CONSECUTIVE INTER-YEAR TEAM PROJECTS - A LEARNING EXPERIENCE ENTITY?

Clare GREEN
Institut Supérieur de Design, Valenciennes, France
Ecole des Hautes Etudes en Sciences Sociales, Paris, France

ABSTRACT
Part of an ongoing research project on inter-year team-working in design education, this paper looks at the cumulative effect of consecutive group projects as a learning experience.
Design process today places emphasis on multidisciplinary teams and in this context designers need to be particularly skilled for collaborative working, perhaps becoming facilitators and teamwork experts.
The inter-year teamwork format seems valuable in giving students experience of heterogeneous team working; managing different backgrounds, different knowledge levels and different approaches. Previous research has shown that students with experience of inter-year teamwork appear to be better equipped for subsequent group projects. This paper aims to better understand how past teamwork experiences influence future team behaviour and what learning is reapplied in this experiential format. This research is based on retrospective self-reports detailing individual student journeys through 4 consecutive 5 month long inter-year team projects. We present aspects of experiential and peer-learning most clearly identified by this student cohort and discuss insights that may be useful for improving teaching input in project based teamwork contexts.
We also present examples of successful cumulative teamwork experience and discuss key factors which appear to have created strong team-working and team-leading skills in final year students.
We conclude with recommendations linked specifically to inter-year teamwork and teamwork journeys for design students. Whilst highlighting both specific qualities and drawbacks of inter-year teamwork we discuss how this example of collaborative learning may be particularly relevant in design education.

Key words: Inter-year teamwork, heterogeneous teams, experiential learning, reflective learning

1   INTRODUCTION

Our research focuses on Inter-Year team projects carried out by students from their 3rd to 5th year of design studies. During their third year of study, students will work on two consecutive five month long projects in heterogeneous teams of 3 to 6 students. The teams include students of different year groups, the first project combining 3rd and 5th year students, and the second combining 3rd and 4th year students. After these two long team projects which represent one day a week of in-school study and tutorial time, students will spend the first half of their 4th year in internships before returning to the school and working in two more long team projects, this time as senior members, once at the end of their 4th year and then at the start of their fifth year. Nearly all of these projects run with an external industrial or research partner.
Previous research on this cumulative study model [1] seemed to show that these team projects progressively equip students for working in heterogeneous teams, which if proved - would seem to be a valuable skill for design students. In describing design thinking attributes, Jobst et al [2] cite T-shaping as key, the horizontal bar represents one's ability to connect with others and use the other's expert knowledge. Cross functional teams are needed today due to the complex nature of developing high volume products which now involves an increasing number of specialists who must work together [3].
Our research highlights that students in the school at the centre of our study seem to all validate the importance of working in groups, a typical comment, "*today it seems indispensable to do group projects, as we are permanently in exchange situations with specialists in different areas in our*

professional activity". Another student writes *"it stops us becoming "egocentric" designers, rather to join forces to become a team. This experience helped me integrate more easily during my internship"*.

In this research we aim to study the cumulative effect of consecutive group projects in terms of learning experience based on student retrospective self reports of their 4 cumulated inter-year team projects. We analysed these self reported student journeys to try to better understand what positive experiential and peer learning is identified by students, but also what factors may make these projects less successful. Finally we focus on a small number of students who seem to have learnt very useful skills through this 4-project cycle, and we discuss what we can learn from these examples.

In this research project we test the pertinence of looking at the four consecutive inter-year team projects as an experiential whole. By better understanding the student experience of these journeys through 4 consecutive inter-year team-work projects we hope to be able to generate improvements to what appears to be a valuable but perfectible design study module combination, potentially equipping students for effective teamwork in their future careers.

