus. The tutors role here is to foresee problems beyond the scope of the students. Examples of this include reducing the complexity of some elements, limiting the list of functions, deciding materials where some of the options are either prohibitively expensive or time-consuming to use. During the workshop, the students increase their understanding of the scope of the project and become more independent in their choices. During the 5 years that the cases span, the tutors increasingly aimed to make themselves redundant during the design and build workshop. as long as a the project was moving towards a good architectural result and the focus of the students was not only on craftsmanship, but on how to design better in a dynamic environment, the main focus of the courses.

2.4.aftermath (c)

The final stage of the project occurs when the design work is done and only small details remain. At this stage, the students always have a critical review of their work and perform a self-initiated correction of the design elements which they feel do not meet their standards. By now, the students have a very high attention to detail, add their personal touches to the project and finish whatever parts of the project is yet unfinished. As the list of tasks is reduced, the students start documenting and experiencing the space and project they have built, cleaning the surroundings and discussing their work. The documentation is later on processed into a format suitable for publishing and presenting, as well as to be added to the individual student portfolios. When the project work is done, a live critique with an external critic is performed, discussing the project with the students, followed by an assessment and a student evaluation of the course. If possible, and in best case, the external critic has also participated in some of the construction phases, observing the students in action, or at least joined in the use of the completed project.

3.FINDINGS

This organisation of design and build projects has lead to 3 key observations during these 10 projects:

3.1.Skills lead to participation

Firstly, in order to participate, the students need to be able to work together efficiently. The format of an intensive design and build workshop sets demanding requirements to the design tools that accommodate this process. The outdoor environment, together with limited power and travels, usually made the use of laptops, and therefore all digital processes, more or less impossible. Even in the 3 cases where a suitable working environment was available, the use of the digital tools needed to be greatly encouraged by the tutors and tended to result in a split in the working team, always resulting in a less than optimal working environment and was in each case commented by the students in course evaluations as a major short-coming of the project. Digital tools were favoured by the students for the as-built documentation of the project after it was built and in this context they worked well.

The skills that have shown to be most efficient and enabling of participation is a combination of verbal communication, fast hand-drawn sketches and 1:1 references on site. The 3 methods compliment each other so that each can replace another to deal with a given issue They enable an equal, active participation from each student during any design discussion, a key aspect of building up a good collaboration framework based on a flat team structure. The tutors have thus observed that the choice of tools and the students competency in using those in the initial design phase has a correlation to the speed at which the initial design consensus is reached and thus also affects the forming of the social group.

3.2. Social Evolution

Secondly, the social group evolves during the work. In the beginning of the design and build workshop, the tutors observed a strong focus on reaching consensus for the project concept based on the individual design ideas. The discussion was in each case driven by individual ideas and the students refer to the ideas as "my idea" or "our idea", claiming ownership of the ideas. After the social group develops, the work is increasingly based on trust. After a few days, the students refer to the ideas as "an idea", specifically as "an idea fitting for the project". The students begin dividing work, and responsibility for the design decisions among themselves and only return to a consensus discussion when the individual student sees that his or her decisions have implications beyond what he or she sees as their defined responsibility from the rest of the group. This trust in fellow students in most cases resulted in better or more precise professional discussions, increased speed in the process and better participation.

The project develops as a joint venture and this seems to lead to a strong social bond in the group, especially if the project is built in a remote location where the students spend all their time together. In the 3 cases where the students later in the course developed an individual proposal for and extension of the built project, they talked more freely about their designs than the tutors thought common. The students were eager to discuss the shortcomings they perceived in their own projects and genuinely sought assistance in the social group. Additionally, when producing the as-built documentation of the project, the students had no issues dividing the work between themselves, based on their understanding of the strengths and weaknesses of each student. At this stage and in all the cases, the group was more or less autonomous from the tutors.

