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Helping design educators foster collaborative learning amongst design students

Abstract

This paper discusses the development of online teaching resources that enable design educators to foster collaborative learning amongst students in the design disciplines. These online teaching resources will be made available through the Design Collaboration website (<http://www.designcollaboration.org>). This website was recently set up by Northumbria University, a UK based institution, to provide an online resource for design educators wishing to develop collaborative pedagogies in design education. It currently contains case studies of collaborative student projects but lacks practical teaching resources. As a result, a research project was set up to compliment the current case studies by creating a suite of design-specific tools and resources that will help foster team management and development. Although various institutions have addressed the subject of group work and collaborative learning, there has been no online resource dedicated to the development of practical teaching tools to help design students work and learn together.

This paper focuses on showcasing the range of teaching tools and resources developed through classroom-based trials. These resources have been developed specifically in consultation with Northumbria University's design educators and trialled with undergraduate and postgraduate students from different design disciplines. In addition, issues surrounding the translation of these tools into a practical, easy to use and accessible in an online format is discussed. The ICOGRADA World Design Congress 2009 Education Conference is the ideal international platform to share these tools with the wider design education community. More importantly, we hope to grow the website by encouraging other design educators to submit case studies to the website, using it not only as a means of sharing good practice but also as a tool for reflection.

The research value is two-fold (a) translating implicit knowledge of collaborative learning into a practical teaching resource and, (b) helping tutors improve their teaching practice, by linking the teaching resource to real experiences through case studies and interviews.

Key Words: *collaborative learning, online teaching tools, working in design teams*

INTRODUCTION

This paper discusses a research project conducted at Northumbria University, UK, relating to the development of online tools to foster collaboration amongst design students. The project identified common problems in different types of collaborative learning and translated this implicit knowledge into an online resource for the design education community. The project team consisted of Joyce Yee (project manager), Kathryn McKelvey (project advisor) and Emma Jefferies (research assistant).

Design education in general has always been focused on the individual, through the Apprenticeship model^{1 2}. Individuality is prized in Design because it is seen to be a creative and personal endeavour.

¹ Katherine McCoy, "Education in an Adolescent Profession," in *The Education of a Graphic Designer*, ed. Steven Heller (New York: Allworth Press, 1998).

² Nigel Cross, *Designerly Ways of Knowing*, Hardcover ed. (London: Springer, 2006).

This however is not reflected in professional practice as designers often find themselves working in teams with other designers as well as non-designers. The effects of globalisation and diversification of manufacturing processes have shifted design education to what Moggridge³ framed as a ‘post-disciplinary design’ era. Three reports looking at U.K.’s creative industry^{4 5 6} have indicated two key factors that are representative of this change:

1. Lack of graduate jobs: Currently, 55,000 students are studying design in the UK, which suggests there are more than 11,000 graduates fighting for only 6,500 job opportunities in the industry each year.
2. Overseas production: Designers losing control over the whole production process as a larger percentage of production is being moved abroad.

These two factors suggest design education needs to provide a wider skill base to work across disciplines, placing more emphasis on developing students’ ability to work in a team, communicate and share knowledge. Recognising the importance of fostering these transferable skills, this project focuses on helping design tutors to foster collaborative working and learning skills. The project recognises that instilling team-working skills provides the foundations for a student’s self-development through collaborative learning.

WHAT IS COLLABORATIVE LEARNING?

Collaborative learning has been a well-supported approach in non-Design disciplines and represents a significant shift from typical teacher-centred learning environments. Theorists such as Piaget^{7 8}, Vygotsky⁹, Fox and Karen¹⁰ and Thomas and Funaro¹¹ recognised the importance of collaboration in constructive cognitive development. Collaborative learning is seen to provide more realistic social contexts in which to learn and helps sustain students’ interests through a more natural learning

³ Bill Moggridge, *Designing Interactions* (Massachusetts; London: MIT Press, 2007).

⁴ George Cox, "The Cox Review of Creativity in Business: Building on the UK's Strengths," (2005).

⁵ The Design Council and Creative and Cultural Skills, "High-Level Skills of Higher Value," (2007).

⁶ Jennifer Whyte and John Bessant, "Making the Most of UK Design Excellence: Equipping UK Designers to Succeed in the Global Economy" (2007).

⁷ Jean Piaget, *The Language and Thought of the Child* (New York: Harcourt, 1928).