2   METHOD

All fifth year product and transport design students were asked to reply in writing to a series of open questions relating to their four long inter-year team project experiences. Students were asked to use their own words, identify the principle positive and negative aspects of the teamwork and what they learned from their colleagues and from team working as a whole. Out of a total of 57 fifth year students, we received 43 detailed replies. The student replies were coded to generate meaningful categories. We summarise the points most often mentioned below, differentiating comments relating to experiential learning and those relating to peer learning.

In order to have a better understanding of what might be optimum learning experiences from the combination of four long team projects, we subsequently combined contemporary staff reports and team project outcomes in terms of grade to identify a small number of student journeys that seem particularly successful. These individual student case studies were revalidated with tutor interviews and short junior team member written reports. The self-reports of this reduced cohort of seven 5th year students were subsequently recoded with the aim of identifying common factors related to effective cumulative team-work related learning.

3   EXPERIENTIAL LEARNING

Experiential learning is described as the process whereby knowledge is created through the transformation of experience [4]. Experiential learning also has a long history in the context of teamworking. Members of a team may separately have one of the four learning styles defined by Kolb, (diverging, assimilating, converging, accommodating) and by reflection and conversation on team experiences, meaningful learning can occur. In replying to our survey we feel that students have probably undergone a process of reflection, identifying experiences that have been transformed into learning. We divide comments into three categories, experiences linked to personal evolution, linked to understanding good team-work practice and comments linked to good team-management practice. In these second two categories numerous comments suggest that students tried to reapply learning in subsequent team projects and in their internships. Many students also directly mention that the experience in one project helped them for the next, with a key point being gaining confidence and understanding what to do in the team, *"I had gained autonomy, the fact that I was coached on the preceding project let me know what I should do"*. We list here the most often mentioned points.

3.1 Personal evolution

Answering the wider question of what consecutive projects have taught, many students write that *"group work teaches us to listen to others and be more tolerant"*. The notion of tolerance is very widely mentioned, often linked to learning to compromise and also to not being too demanding. *"I know I tend to always set unreasonably high standards"* and another student *"I learnt to compromise and choose my battles"*. Students comment that successive team projects have taught them patience, *"I learned to be patient because to be demanding all the time and for everything doesn't help to move forward"*. Two other related points often mentioned are learning to have confidence in fellow team members and also gaining self-confidence.

3.2 Good team-work practice

Perhaps not surprisingly comments which can be classed as relating to learning good team-work practice are essentially in the area of inter-personal relations and communication. The most commonly mentioned point here is the importance of team cohesion, and the benefits of having a good atmosphere between colleagues. This point is discussed further in section 5,4. A second and related point is that it's important to try to know the person before the colleague. *"Teamwork allowed me to exchange, to know the person before knowing the colleague, which I think facilitates group work".*

Many comments relate to communication in general and that it is important to be able to talk about how a project is going. This learning quite often comes from student experiences as a junior team member reporting not being listened to by senior students. This point is often mentioned in reapplied experience, these same students trying hard to not reproduce errors in this area.

Many students mention that the four team project experiences were all very different, and understanding the need to adapt to different groups and behaviour is widely commented on.

3.3 Good management practice

One of the areas widely commented on by students, particularly when relating their projects during their third year, as junior team members, was learning that the group manager (4th or 5th year student) must show him/herself to be motivated and passionate (*"the team leader was above all very motivated, and as a result he communicated his enthusiasm for the project to us"*).

Another point mentioned, but more often in the second project as a team member, is the positive benefit when junior members "*feel essential and important in the project"*. Or another comment, *everyone must feel in confidence and listened to*. Students widely report that when this attention to (junior) team members is missing, the important individual motivation is quickly undermined, and this particularly in 3rd and 5th year teams.

Another point often identified is the value of good time management, "*she organised meetings at fixed times, we never finished working after midnight, and didn't see each other at the weekends but the results were there"*. And inversely "*it's important to avoid working through the night, useless and inefficient, just creating tensions within a group"*.

