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Distributed Collaboration between Industry and University Partners in HE

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Abstract: Over the past three years the School of Design has been experimenting with an innovative curriculum design and delivery model named ‘the Global Studio’. The Global Studio is a cross-institutional research informed teaching and learning collaboration conducted between Northumbria University and international universities and industry partners based in the UK, USA, Netherlands and Korea. The aims of the Global Studio are directly linked with current and future industry needs that are related to changes in the organisation of product and service development. These changes highlight the importance of equipping design students with skills for working in globally networked organisations particularly the development of skills in intercultural communication and collaboration.

In this paper we will focus on the Global Studio conducted in 2008 which included Northumbria University (UK), Hongik University (Korea), Auburn University (USA), Intel (USA), Motorola design studios located in the UK and Korea and Great Southern Wood (USA). These projects will be used to illustrate challenges and benefits of international collaborative industry-based projects undertaken in distributed settings.

Key words: *Global Studio; Industry Based Projects; International Collaboration.*

1. Introduction

Over the past three years the School of Design at Northumbria University has been experimenting with an innovative curriculum design and delivery model named ‘the Global Studio’. The Global Studio is a cross-institutional research informed teaching and learning collaboration [1] conducted between Northumbria University and international universities and industry partners. Participating institutions include: TU Delft, Napier University, Hongik University, Ohio State University, Auburn University and RMIT University, Intel Corp., Motorola, Great Southern Wood and Inverness Medical Innovation; based in the UK, USA, Netherlands, Australia and Korea. The aims of the Global Studio are directly linked with current and future industry needs that are related to changes in the organisation of product and service development [2]. These changes highlight

the importance of equipping design students with skills for working in globally networked organisations particularly the development of skills in intercultural communication and collaboration.

The focus of this paper is the Global Studio conducted in 2008 [3]. The paper will briefly introduce the collaborative projects conducted between Northumbria University and its industry partners based in the USA and Korea. Then we will discuss the interaction and communication between project teams. We will draw on evaluation data collected from the UK based students¹ while projects were in progress and at project completions in order to undertake the analysis. Two of the authors were involved in the delivery of the Global Studio and their observations also form part of the data set.

2. Background to the 2008 Global Studio

The initial Global Studio was conceived as a course conducted annually between participating universities located in different countries. One of the major aims of the Global Studio was to provide a learning environment where students could develop skills in intercultural communication and collaboration but in a way that was economically sustainable and that would enable an entire cohort of students to participate. Another aim was to develop a structure that would enable teaching and assessment to be organised independently at each of the partner universities, thereby overcoming some of the difficulties associated with cross-institutional collaborations [1].

In the initial course, student roles and associated activities were structured throughout the project to encourage students to engage in cross-institutional communication and interaction. This was predominantly achieved through having students act in the dual roles of client and designer. A detailed description of the organisation of the client and designer roles has been reported elsewhere [1].

A year later, a different programme in the School of Design took up the Global Studio with the view that beside collaborating with university partners it would also enable collaboration with industry partners who would be based in different geographic locations. Inclusion of the industry partners provided additional challenges to those experienced in the previous Global Studio. For example, the inclusion of industry partners increased the complexity of interaction and communication amongst the students, lectures and the industry partners (see Figure 1 and Figure 2).