⁸ ———, *The Moral Judgement of the Child* (London: Kegan Paul, Trench, Trubner and Co, 1932).

⁹ Lev Semyonovich Vygotsky, *Mind in Society: The Development of Higher Psychological Processes*. (Cambridge, MA: Harvard University Press, 1978).

¹⁰ B Fox and L Karen, "Collaborative Cognition," (Report from Linguistics Department, University of Colorado, Boulder, 1990).

¹¹ J. W. Thomas, and Funaro, G. M. , "A Multi-Media, Computer-Based Model for Learner-Directed, Collaborative Problem-Solving," in *Working Notes of 1990 Spring Symposium Series on Knowledge-Based Environments for Learning and Teaching*, ed. B. Woolf, et al (Stanford University. : 1990).

environment, taking a variety of forms and practised in different disciplines. Smith and MacGregor¹² identify characteristics of collaborative learning as:

- An active, constructive process
- Dependent on rich contexts
- Diverse
- Inherently social.

Collaborative learning according to Cohen et al¹³ is based on the type of social interactions that occur during the learning process. It refers to a “situation in which particular forms of interaction among people are expected to occur, which would trigger learning mechanisms, but there is no guarantee that the expected interactions will actually occur.”¹⁴ Key to understanding its development is recognising the relationship between four characteristics:

Situation: What was the nature of the collaboration? Who was involved?

Interactions: What were the interactions between the people involved?

Learning Processes: What was gained by this learning process?

Effects: What were the effects and outcomes of the collaboration?

Collaborative learning can also be described as the degree to which a learning task involves a prescribed division of labour amongst participants. Engeström¹⁵ differentiates them as:

Type 1: Co-ordination - Students are carrying out individual tasks without having a shared object. It is accomplished by the division of labour amongst the participants.

Type 2: Co-operation - Students collaborate in a shared problem and try to negotiate an equally acceptable way of solving it.

Type 3: Reflective Communication - Students are not only sharing an object but also organising their collaborative efforts through a shared script of joint activities.

The type of collaborative learning depends on whether students are sharing the same objects (such as visual representations, concepts, tools, and concrete materials) when solving the design problems.

¹² B. L. Smith and J. T. MacGregor, eds., *What Is Collaborative Learning?*, Collaborative Learning: A Sourcebook for Higher Education. National Center on Postsecondary Teaching, Learning, & Assessment (Syracuse University, 1992).

¹³ Louis Cohen, Lawrence Mannion, and Keith Morrison, *A Guide to Teaching Practice* (London: Routledge, 1996).

¹⁴ Patrick Dillenbourg, "Introduction: What Do You Mean By "Collaborative Learning", " in *Collaborative Learning: Cognitive and Computation Approaches*, ed. Patrick Dillenbourg (Amsterdam: Pergamon, Elsevier Science, 1999). 5.

¹⁵ Y. Engeström, "Interactive Expertise: Studies in Distributed Working Intelligence," in *Research Bulletin 83* (University of Helsinki, Department of Education, 1992).

According to Engeström¹⁶, reflective communication is the most effective kind of collaborative learning in prompting social interaction by sharing both the tasks and how they are organised.

In relation to Design, collaborative designing is described by Lahti *et al.*,¹⁷ as “a process of actively communicating and working together in order to jointly establish design goals, search through design problem spaces, determine design constraints, and construct a design solution”. Within a pedagogic environment, the commonest forms of collaborative learning occur during formal group projects. At Northumbria University, a majority of the collaborative learning within the School of Design occurs in live industry projects where a company or an organisation acts as the ‘client’ and students are asked to respond to a design brief. Generally, the brief requires a group rather than an individual response due to the scope of the design problem.

HOW THE TOOLS WERE DEVELOPED

Current resources in collaborative learning for Art and Design include online teaching resources such as Clients and Users in Design Education Project,¹⁸ StudyNet,¹⁹ and textual resource such as Deliberations²⁰ and Tools for Teaching.²¹ Our review reveals that these resources are limited in range and insufficient to assist design tutors to foster collaborative learning in design teams. Additionally, the resources are textual and not as engaging as using a mixture of media, as proposed in this research project. Hence, a key project objective was to produce teaching and learning resources that were practical, rich, engaging and relevant to undergraduate and postgraduate design students.