4   PEER LEARNING

In terms of peer learning, many students identify "tools" and software and sketching skills, particularly in their first long project, where as a third year student they have one or more 5th year "managers". *I learnt drawing techniques, 2D and 3D software that I still use today*. The other main category mentioned in peer-learning is management, and more specifically organisation and time management, a typical reply; "*I discovered what the work of a manager is (organisation, anticipation, calm)"*.

The fact that many students in the school are aware of the importance of team projects seems to generate something close to a tacit contract, where particularly in the first 3rd year project students expect to learn tools and management skills from their 5th year team partners. Many comments in our research reinforce this idea, both positively, and in terms of frustration when this learning has not taken place. The "teaching" aspect of peer learning is also frequently cited as a source of pride, and pleasure in teamwork.

Although the school puts in place these opportunities for peer learning, many comments from students suggest that the school's role is not identified, and they feel there is too much reliance on using students to teach other students.

5   DIFFICULTIES AND MODERATING FACTORS

This is a non exhaustive list of difficulties and factors that may moderate student experiences in inter-year teams that emerged from the self reports.

5.1 Social Loafing and motivation

Clearly this is one of the key factors that can negatively influence a team experience, and one that student team members and team managers seem ill equipped to deal with. Social loafing is defined as a reduction in motivation and or effort by an individual when working in a team [5] and is a widely researched phenomenon, particularly in social psychology. Research has shown that in general teams try to compensate for members who offer poor quality work [5], but also that social loafing has negative effects on overall group performance, group cohesiveness and group satisfaction.[5] Peer

evaluations are seen as a possible solution for this problem, but they are not seen as completely satisfactory. Detecting lack of motivation and poor work quality in colleagues is one of the major cited causes for frustration in team work experiences.

5.2 Management

Not all students are born managers. In the 3rd and 5th year teams management is expected from the senior members - but they may not have the skills needed. Team members are very critical of what they perceive as "poor management" even if when the management breaks down students seem to gain a lot of useful learning from managing in place of senior students. Management expectations particularly in 3rd and 5th year projects can create problems and frustrations, so it would seem important to ensure that at least one student with management skills is present in each team, but also that the most important aspects of leading a team are better understood, see section 6 below.

Co-management also seems to create problems, with a lot of student reports mentioning difficulties. Management in 3rd and 4th year projects seems very often flawed, and positive experiences relating to these projects seem to focus on a management process which is much more shared among group members. In general there may be too much pressure to manage groups, and management expectations seem to create tensions and problems. Aman et al [6] highlight that one factor identified for predicting dysfunction in group learning is the creation of non-constructive hierarchies.

5.3 Emotions

Emotional intelligence is an important factor for performance in teams [7] and has been divided in literature into four parts, awareness of own emotions, awareness of others' emotions (being able to express own emotions and read those of others) management of own emotions and management of other's emotions. Managing own emotions may mean respecting team members' opinions even when not agreeing, and giving a fair hearing to other team member ideas. Managing others' emotions includes being able to communicate enthusiasm and get team members motivated. Emotional intelligence is probably not a skill that all students possess, and is perhaps often confused with the need to simply create a "good group atmosphere".

5.4 Socialising

Many students comment on the importance of 'out of work' activities to create group cohesion - but this social aspect of group work seems to be hard to balance. Many students talk of having created a good atmosphere, but then deplore a project that nevertheless failed. Also, when talking of social activities we can see a certain discrepancy between attitudes to the same socialising depending on viewpoints of different team members. Research has shown that too much agreement or agreeableness as a group trait is not helpful for successful teamworking [6]. Although our students try hard to create a good atmosphere within their groups, there may be too much emphasis on group harmony, and not enough on allowing constructive controversy [6].

5.5 External Project Partners

Many students comment on their satisfaction at working with an external partner on long inter-year projects, and on the value of this exchange, but equally the quality of external partnerships is the cause of many negative experiences. This factor clearly contributes to overall team (project) satisfaction and confidence.