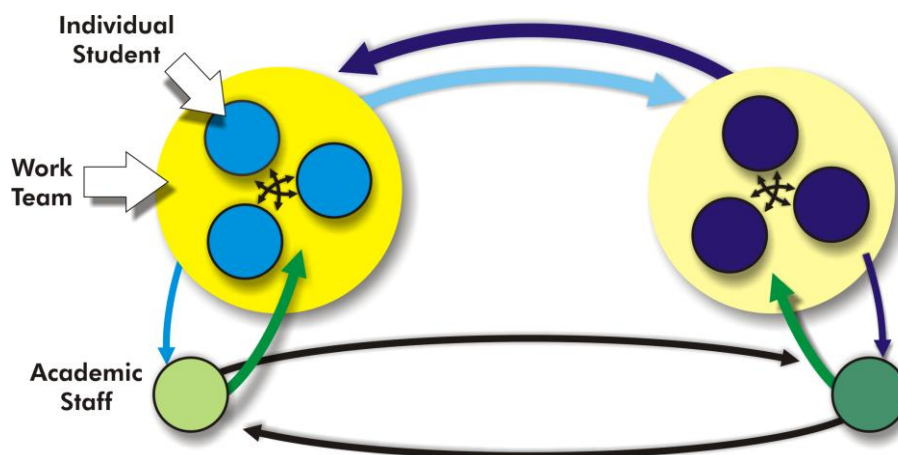


Figure 1. Interactions between student teams and lecturers in the Global Studio conducted in 2007²

¹ Only the UK based students completed the project exit surveys therefore the data will generally reflect views from Northumbria University students unless noted otherwise.

² Note: there were multiple work teams located at each of the partner universities

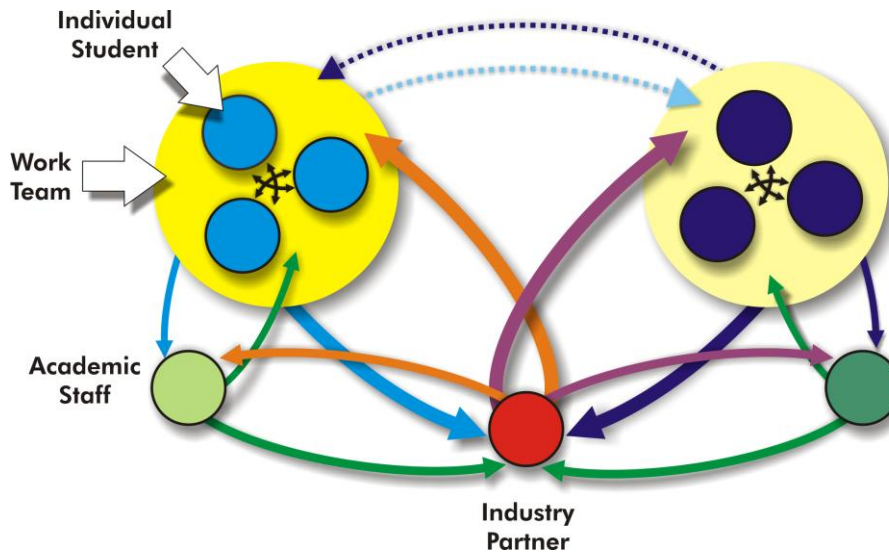


Figure 2. Increased complexity of interactions between student teams, industry partners and lecturers in the Global Studio conducted in 2008²

The inclusion of three industry partners also impacted on how projects were structured as well as student roles and their activities. For example, in the 2008 Global Studio it was the industry partners who took-up the role of clients. This meant that students from the participating universities no longer acted for each other as ‘clients’ and ‘designers’ as they had done in the previous Global Studio. This significantly changed the way students from the different participating universities interacted and communicated with each other.

2.1 Projects and Partners

In this section we will briefly describe the industry-based projects that were undertaken during the 2008 Global Studio. Three collaborative industry-based projects were introduced into the Global Studio: ‘Constructing Constructs’, ‘Thinking outside the Box’ and ‘On the Move’. Each of these industry-based projects was undertaken with different industry and university partners (see Table 1).

The ‘Constructing Constructs’ project was conducted between Northumbria University and Hong-ik University (based in Korea) in collaboration with Motorola’s UK and Korean design studios. Motorola’s Korean Design office also provided a staff member who conducted an elective class for 10 third year industrial design students at the participating Korean university. This industry-based project explored two sub-themes of ‘Constructing Luxury’ and ‘Constructing Technology’ [3].

