

The OnlyConnect Experience

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Introduction

In an increasingly networked society, the ability and know-how to work in geographically dispersed teams has become a vital skill to acquire. In the context of design teaching, a course titled, "Information, Interaction, and Global Context" was created at the School of Design of the Hong Kong Polytechnic University to provide undergraduate students with an experience-based learning opportunity in remote and collocated design collaboration. Course contents covered information technology, communications, and teamwork, and manifested in an international, online collaborative design project named "*OnlyConnect*." Between 2001 and 2005, the Hong Kong-based *OnlyConnect* project was conducted for five iterations, with international partnering institutions in US, Austria, Japan, Korea, and Taiwan. Hong Kong students from different design disciplines (product design, fashion design, environmental design, and visual communication design) teamed up with design students from collaborating institutions and collaborated on a given design task. The course encouraged students to explore both human and infrastructural issues relating to networked design collaboration including communication protocols, collaboration process, team dynamics, available technology, and potentials and limitations of the virtual environment. The ultimate goal is to enable design students to cultivate individual strategies and methodology to carry out effective online design collaboration in their future career.

This paper aims to share experiences gained from the design and implementation of five iterations of the *OnlyConnect* project. Insights are summarized into an overview on how to plan for and implement an international, online collaborative design project. Key factors for success and failures will also be discussed with relevance to implications for design teaching and learning.

Conceptual Framework for the OnlyConnect Project

Design is inherently a collaborative act. In the design process, ideas are constantly being presented and critiqued upon amongst personnel within the design studio in search of an optimum solution to a design problem. Innovation-driven and technology-intensive design tasks of the 21st-century demands a more complex level of collaboration as multiprofessional design expertise are often required, involving parties geographically dispersed outside the design studio. Indeed, design educators have envisioned this scenario over a decade ago, and have responded with series of action research and experiments based on the concept of a Virtual Design Studio (VDS) (Wojtowicz, 1995; Maher, Simoff, and Cicognani, 2000; Kvan, 2001).

In a VDS, designers who are dispersed across geographical spaces and time, collaboratively generate, communicate, and implement design ideas via the support of computer networks (Maher, 1996). Characteristics of a VDS are (Maher, 1996):

- the design team is composed of people in different physical locations
- the design process and designers' communications are computer-mediated and network-supported
- design information is in digital form
- the final design documentation is often in electronic form

The dispersed nature of a VDS has enabled the design task at hand to involve design experts most suited for the context disregard of geographical limitations. However, this has also added an extra layer of demand on the designers in that they now need to adapt to a network-mediated design process and associated interactions. Similar to other institutions which had carried out VDS experiments, learning to

successfully operate in this new virtual social environment has been one of the major pedagogical objectives of the *OnlyConnect* project.

Another important concept for the VDS is the notion of *collaboration*, which could be generally understood as the sharing of goals, process, and activities when more than one party is involved in a single, common task. A more elaborated definition could draw reference from the distinctions between *collaboration* and *cooperation* as suggested by Dillenbourg et al. (Dillenbourg, Baker et al., 1996):

Cooperation and collaboration do not differ in terms of whether or not the task is distributed, but by virtue of the way in which it is divided; in cooperation the task is split (hierarchically) into independent subtasks; in collaboration cognitive processes may be (heterarchically) divided into intertwined layers. In cooperation, coordination is only required when assembling partial results, while collaboration is « ...a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem».

A similar differentiation is conceived as *single task collaboration* and *multiple task collaboration* by Maher et al. (Maher, 1996):

During *single task collaboration* the resultant design is a *product of a continued attempt to construct and maintain a shared conception of the design task*. In other words each of the participants has his own view over the whole design problem and the shared conception is developed by the "superposition" of the views of all participants.

During *multiple task collaboration* the design problem is divided among the participants in a way where *each person is responsible for a particular portion of the design*. Thus, multiple task collaborative design does not necessarily require the creation of a single shared design conception, though designers work cooperatively in a common electronic workspace.

Yet another approach to designing collaboration within a VDS is *full collaboration* and *partial collaboration*. In *full collaboration* model, the design team shares one common design task and collaborate fully throughout the entire design process until final implementation of one resultant design. While *single task collaboration* does not necessarily specify the total coverage of the entire design process, *full collaboration* implies shared responsibilities from beginning to end of the design task. In *partial collaboration* model, typically the design team shares initial research or design conception phase, and split up to either develop and implement different portions of the design, or to generate different solutions from multiple perspectives in response to findings from initial phase.

The above discussions on collaboration aim to provide background understanding to designing tasks in a VDS, which have important bearings on learning experiences thus enabled.