6   SELECTED STUDENT JOURNEYS

Key student journeys were selected via evaluations by three different actors linked to the team as described above. The seven student journeys chosen include three final projects managed by one 5th year student alone, and two co-managed groups. In one co-managed group the management was clearly equally divided, whilst in the other there appears to have been one manager and one senior team member who's role was nevertheless valuable for the overall success of team working. We also identify that in the other groups, the management style and role of the 5th year students was quite varied. These findings reinforce our understanding that students will not all be the same kind of manager and that there are a wide variety of possible models and methods. These student journeys have a lot in common with those of the larger cohort, and also have certain differences between each other, but we can tentatively identify 6 factors that may differentiate these student journeys.

6.1 "Remarkable" experiences

All but one of our reduced cohort mention remarkable or strong experiences in their four-project journey. In many cases this was a difficult situation that the students overcame, or which gave them important insights into how not work in teams. On analysing replies from the wider cohort, it seems that generally satisfactory experiences may not push students to reflect on why a project went well. Stempfle and Badke-Schaub [8] cite a wide range of research that supports the idea that self reflection is very beneficial in teamwork. We can identify from our reduced cohort that certain students have reflected on a large part of their teamworking experiences with good results, but not all students have these reflective skills. Remarkable experiences may push students to self reflect more. Stempfle and Badke-Schaub also mention that self-reflection in teams is often avoided, as this may diminish feelings of team confidence and efficacy, therefore we may need to encourage retrospective reflection.

6.2 Managing teamwork

In our reduced sample students appear to understand that making a team function is not easy, describing difficulties even in their successful final projects, and this may be a useful mind frame for student managers. The literature on team roles suggest that successful teams need a wide variety of skills. Belbin's team role theory identifies 9 different roles. [9] The framework described by Kolb et al [4] creates four categories which show the variety of skills student teams and team managers need to address; interpersonal, information, analytic and behavioural roles. Two of these are particularly confirmed by our reduced cohort, firstly interpersonal roles, motivating, inspiring, relationship building and secondly behavioural roles, goal setting, action taking for meeting deadlines, being responsible, organising day to day activities.

Team research by Zafft et al [10] suggests that skills described as managing processes and leading change may have most impact on team success. Our research suggests that these aspects should be identifiable by group members and clearly communicated. In the reduced cohort students show signs of communicating a clear project orientation to all group members, "*the manager always gave the impression that she knew where we were going"* or that another manager was *reassuring* allowing the group to advance serenely. A senior student in a co-managed group comments that "*the third year students didn't feel lost and knew where we were going*" - a point confirmed by third year student group member. This also illustrates that clear orientation is not necessarily linked to one "manager".

6.3 A Group project

"I tried to run it not as my project but as the group's project" This comment seems typical of the reduced cohort in their final project. *"As design manager I don't feel I pushed my idea on the team but rather to have co-constructed with the team*". Balancing direction and organisation with the creation of a real team project seems to be something the reduced cohort managed, whether working as co-manager or managing the project alone.

6.4 Empathy

The need to respect team members seems to be well understood. The difference in comments by our reduced cohort suggests the importance of really taking interest in group members - knowing their skills, their needs, their difficulties. Kolb [11] cites research showing the importance of psychological safety in successful teams, where constructive discussions take place on interpersonal divergence, affirming differences and contrasts. The best place for this recognition of differences may not be organising individual progress meetings between team managers and members, though widely practiced these do not always appear a successful strategy. Previous research [1] showed students often found it difficult to discuss their individual role in team projects with other team members. Ongoing empathy might be a better way of describing the strategy needed. A junior team member comments, *our managers were continually listening to the other group members,* suggesting that this empathetic attitude needs to be permanent through a project. Empathy is clearly recognised as a key designer skill, Jobst [2] but this "friendly curiosity towards the strangeness of the other" is also key in heterogeneous team working.