The second industry-based project titled ‘Thinking outside the Box’ was undertaken between the UK and the USA based universities in collaboration with Great Southern Wood (USA), a national USA timber company. Students at Auburn University (USA) were final year industrial design students. This industry-based project was organised by a lecturer based at Auburn University.

The ‘On the Move’ project was commissioned by Intel, a multinational semiconductor company. This industry-based project was conducted between Northumbria University and the industry partner’s office in the USA. The ‘On the Move’ project explored three broad sub-themes: ‘Design for Experience’, ‘Imagining a Notebook’ and ‘Futures of Mobile Computing’.

A third year class of 34 Industrial Design students from Northumbria University took part on all of the above projects. These students self selected which project they wanted to undertake. Ten students elected to work on the ‘On the Move’ project³, 12 students on the ‘Thinking Outside the Box’ project and another 12 students worked on the ‘Constructing Constructs’ project. In addition, a number of Master of Design students observed

³ The number of students on this project fluctuated over the duration of this project. This was due to students leaving the project as they were offered industry placements.

some of these project teams as part of their studies in Design Management. Although, these Master students were not directly involved in designs the undergraduate student commented on that they liked these student shadowing the team as they were ‘a wealth of knowledge’.

Further, each of the three project groups was divided into smaller work teams. There were 6 work teams at each of the participating universities working on the ‘Thinking Outside the Box’. The ‘Constructing Constructs’ project included 3 linked work teams at each of the participating universities.

Table 1. Global Studio work teams

Industry-Based Projects	Partners			
	Constructing Constructs	Northumbria University (UK) 3 groups each having 4 members	Hong-ik University (Korea) 3 groups each having 3 members	Motorola, multinational mobile phone maker (UK and Korea)
	Thinking Outside the Box	Northumbria University (UK) 6 groups each having 2 members	Auburn University (USA) 6 groups each having 2 members	Great Southern Wood, national USA timber company
	On the Move	Northumbria University (UK) between 10 and 7 students		Intel, multinational semiconductor company (USA)

Students working on the ‘On the Move’ project worked on their individual concepts. However, they were encouraged to work in pairs to help each other at different stages of the design process such as idea generation. This group of students was also asked to present as a ‘group’ to the industry partner rather than to pitch individually.

2.2 Brief description of the three projects

The ‘On the Move’ project commenced with one of the industry representatives visiting Northumbria University and presenting the project team with three broad sub-themes: ‘Design for Experience’, ‘Imagining a Notebook’ and ‘Futures of Mobile Computing’. The general idea for each of the sub-themes was to provide a different time frame for the design solution. The ‘Design for Experience’ sub-theme was aimed at examining solutions for the present, the ‘Imagining a Notebook’ sub-theme was looking 4 years into the future and the ‘Futures of Mobile Computing’ sub-theme looked beyond this 4 year time frame. Students were asked to interpret the requirements and submit a brief to be discussed in consultation with the industry representatives. The only limitation was that the screen of any proposed device could not be smaller than specified by the company. The ‘On the Move’ industry partners regularly visited Northumbria University over the duration of the project to conduct face-to-face meetings and project reviews.

The project sub-themes that were set by the Motorola representative covered two broad themes: ‘New Luxury’ (Constructing Luxury) and ‘New Digital Lifestyle’ (Constructing Technology). A teleconference linking the UK and Korean universities and the industry partner representatives was used to conduct a briefing session which was accompanied by a presentation. The only request made by the industry representative was that they did not want phones. At first this request caused uncertainty amongst the work team members as they selected the project with the view that the project would be set within the company’s product portfolio (*i.e.* mobile phones). Again student groups were asked to generate a design brief addressing one of the two sub-themes.

A briefing session for the ‘Thinking Outside the Box’ project was conducted by a lecturer based at Auburn University who organised this industry project. Student teams at Northumbria University were paired with student teams based at the Auburn University. The UK students were asked to generate a design brief which would complement the work undertaken by the USA counterparts.