3.3. Project Ownership and focus

Thirdly, the students feedback show a great appreciation for the opportunity to work on a real world project, as opposed to a fictional studio project, and the process of learning from design to actually building the project themselves. This approach also allows the students to work with and understand the importance of tactile and constructional material quality, procurement, planning schedules, on site team collaboration and other aspects of building not included in the usual studio design courses. For the students, the process of building your own design with all of its faults and brilliant ideas in a real-life project is mentioned in student evaluations as one of defining positive aspects of the course and most remark on it as a great learning experience, regardless of the background of the student. This is also clearly seen by the tutors in the students approach to the course and project. They claim project ownership, sometimes working extensively beyond what is required by the course, even after final critique. In the tutors opinion, this shows that they are focused on making good architecture, instead of passing a course or grading. Furthermore, there are instances where our students from previous courses have attended some later workshops, as an outside volunteer as well as exchange students having initiated similar workshops at their own schools after returning home. These are by the authors seen as positive signs of empowering process, where the students are given more tools to steer their own studies and at the same time create and test architecture in a more tangible and urgent manner.

This level of dedication allows for some adjustments in the framework that would usually be impossible. The students accept a lack of planned activities and time-table-based participation on the course and instead choose to actively participate, usually with short notice and long hours, to dynamically develop the project as a team, even if this seems like an uncertain process at the time.

4.DISCUSSION

The authors find that the intensive design and build workshop facilitates the formation of a strong social group that enables both the group and the individual students to reach a higher level of autonomy in their work and to handle a more dynamic design scenario during the workshop. Furthermore, the format allows for an increase in positive learning outcomes, condensing the perceived learning into a very short time frame. The identified key mechanisms in the process are the design process leading to the initial design consensus regarding the concept for the project and the stage at which the students regain independence and ownership of the project as a while, making the tutors effectively redundant.

4.1.Tutors advisory role

The first part of the course can be explored within the theoretical framework of Appreciative Advising (Bloom et al. 2008), in this case adapted to a individual student in a group assignment. Bloom outlines 6 steps. The first step, disarming, where the student should feel welcome, corresponds well to the introduction scenario in the course cases. The main goals of the introduction are to present ourselves, establish a good atmosphere and gain confidence in the task we, both tutors and students, are about to undertake. It is also stressed that the work will be undertaken as a team, where everyone, including the tutors, should be regarded as equals. The second step, discovering, is where the strengths and weaknesses of each individual student should be assessed. The woodworking session assessment of the students proficiency in working with tools and communication, and also gives the tutors a good idea of the initial professional standing of each student, which both advises the design of the workshop as well as the health and safety aspects of the process. Third step, dreaming, involves letting the student explore their wildest ambitions and goals. In context of the course, this is largely done in the initial design phase in the first day of the workshop, where individual solutions are developed freely without many constraints. Blooms fourth step, designing, where a plan for the future is formulated, corresponds to the first design review and the work to reach a consensus on a concept for the design and build project. These steps are clearly aligned with the tutors observations of good learning outcome as well as student feedback.

Blooms fifth and sixth step, however, do not seem optimal in an intense design and build project. Bloom continues to uphold a clear distinction between tutor and student as the basis of the Appreciative Advising theory, while the authors experience it more fruitful at this stage of the project to emphasise a flat structure and to reduce this distinction as much as possible. In practice this means that the tutors participate together with the students on equal terms. For instance, the tutors might be delegated the task of carrying wood cladding for an hour or to operate the concrete mixer, just as everyone else. In the authors opinion, this leads to a strengthening of the social group that has developed through the first four steps of the Appreciative Advising method. A contradicting finding has been documented by Hansen (Hansen 2006), who points to lack of organised leadership as a possible negative in group work. This view is also supported by Forman and Katsky (Forman and Katsky, 1986), although the study focuses on collaborative writing and not architectural work.

By striving for a flat structure, the tutors remove themselves as an authority on project solutions. The students receive responsibility for ever more of the solutions, progress and work on the project, while the tutors only intervene in the solutions either with suggestions in line with everyone else or more authoritatively if the project is in danger of encompassing a design flaw that the students have no way of anticipating. Towards the end of the project the tutors are largely redundant as students control all aspects of the course including developing the design, and in 1 case, the students completed the project without tutors present.

4.2.Social group

The same time frame as steps 1 to 4 in Appreciate Advising can be examined in terms of the establishment of the social group. Tuckman (Tuckman 1965) proposes following phases for the development of small groups. The first stage, forming, involves all interaction until the development of the initial, individual, designs are presented. The time from the first design review to

the reaching of consensus on the design concept, storming according to Tuckman, is in most cases the only period of a given project where there is a disagreement between students. In each case the disagreement was a professional discussion on the merits of the presented design proposals. A curious but inconclusive occurrence noted by the tutors is that if a single group of students participated in more than one project during a course, only the first project had any significant disagreements or competing proposals, while in the later project, consensus was reached quickly.