6.5 Experience variety

Whilst common in the whole student cohort - all the students in our reduced cohort have worked in mixed sex groups, and their final project was carried out in a team with a high level of diversity. All

have worked in teams with students of different origins and not just those who have done their entire design studies at the same school. This reduced cohort also has experience of working in teams of varying sizes, including very small teams and this seems to be a valuable experience as part of a student journey. Research on team working confirms the advantages of heterogeneous teams, and this also seems beneficial for repeat experiences in consecutive team working projects.

6.6 Learning and adaptation

Describing the basis for a more holistic use of Experiential Learning Theory, Kolb [11] explains that learning is a holistic process of adaptation and lies at the core of the management process. Our reduced cohort seems to demonstrate a receptive attitude to learning up to the end of their 5 years of study. One student writes of his 4th year student project - *I learnt a huge amount on this project* and his colleague on the final 5th year project writes *I've learnt or at least perhaps understand how to get the best out of each person... how to work together in the same direction, but I've still a huge amount to learn in this area*. Comments show that our reduced cohort seems to include students who were in a "learning frame of mind", even after their key 4th external internship and also that they were ready to re-adapt to new situations.

7 CONCLUSIONS AND RECOMMENDATIONS

Although these projects are a cumulative experience - it may be beneficial to describe each project as a step with a different focus and different specific role for junior and senior team members. To better prepare students for what is expected of them it may be useful to emphasize the management, peer learning and guiding aspect of 3rd and 5th year teams, and focus on a balanced and shared management approach for the 3rd and 4th year projects.

The issue of students with low motivation or social loafing needs to be addressed to reduce this major source of frustration.

The analysis of student replies supports the value of consecutive inter-year team working. To improve this model we need to encourage more self-reflection in student journeys with real diversity, remarkable experiences and empathy.

REFERENCES

[1] Green C. Inter-Year Teamwork Formats examined Through Student Experience. *E&PDE Conference Proceedings,* 2012

[2] Jobst B., Endrejat P. and Meinel C., Does Design Thinking Mediate Critical Innovation Skills? An Interview Approach to Synthesize Five Competencies Taught at the D. School. *E&PDE Conference Proceedings,* 2011

[3] Reed D. J. and Bohemia E. Representations of Design Outputs in Cross Functional Teams. *E&PDE Conference Proceedings,* 2012

[4] Adams A.B., Kayes D.C., Kolb D.A. Experiential Learning in Teams. *Simulation and Gaming,* Sept 2005.36:330-354

[5] Nicholson A. Perceptions of the Peer Evaluation System: Relation with Social Loafing Behaviours. Masters Thesis, John Molson School of Business, Montreal, Quebec, Canada, 2012

[6] Aman C., Poole G., Dunbar S., Maijer D. Hall R., Taghipour F. and Berube P. Student learning teams: viewpoints of team members, teachers and an observer. *Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre*, Vol 2, No 1 (2007)

[7] Jordan P.J. and Lawrence S.A. Emotional Intelligence in teams: Development and initial validation of the short version of the Workgroup Emotional Intelligence Profile (WEIP-S) *Journal of Management & Organisation* (2009) 15: 452 - 469

[8] Stempfle J. and Badke-Schaub P., Thinking in Design Teams - an analysis of team communication. *Design Studies* Vol 23 No5 September 2002

[9] Vanhatalo Effects of Team Role Assessment in Problem Based Group Work Learning. *E&PDE Conference Proceedings,* 2011

[10] Zafft C.R., Adams S.G., Matkin G.S. Measuring Leadership in Self-Managed Teams Using the Competing Values Framework. *Journal of Engineering Education*, 2009, 273-282.

[11] Kolb A.Y. and Kolb D.A., Experiential Learning Theory: A Dynamic, Holistic Approach to Management Learning, Education and Development, in *Handbook of Management Learning, Education and Development.* London: Sage Publications 2008