The development of these tools is divided into four stages (see Figure 1). The first seeks to identify a range of common issues and challenges faced by tutors during collaborative projects through a questionnaire. The second stage involves reviewing existing collaborative learning tools in order to evaluate and match their appropriateness with the list of issues identified in the first phase. The third stage is the development and translation of collaborative tools into a format that is communicable and usable for tutors. These resources are published on the Design Collaboration website. Finally, the issues and tools are connected back to the real experiences of design practitioners through a series of

¹⁶ Ibid.

¹⁷ H. Lahti, P. Seitamaa-Hakkarainen, and K. Hakkarainen, "Collaboration Patterns in Computer Supported Collaborative Designing," *Design Studies* 25, no. 4 (2004). 351

¹⁸ CEBE, "Client and Users in Design Education Project," <http://cebe.cf.ac.uk/learning/collaborative/resources.php> (accessed 7 June, 2008).

¹⁹ The University of Hertfordshire, "Studynet," <http://www.studynet2.herts.ac.uk/lis.nsf/getpage?readform&id=studynet> (accessed 7 June, 2008).

²⁰ London Metropolitan University, "Deliberations,"

<http://www.city.londonmet.ac.uk/deliberations/collab.learning/urls.html> (accessed 7 June, 2008).

²¹ Barbara Gross Davis, *Tools for Teaching* (San Francisco: Jossey-Bass, 1993).

filmed interviews. These are meant to serve as a learning resource for students and to provide real-world grounding of the challenges and issues related to design teamwork.

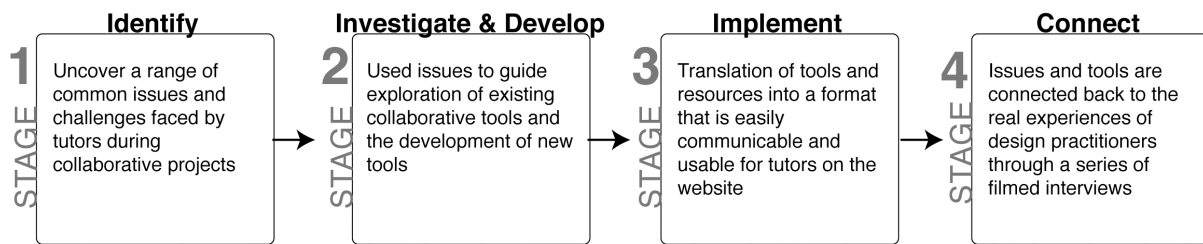


Figure 1: Project Stages

The analysis of the questionnaires collected in Stage One identified four categories of issues, which are related to the various stages of a collaborative student project. These are planning, management, assessment and legacy. In Stage Two, we proceeded to cross-reference existing tools with the issues identified in Stage One. As a result, we formulated a matrix of issues with possible resources that could be developed into practical tools. Figure 2 illustrates an example of how the different categories of issues encountered during the management of a collaborative student project are linked with possible tools. These matrices were used to inform the project team on which tools to trial with design students and to develop into practical resources.