3. Communication

Following the briefing sessions students were asked to post an introduction and a photo of themselves onto the project wiki pages. The second activity was for the work teams to create shared space for their team including: (i)

a wiki page, (ii) a name, (iii) a logo and then (iv) to upload design briefs onto their work team project wiki pages. This then was followed with a virtual meeting with the other partners to discuss the design briefs. After these briefs were agreed on, the work teams would conduct research to explore directions on how the design briefs could be addressed. The research findings would be reviewed in order to inform concept development which in turn would be reviewed in order to provide directions for subsequent refinements and iterations of the design proposals. This would then lead to the presentation of the final design proposition to the industry partner representatives.

The presentation outputs varied across the project workgroups as well as within these workgroups. For example, the ‘On the Move’ final design propositions presentation was made up of series of 2 minutes animations describing the main benefits of each of the design concepts which were collated into a standalone DVD presentation. The ‘Constructing Constructs’ included a combination of storyboards and multimedia animation presentations. The ‘Thinking Outside the Box’ included storyboards and scaled down models to demonstrate working principles of the various design proposals.

The three projects utilised various communication tools to support asynchronous and synchronous communication. The selection of these tools was structured by what communication equipment was available at each of the participating partner organisations and by the IT policies of the UK based university.

Students were provided with an opportunity to work in collocated as well as in distributed settings and to interact using various communication technologies while conducting synchronous and asynchronous communications. For example, they worked in collocated settings and communicated synchronously when they collaborated with their work team members who were also based at the same institution (top left quadrant in the Figure 3).

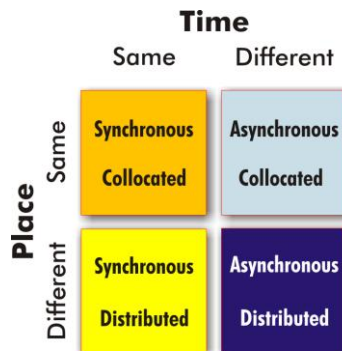


Figure 3 Dimensions of collaboration [based on 4]

These work teams members based at the same institutions also used asynchronous communication tools such as email and wiki pages (top right quadrant in the Figure 3). They also worked in distributed settings and communicated synchronously while conducting tele/videoconferencing with partners who were located at other geographic places (bottom left quadrant in the Figure 3). They used asynchronous communication tools such as email and wiki pages to communicate with partners located at other locations (bottom right quadrant in the Figure 3).

3.1 Asynchronous communication

To support asynchronous communication each project was provided with secured dedicated wiki pages⁴ which used MediasWiki software⁵. The wiki pages were hosted by Northumbria University. The wiki pages were selected as a communication tool for a number of reasons:

⁴ ‘A web-based service allowing users unrestricted access to create, edit and link pages’ [5] Committee of Inquiry into the Changing Learner Experience (2009) Higher Education in a Web 2.0 World. p 50..

⁵ The MediasWiki is the same software used by the Wikipedia.

- The external collaborators were allowed to access these dedicated project wiki pages, as the existing university on-line learning system (*i.e.* Blackboard) was restricted to only students enrolled and staff employed by this university
- The users who were provided with their individual log-ins had unrestricted access to create, edit and link pages, thus providing them with flexibility in terms of structuring their group/individual project wiki pages
- Basic text editing within wikis does not require knowledge of the html coding and standard files could be uploaded with the wikis thus not requiring special external software such web editor and/or FTP client

The idea was for the design teams to upload their work such as design briefs, research including mind maps, moodboards and videos, sketches and other visual representations of design concepts, story boards, multimedia files including animations and movies onto their group/individual project wiki pages. These pages could then be viewed by the participants at each of the sites during the scheduled synchronous project meetings. This enabled participants to present and review the project in relation to material available on the wiki pages.