The OnlyConnect Project 2001–2005

The *OnlyConnect* project was a major initiative of the School of Design to nourish global perspectives amongst design students in their undergraduate studies. It had its early conception in a small scale international design workshop taught by Yasu Santo in the summer of 2001 in collaboration with Keio University, involving about 15 Hong Kong and Japanese environmental design students working physically together in a two-week collaborative design project. While witnessing the communication problems students encountered due to language barriers, interests were developed in coming up with a technological solution so that students could communicate through exchanging images. Such was later realized in custom-developed groupware used in the following *OnlyConnect* projects.

With accumulated interests in providing international collaborative experience to design students, and experiences gained from the initial summer workshop, the School decided to launch its first design collaboration project in virtual space. Conceived and led by Catherine Hu and Yasu Santo, the first *OnlyConnect* project was implemented in September 2001. As opposed to most other VDS projects in scale and subject nature, the *OnlyConnect* project was implemented as a compulsory, major design studio subject that the entire group of over one hundred second-year design students from all design

disciplines had to participate in. From the onset, the *OnlyConnect* project was a real challenge in planning and implementation. Throughout the five years of offer, over six hundred design students and faculty had participated in the *OnlyConnect* project, with a wide variety of collaborated design project outcomes that spanned from spatial designs to furniture designs, product designs, fashion designs and Websites.

Project Objectives

Aims of the *OnlyConnect* project were:

1. to provide an understanding in the relations between design and digital culture
2. to facilitate learning experiences in team work
3. to provide a learning experience in computer-supported design collaboration, with the intention of preparing individuals to navigate and succeed in a world of networked communications
4. to cultivate an understanding in the potentials and limitations of a networked design studio, and to explore the enabling factors and derive strategies for an effective virtual collaborative environment

If education is less and less about transferring knowledge and increasingly about providing opportunities for students to create knowledge on their own (Coker, 1999), providing a rich responsive learning environment is what the *OnlyConnect* project was intended to be. The faculty team conceived the project as an experience-based learning opportunity. The goal was to design the conditions and environment which would enable students to formulate their own personal learning experiences.

Collaborating Institutions and Team Formation

Local participants in the *OnlyConnect* project from School of Design came from several design disciplines: Environmental design, Product design, Fashion Design, and Visual Communication Design. Over the years, the school had seek collaboration from numerous overseas institutions with compatible design specialization and was fortunate in forming collaboration with nine institutions in the past five years of offer of the *OnlyConnect* project. These included Asian, American and European institutions, involving disciplines and departments like architecture design, environmental and information design, fashion design, information design, product design, digital media design and digital art. Most institutions began collaboration more as observers and played a less active role during the first year of collaboration, but with accumulated experience, they promptly assumed full involvement in second year and continued to participate in all aspects of planning and management of the project in the third year.

Due to the large number of local students, it had proven to be very hard to find matching number of design students with compatible design expertise to collaborate with. As a result, teams in the *OnlyConnect* project were dominated by Hong Kong students which sometimes proved too overwhelming and caused pressure on the collaborating remote participants.

The project had also tried grouping students into multi-disciplinary teams, for example, local visual communication design students would team up with overseas architecture design students. After some experience, feedback from students confirmed this was not such a desirable structure after all, as the incompatibility in expertise further deteriorates communication that was already made difficult by differences in language and culture.

Structure of the OnlyConnect Project

The *OnlyConnect* project spanned a total of seven weeks in the fall semester each year. The structure of the *OnlyConnect* project typically began with a short, one-week ice-breaking project. This was meant to stimulate team dynamics within a very short period of time so teams could quickly get into collaboration mode. Second week was usually a physical interaction week when students from collaborating institutions would come visit Hong Kong and the School such that there was a chance for team members to have face-to-face meetings (Figure 1). This had proven to be very useful in nourishing friendship, cultivating cultural understandings and team dynamics. In most cases, the ties that built up within this period had resulted in better collaboration when team members resumed to operating remotely.



Figure 1. Face-to-face meeting is important to cultivate bonds amongst remote team.

(Figures 2 and 3).

After the face-to-face meetings, teams basically followed a normal design process of identifying a design issue to explore, carried out research and sharing insights, then collaboratively developing design concepts and finally implementing the design into physical artifacts as well as representing the design digitally in the form of team websites. The final phase of the *OnlyConnect* project was a series of collaborative networked presentations when members of each design team had to jointly present the project outcome via video conferencing. This was regarded as the highlight and an indispensable component of the *OnlyConnect* project, one that most OC participants valued as the most valuable experience



Figures 2 and 3. Final networked presentations. *Onlyconnect* 2003.