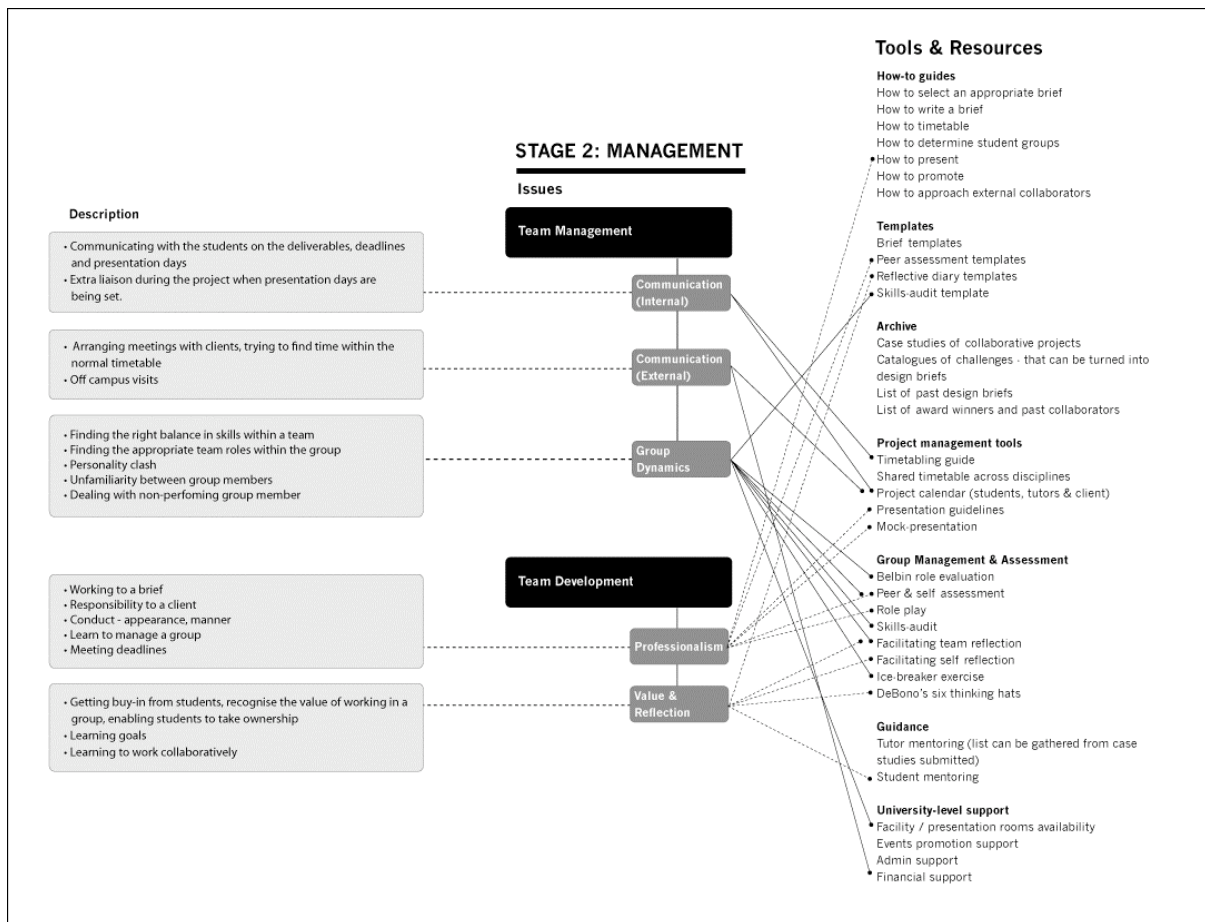


Figure 2: Example of how project management issues were mapped to potential tools and resources

The project team identified suitable collaborative projects that ran in Northumbria's Design School between January-April 2009. We worked closely with module tutors to understand the types of project and how they would like to manage the collaboration between students. This initial discussion helped identify suitable tools to trial with the respective students and plan the delivery into the project timetable. We were involved in two different collaborative projects, one with undergraduate students, and the other with postgraduate students. The varying experiences, subject specialism and cultural backgrounds found in the two groups of students provided us with challenging student environments to work with.

The classroom-based trials were usually in a workshop or seminar format. After every session, the facilitator wrote notes on how the session went and which aspects of the tool could be improve on. These sessions were not only important for testing the appropriateness of the tools, but also enabled the project to identify emergent issues overlooked in Stage One. For example, resolving conflict amongst team members emerged as an important issue during a session where students were asked to select their team members. A specific student was not accepted into any team, as he was perceived to

be a ‘difficult’ person to work with. In that instance, the tutor had to intervene and act as a facilitator in order to resolve the conflict.

The third stage involved the refinement and translation of teaching tools into a format suitable for online delivery. This meant that each tool had to be written and structured in a set format which is available as a downloadable PDF document with pre-defined templates that tutors can use immediately. The tools are also linked to additional internal and external resources, which could be used as support material. Some of the additional support material comes in the form of short videos, which were filmed specifically for this project. We asked a range of designers from different disciplines and sectors about the challenges of working in a team and they responded with a range of interesting and useful advice for students.

COLLABORATIVE LEARNING TOOLS FOR DESIGN STUDENTS

This section introduces the range of tools developed from our research and provides some detailed examples. We also introduce the structure of the Design Collaboration website in order to contextualise the roles of the tools in relation to other parts of the site.

Design Collaboration Website

The Design Collaboration website is divided into seven sections (see Figure 3 for its system architecture). A main section is ‘Explore Collaborations’ (Figure 4) containing case studies of different types of collaborative learning which are project reflections written by design tutors. This offers a way of recording how student design teams have been facilitated and enables sharing of good practice. An equally important section is ‘Teaching Resources’ (Figure 5) which contains a list of specially developed teaching and learning resources for design education, which supports tutors wishing to address issues encountered during collaborative learning.