3.2 Evaluation of wiki pages

Although, all students undertook the introductory exercise, many students found it difficult to use the wiki pages. Some even elected not to use it at all, especially those students who were based at Auburn University. They decided to use Facebook instead using the dedicated project wiki pages for the asynchronous communication with their UK based counterparts. This meant that the UK based students working on the ‘Thinking Outside the Box’ also started using Facebook rather than wiki pages. One of the UK based students commented that:

- *I enjoyed the experience of the video/tele conferencing, this has given me new skills and confidence in trying to present my ideas through different means. The student I was working with failed to use wiki pages even though I constantly asked him to. therefore i did not put much on as i felt it would be wasted.*

The USA based students reported the problems with constantly overwriting other students’ wiki pages, files and images as this student comment illustrates:

- *The wiki page was a pain in the ass. Loading images created a huge headache. As our class was not familiar with the system several students placed pages in the wrong place and overwrote other students’ pages.*

A technical reason for this is that wiki pages have a ‘flat’ structure as opposed to html based web pages which include folders. This means that any new wiki page and uploaded images and files have to be given a unique name otherwise they overwrite the existing wiki pages, files and images. For example, a student would upload their photo named ‘my photo.jpg’, and then another student would upload a photo with the same name. Although, a message would come up indicating an image with the same name already existed and if they chose to proceed with the upload then they will overwrite the exiting image. They would select to continue, thus, overwriting someone else photo. However, they would not have seen the outcome of their action unless they visited the other person’s wiki pages.

Across the board, students commented on the wikis poor editing interface, inadequate file uploading facilities and slow upload speeds. To overcome these shortcomings, student teams working on the ‘Constructing Constructs’ project would upload their large multimedia files onto ‘free’ file sharing websites and then would provide links for these files onto their project wiki pages so that the others knew where to access these files. This generated a different set of problems. For example, the project files were no longer hosted in a secure project web environment. This is problematic as it potentially compromises the confidentiality of the project. In addition, these links generally expired after a few days. Other potential problems were that many of these ‘free’ of charge file sharing/hosting sites advertised adult content websites and software which could potentially infect a visitor’s computer.

Despite problems associated with wiki pages, students commented that the idea of having a web space to share the project progress was useful as illustrated by this comment:

- *wiki pages have difficult grasp sometimes but it's good to have somewhere to share ideas and work*

They also indicated that having their work (*e.g.* multimedia files) available on internet to other student teams and industry partners enabled them to explain their ideas over the phone or videoconference. They also found it useful to observe other students work as these student comments illustrate:

- *[it] was good to see how everyone tackles the project in their own ways*
- *we can compare each other learning ways*

Having been able to observe others work and to be observed by others also provided an element of competition as exemplified by this student comment:

- *Pushes you to work to your potential as you can see real competition. Engaging with others improves your work.*

3.3 Synchronous communication

At the time of running the 2008 Global Studio all messaging and Voice over Internet Protocol (VoIP) software were blocked at the UK based university because of the IT policies that were in place at that time. This meant that internet based software which supports synchronous communication such as AOL Messenger, MSN Messenger, Yahoo! Messenger, Net Meeting, ooVoo and Skype could not be used by the participants from the UK based university using the university's IT infrastructure. Thus, the students and the academics could not conduct synchronous communication with the external collaborating partners using any of internet based messaging and VoIP software.

Therefore, the synchronous communication was either conducted using standard phones or videoconferencing equipment. Teleconferencing was used to support the synchronous communication between the participants working on the 'Constructing Constructs' as well as the 'On the Move' projects and it was the industry partners who resourced and setup these teleconference meetings. Generally, these teleconferencing sessions would last for up to 2 or more hours. The cost of each of these sessions was approximately around £100. For example, Motorola's representative based in the UK would setup a three-way teleconference bridge to facilitate meetings between the two universities which were based in the UK and Korea and this industry partner.