After the group has reached a consensus on the design concept, the group quickly develops into a cohesive unit in a process Tuckman calls norming. The group in this stage is characterised by the development of belonging and developing their own roles in the group. It is noted by both Tuckman and the tutors that the students begin to express their own ideas and solutions more freely at this stage. As mentioned before, at this stage the tutors actively seek to reduce their authority and participate on equal terms in the group. The final stage of the development of the group, performing, is reached when the group structure becomes the tool for the completion of project. Tuckman notes that this stage is characterised by flexible and functional roles and that all energy is directed to the task at hand. The tutors noted that this stage corresponds well to the point where the students autonomy becomes more evident and the tutors themselves contribute less and less into the design and the process of building. While performing, the students become autonomous in the project. The authors find a correlation between their observations and Tuckmans description of the phases of group work.

4.3.Autonomy and dynamic:

The development of the social group is essential to discuss elements of the Self Determination theory (Deci 1980). The theory identifies 3 key human needs for optimal learning: competence, relatedness and autonomy.

Competence refers to the psychological need to understand, seek to control of the outcome and experience mastery over the work undertaken by the individual. Seen in light of the development of a intensive design and build workshop, these steps occur during the introduction and first sketches, forming, (understanding), the discussion before first consensus, storming, (controlling the outcome) and finally when the work is undertaken as a group, this turns into performing, through the initial norming process (mastery). The theory closely follows the observations of the tutors and has also been evident in student discussions during the projects.

The second psychological need, relatedness, is each students urge to interact with others. This continuous development can be understood through Tuckmans phases of group work, but the tutors also pointed out that the group bonding is stronger when working in a remote location and the social atmosphere becomes more relaxed. In other words, to understand the social bonding only through the project working hours would give an incomplete picture of the process and also points to the significance of tutors participating in social gatherings outside the project if the goal is to develop a flat structure and to encourage student autonomy.

The third necessary aspect according to Deci is each individuals need to act according to ones own self and to make their own choices, to be autonomous. Deci and Vansteenkiste (Deci and Vansteenkiste 2004) specify that autonomy does not mean independence from others. In the context of a design and build workshop, the autonomy of the individual is seen in their first initial sketches for the design, but this autonomy is subject to discussion during the process of reaching the initial concept consensus. At the stage when the first design consensus is reached and the students start acting as a project team for the building of the project, norming, the individual also begins to gain increasing autonomy over parts of the design, although it is not independent from the group. At the same time, the group itself becomes more autonomous and more independent, and eventually moves to the performing stage at which both the individuals and the group can in the tutors opinion be seen as autonomous. This points to the latter part of the workshop as the most suitable frame for positive learning outcomes and suggests that repeated workshops with the same participants would reach this phase quicker, as observed by the tutors.

5.CONCLUSION

This study represents the authors first foray into a coherent description of the mechanisms they have observed in during both these 10 cases and previously undertaken projects. Acknowledging this, the authors wish to propose a framework for further discussion and to point out two key mechanisms that need further research. The first identified aspect is the importance of the process leading to initial design consensus and how this process pivots the students into action that they feel is meaningful and where they actively participate in the learning process. The other identified aspect is the point at which the tutors become redundant and the students take over all significant parts of running the project to its completion. The chronological understanding of the processes is illustrated in Table 1.

It is the authors hope that this study can be used to develop the understanding of phases in an intensive design and build workshop in architectural education and function as a tool to recognise, process and, if need be, adjust the course of a project within the hectic workshop period.

Table 1. Timeline and phases of an intensive design and build workshop.

Timeline and phases	Course introduction		Workshop 7-14 days			
Tasks	Introduction day	Preliminary work	Individual proposals	Concept consensus	Early group work	Late group work and beyond
Advising	Disarming	Discovering	Dreaming	Designing		
Phases		Forming	Storming		Norming	Performing
Competence	Understanding		Controlling			Mastery
Relatedness	Develops continously					
Autonomy	Uncertain		Observed	Discussed	Develops	Autonomy
Group	Non-existent		Begins	Begins	Develops	Independent
Observed points	Uncertainty	Social group forms	Ideas	Active group	Flat structure	Tutor redundancy

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