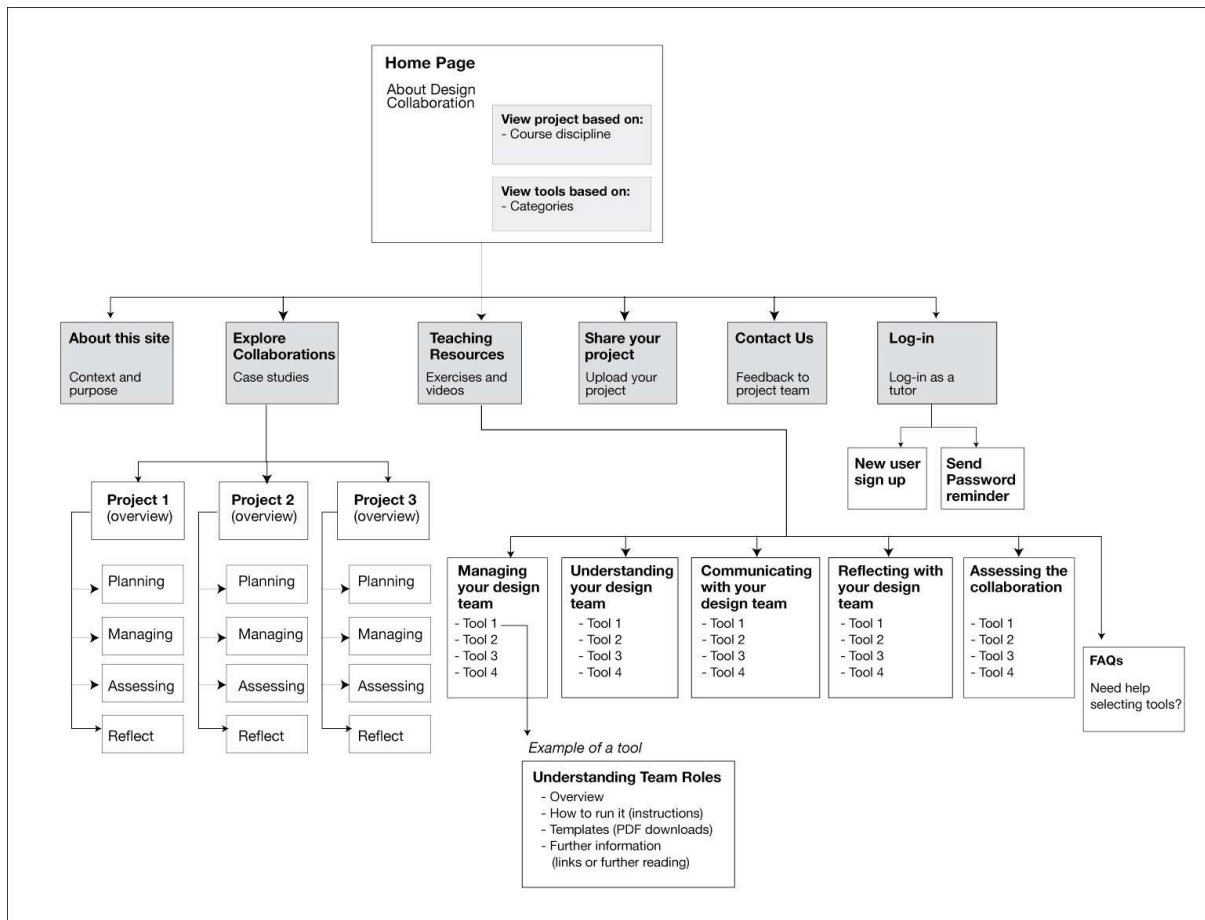
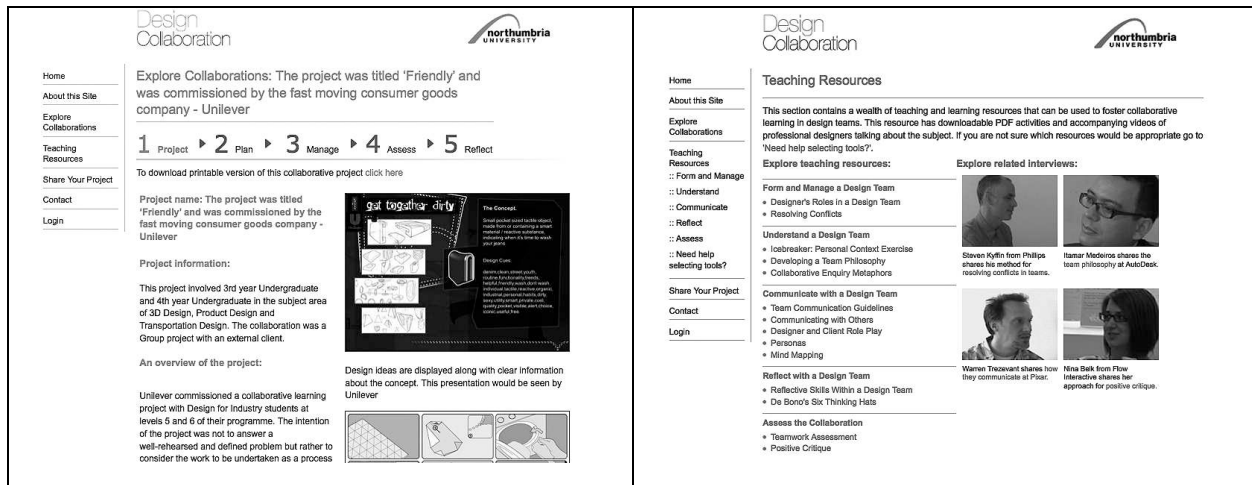