Project Requirements

To coordinate efforts and to lay the ground for successful collaboration, the *OnlyConnect* project proposed the following requirements for all OC participants:

1. **Remote collaboration:** OC participants are encouraged to interact with each other frequently - with own team members as well as with other teams in terms of peer learning, either via synchronous means like chat or video conference, or asynchronously using emails or participating in online discussions. The *OnlyConnect* website was an open space dedicated to serve this online community. Teams are advised to constantly upload recent images to each team's web space to establish its online presence, and also to initiate responses and discussions amongst each other. Participants are also encouraged to use the communication tools provided on the project website to communicate and interact, as well as to freely cruise the websites of different teams and be informed in each others' progress.
2. **Team work:** To work effectively as a team, it is advisable to identify roles that each individual team member will play in the team. Roles and responsibilities might change and evolve as the project progresses. Teams should also develop a team identity with a team name and team logo design, and establish its unique presence in this virtual community.

3. Team website: Each team is required to design, develop and maintain a team website. All design information relating to the *OnlyConnect* project should be documented and presented in the form of web pages in the team website. Team should update their website frequently such that latest information is uploaded in a timely fashion.
4. The design task: At the end of the seven weeks period, each team should present a body of design work that collectively exemplifies an overall vision which the team has defined in phase 1 of the project. There is no limit to the format of the deliverables (could be physical or virtual models, test garments, booklets, prototypes, video, and so forth) except that all physical artifacts should also be represented digitally on team websites.
5. Charting progress: Participants of the *OnlyConnect* project will work collaboratively in a 'mixed reality' that is equal parts studio and online interaction. In fact, in the *OnlyConnect* project, the *process of design collaboration* is as important (if not more) as the final design outcome. Teams are advised to keep an online log book to document explorations and interactions which they have experienced in the process.
6. Individual report: In connection with the above, each participant is required to submit a one page report at the end of the project. This brief report summarizes learning experiences gained in this collaborative project, and reports on the communication model and interactions that has occurred amongst team members. The report should also discuss individual team member's learning experience as well as insights on networked collaborative design.

The preceding was an extensive set of requirements used in the first run of the OnlyConnect project. With more experience, some requirements like the development and maintenance of a team website had proven to be difficult to achieve particularly for product and environmental design teams, and was subsequently removed.

Communication and Interaction

On a daily basis, teams used a mixture of communication methods to collaborate. The following shows a generic set of communication tools suggested to teams which they were asked to pick and choose based on their working habits and preferences. For video conferencing, PC stations equipped with Web cameras were set up in the studios for free access over the duration of the OC project (Figure 4).

Type of communication	Available Tool	Information support
Asynchronous	Email	Text, images, data files
	Message boards	Text, images, data files
	Blogs	Text, images, data files
	WWW pages	Text, images, multimedia contents, hyperlinks
Synchronous	Chat	Text
	Video conferencing	Video, audio, images, text

The custom-developed *OnlyConnect* website served as an important communication portal. (Figure 5) The site provided resources like lecture materials, schedules, profiles of participants, etc. The main forum was for posting announcements to all participants while individual team spaces were for exchanges of thoughts and ideas. The site provided good support for images as the intention was to encourage participants to communicate using visual means. There were also other communication functions like group mail which made it easy for participants to send emails to selective groups of participants, and a chat facility for participants to carry out spontaneous online discussions without leaving the OnlyConnect website and launching another instant message application.



Figure 4. A typical video conferencing discussion

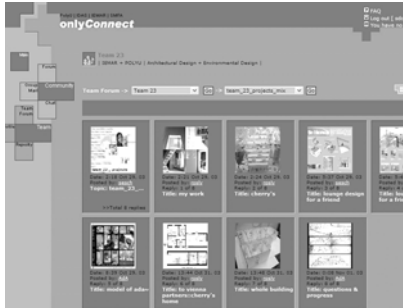


Figure 5. OnlyConnect online collaborative environment. session with remote partners in the studio. Latest uploaded image messages could be viewed Onlyconnect 2002. in team space. OnlyConnect 2003.

Observations and Findings

There were many lessons learned from running five years of the *OnlyConnect* project. Drawing on a model on the *design studio's social system* (Yee 2001, Sproull, and Kiesler, 1991), key findings are summarized in the following section in terms of four key components (Yee, 2001):

1. **People:** collaborators, participants, faculty, students, stakeholders of the OnlyConnect project
2. **Events and their organization:** collaboration model, collaboration process, rituals, reviews, presentations, other teaching & learning support activities, general behaviors
3. **Content and processes:** curriculum, project briefs or design tasks, work and learning processes developed into the OnlyConnect project
4. **Space:** the virtual environment where collaboration activities are performed

People: Collaborating Institutions

- For collaboration to succeed, it is important for collaborators to share common goal and interests. Seek collaborators who have the same passion and commitment as you have in providing networked learning experiences to students as a first step to succeed.
- Clearly identify roles in the partnership. It is important that a clear understanding is established in terms of responsibilities amongst stakeholders.
- Unless demanded by student numbers needing to collaborate, otherwise try to limit collaboration to a comfortable number which your institution could handle. Communication and coordination tasks easily doubled and tripled as more collaborators are involved at the same time.
- Compatible design expertise is a viable consideration when seeking collaborators. Mismatched design expertise tends to increase tensions and worsen communication problems.