Figure 3: Design Collaboration web pages



Figures 4 & 5: Screen shots of the Explore Collaborations and Teaching Resources pages from the Design Collaboration website

Learning and Teaching Resources

Table 1 illustrates the final list of teaching and learning resources developed for the project. Each theme is supported by either a PDF, a video or both. The resources are grouped into five main sections, which are related to the activities of managing, understanding, communicating and reflecting with a design team, as well as assessing the collaboration itself. Not all of them have been trialled with students, as some of the themes emerged during the work with students or when interviewing professional designers about design teams. Due to the shortage of space, we will only describe one exercise from each theme which we have trialled as we are able to comment on their effectiveness.

Managing your design team	Understanding your design team	Communicating with your design team	Reflecting with your design team	Assessing the collaboration
Roles of a designer in a design team	Icebreaker: personal context exercise	Team communication guidelines	Reflective skills within a team	Teamwork assessment
Resolving conflicts	Developing a team philosophy	Communicating with others	DeBono's Six Thinking Hats ²²	Positive critique
	Collaborative enquiry metaphors	Designer and client role play		
		Aiding communication in a design team using personas		
		Mind mapping		

Table 1: List of teaching and learning resources on <http://www.designcollaboration.org>

Managing your design team - Roles of a designer in a design team

This is a familiarisation exercise to enable discussion and negotiation of roles within a team. It is divided into four parts – the first task involved sharing individual likes and dislikes about team work, and canvassed opinions on desirable personality traits for a team member. The second task asked the teams to consider several possible roles that a design team might need to work effectively. Examples of roles included an Investigator, a Catalyst, a Manager, a Communicator and an Artist. Once the group developed a shared understanding of what these roles were, they were asked to map each member's preferred role and to highlight an additional role in an area where they would like to improve. The team was asked to negotiate the roles between themselves in order to arrive at an agreed

²² Edward De Bono, *Six Thinking Hats* (Massachusetts Back Bay Books, 1999).

solution. We emphasised that these roles are not fixed and should be fluid during the duration of a project, depending on the requirements. When we ran this exercise with students, we observed that it helped them understand different team roles, share areas of weakness and relate their experiences to these roles. Introducing the roles also enabled the tutor to facilitate discussions around team dynamics and the importance of finding the right balance.



Figure 6: Students participating in the Design Team Roles exercise

Understanding your design team - Developing a team philosophy

This exercise was designed to help newly formed teams develop a common philosophy of values and process. We appropriated a technique developed by one of our team members²³ used as consultation method with stakeholders in the development of a brand identity. Our exercise consisted of a set of image cards designed to act as catalyst to discussions about the team approach. Each team was given a set of cards and asked to select a type of animal, a celebrity and a chair that best represented their team philosophy. They were also asked to brainstorm keywords that might go with the images selected and devise a team name and motto. The main objective of the exercise was to offer an opportunity for team members to share values, process and motivations. The final outcome of a team 'motto' was incidental and only served as a vehicle for the purpose of team bonding and communication. Students found the session 'fun' and 'entertaining', boosting team morale and useful in terms of setting a shared agenda.