People: Students

- In regard to team formation, try to have a balanced number at both/all sides. Avoid having one single person collaborating remotely with two or more participants as he will easily be singled out and be left out of the decision chain. Two is a bare minimum at each end.

- Four to six members is a safe maximum in a remote team. Too many members might result in not enough work to go around all members.
- Motivation to collaborate is of prime importance. Language barriers and cultural differences might post difficulties in communication but at the end of the day, successful collaboration really depends on whether one has the motivation to collaborate.
- Collaboration schedule and tasks should supersede local and personal tasks and agenda. Always remember that there is another party out there whose schedule and tasks are dependent on your response and actions.
- Identify roles and responsibilities in the team. Be prepared though to cross boundaries and provide assistance to other members of the team when needed. Good teams are those which could help individuals within the team to perform and excel.
- Collaboration often breaks down because messages were not properly (often politely) transmitted. Remember that it is *not* a computer but a person that one is communicating with. Common sense etiquettes in interaction should be followed and online conversations should not be taken too casually.
- A timely response is crucial to keep remote partners informed of your active participation in the project. When messages were left unanswered for few days, worries and suspicions were prone to develop which will affect team bond resulting in bad collaboration experience.

Events and Organization

- Full collaboration is demanding but worth pursuing in terms of providing more fruitful learning experience to collaborating parties.
- Mismatched academic schedule or course schedule will jeopardize collaboration. Force-fitted collaboration has the danger of either unfulfilling or bitter experience. At all cost, try to compromise on a common schedule. When academic schedule could not compromise, try partial collaboration instead if some degree of collaborative learning experience is still desired.
- Nature of course (subject) also affects psychology of participants. Students in a compulsory course will be much more committed than students in an elective course, and such a mismatch is usually the cause to most collaboration breakdown.
- Face-to-face interactions are conducive and beneficial to cultivating bonds amongst team members. Try your best to factor in physical interaction in the course of collaboration, preferably at early stage while ties are developing.
- Final networked presentation should be a collaborative effort between remote team members. This is an important phase of the collaborative project and should be carried out with all efforts. Much preparations and testing needed to be done prior to presentation day.

Content and Process

- For short collaborative projects (2 weeks to 7 weeks), more precise design tasks are preferred. Open-ended briefs are more suited when there is more time to collaborate, e.g. when collaboration project spans over one semester.
- Remote collaborations are easily affected by local commitments of participants. Try to set up weekly deadlines to ensure project is progressing and on track. Deadline for final deliverables should also be set at beginning of project and be clearly communicated to all parties concerned. It is important to uphold deadlines with all efforts.
- Having teams to keep weekly online log is useful to chart progress as well as to communicate progress to remote tutors and other participants.
- Develop a habit to communicate with remote partners at least once daily. Collaboratively draft out communication profile and schedule for all weeks and agreed on regular schedule for synchronous meetings.

Space

- Desktop video conferencing stations should be set up in studios for easy access of students. It is desirable if students develop a habit of casually and frequently utilizing video conferencing in

their daily communication with their remote partners. There are evidences to show that team bonds are stronger in teams who frequently use video conferencing to communicate.

- Custom-developed groupware is not a must-have in remote collaborative projects. There is free software available which will also provide similar support. Choose solutions that provide good support to use of images in communication. Evidences showed that teams that collaborated well were those which used a lot of images in their communication. This might be attributed to the fact that images tend to lessen the pressure on verbal/textual explanations connected with language barriers.

Conclusion

This paper has shared the experience of running a large scale online design collaboration project for five consecutive years. The project providers had constantly adjusted the structure and components of the project in response to ever shifting circumstances and conditions each year (collaborators, student numbers, motivations, mismatch schedules, etc). Not all issues were resolved effectively in a consistent manner each year, but each year's accumulated experience had ensured a better operation and course design compared to that of previous year. And since the providers had to adapt the environment to teaching circumstances and conditions every year, a vast range of attempts and experiences to run virtual design collaborations have been accumulated, enabling the school to be a resourceful partner in future online collaborations.

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