²³ Joyce Yee and Louise Taylor, "'Are You a Delia or a Chantelle?' Engaging Stakeholders in Branding Exercises," in *Design and Semantic of Form and Movement (DeSFORM)*, ed. Loe Feijs, Steven Kyffin, and Bob Young (Newcastle, United Kingdom: Philips, 2007).



Figure 7: Students participating in the Developing a Team Philosophy exercise

Communication in a design team - Role playing designer/client relationships

This resource is important for student projects involving an industry partner where students have to deal with the expectations and criticism of an external client. This theme is also supplemented by videos of experienced designers sharing their experiences of managing and developing good client relationships. We asked the teams to select one member to act as a client. To help that student get into character, we provided blank facemasks and asked him/her to customise it. Although the students responded well to the ‘fun’ element of the exercise, they also took time to develop the characteristics of the client figure in order to create a believable character. We then asked each team to do a mock presentation to their ‘client’ in order to test how he/she might respond. This exercise enabled the students to anticipate potential responses from the client and, importantly, to understand what the client might expect from the design outcomes.

Reflecting with your design team - Reflective skills within a team

Students were given a framework to help them reflect as a team which took the form of ‘What?’, ‘So what?’ and ‘Now what?’. This tool can be used at any time to help them reflect either on themselves, the process or team members. The students were introduced to this approach at the start of their collaboration, where the importance of using reflection was explained. The tutor encouraged them to use this tool during the project when difficulties arise. Students found that it helped them considered issues and explored possible solutions.

Assessing the collaboration- Teamwork assessment

This exercise was used to enable students to reflect on their experience of working in a team. They used the criteria provided, which could change dependent upon the project, to look at what they had learned, in terms of cognitive skills, technical skills and social skills. When they had done this, they applied the same criteria to each of their colleagues and gave them a mark out of five for each question. This information was then collated together, as each member of the group offered a mark for themselves and their colleagues, so that a combined mark was collected. Students could offer comments about the assessment process, the project or any other information that might be useful in the successful running of the module. This then could be used to determine the weighting of these marks, dependent upon the project and the importance of the team-working element.

CONCLUSIONS

This project has highlighted the importance of incorporating collaborative learning into design education. We found that collaborative learning enhanced and improved idea generation amongst the students. It enabled the team to take individual ideas to a much higher level by sharing ideas and challenging each other. Collaborative learning also enabled the students to learn from each other, for example technical and negotiation skills. For design education to progress and reflect professional practice, the benefits of collaborative learning need to be made explicit to the student and complimentary forms of evaluation found or explored. This would enable more effective design team-working, encourage students to learn from each other and re-balance the focus on the individual learning with learning collaboratively.

Developing a resource that was easy to use and accessible was an important project objective. This was because planning and managing a collaborative project involving an external client places additional workload on a tutor. A majority of a tutor's time is spent on developing and fostering a relationship with the external client as well as ensuring that the students work to project deadlines. As a result, tutors often do not have time devoted to helping students develop ways to work and learn collaboratively. Therefore one of our key objectives was to offer tutors a ready-to-use resource in order to enable them to focus on the pedagogic issues more effectively. The responses that we have received so far, from design educators who have participated in the project, have been positive and encouraging. However, it remains to be seen how the tutors will cope with using the available resources and facilitating the exercises without the presence of the researchers. Additionally, as the tools were developed within a single education environment in a UK context, we have not been able to evaluate their effectiveness in a different learning context.

Although the resources on the website are directed at the educational community, we recognise that the resources could be equally useful for design practitioners. Design managers are especially

interested in tools that can help them develop their team, especially when trying to induct new members. Further development will be required to translate these resources for professional use. These developments can then be used to improve and expand the Design Collaboration website.

And finally, in order to grow and improve the resource, we would like to invite design educators attending the ICOGRADA World Design Congress to share their own experiences of collaborative projects on our website and to explore the tools available. As an ongoing and live resource, we welcome any feedback on ways to improve the tools and resources.

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