The availability of standard videoconferencing equipment at the UK and the USA based universities allowed frequent videoconferencing between the work teams based at these two universities.

As only the university phones and videoconferencing equipment could be used, these synchronous meetings had to be organised well in advance by the lecturers and the industry partners. This meant that while the UK based students were working from the university, which they were most of the time, they were not able to initiate any impromptu discussions with their external partners, unless they were prepared to incur large personal phone bills. The student work teams which used predominantly teleconferencing to conduct synchronous discussion in conjunction with wiki pages with their other partners (*i.e.* 'Constructing Constructs' and 'On the Move') commented that they would have liked to conduct these via videoconferencing as they thought this would enable them to better explain their ideas and to show their concepts. They also commented on the problems associated with speakerphone sound quality.

On the other hand the 'Thinking Outside the Box' work teams who predominantly used videoconferencing to conduct synchronous meetings (and elected not use the project wiki pages to share their progress) commented that it was:

- *hard to see the concepts when they were presented in the video conference.*

Work teams working on the 'On the Move' project had the opportunity to meet face-to-face with the industry partner representatives a number of times over the course of the project (see Table 3). Interestingly, only one student explicitly commented on the importance of these meetings.

The availability and take up of communication technologies resulted in variation in what communication technologies used project teams while undertaking their projects (see Table 2).

Table 2 Communication technologies

	Constructing Constructs	Thinking Outside the Box	On the Move
Asynchronous			
email	Yes	Yes	Yes
Wikis	Yes	Yes (partial)	Yes
Facebook	X	Yes	X
File sharing sites	Yes	X	X
Synchronous			
Teleconferencing (frequency)	Yes (nearly fortnightly)	Seldom (initial stages of the project)	Yes (monthly)
Videoconferencing (frequency)	X	Yes (nearly weekly)	X
Face-to-Face (frequency)	X	X	Yes (4 visits)

3.4 Project timing and work teams interactions

All the industry-based projects started in February. However, the ‘On the Move’ project finished 2 ½ months later than the other two projects. Table 3 summarises the communication meeting frequency for the different projects and projects duration. It also shows the type of technology used to conduct the communication and whether the industry partners took part. For example, industry partners were involved in all communication sessions for the ‘Constructing the Construct’ and ‘On the Move’ projects. On the other hand, the industry partner for the ‘Thinking Outside the Box’ did not get involved with the UK based workgroups until the second half of the project. However, it was only workgroups working on this project that used videoconferencing to conduct meetings.

Work teams working on the ‘On the Move’ project over the 20 week duration, conducted 9 meetings with the industry partners. Four of these were face-to-face meetings when the USA based industry staff flew to visit the UK based project team.

The ‘Constructing the Construct’ work teams conducted seven meetings with the university and industry partners during 10 weeks while the project was running. Over the same period the work teams working on the ‘Thinking Outside the Box’ project had the same number of meetings, with most of these using videoconferencing. However, the UK based work teams conducted only two of these meetings including the industry partner.

Table 3 Frequency and type of frequency between the distributed partners

	February				March				April				May				June			
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Constructing Constructs	<u>I</u>	<u>I</u>	<u>I</u>	<u>I</u>	<u>I</u>			<u>I</u>		<u>I</u>										
Thinking Outside the Box	V	V	V	T		V	V			V										
On the Move	<u>FtF</u>	<u>I</u>			<u>FtF</u>			<u>I</u>		<u>FtF</u>				<u>I</u>		<u>FtF</u>		<u>I</u>		<u>I</u>

Key
 T Teleconferencing
 V Videoconferencing
 Length of the project
Underline indicates that the communication included industry partners

Generally students working on the ‘Thinking Outside the Box’ project scored their experiences to be less satisfying than those students on the other two project groups. They also scored lower than other project groups on how well each of the project phases worked (e.g. Writing a design brief, Communicating design concepts, Design progress reviews and Presenting final design proposal). On the other hand, 80% or more of students who

were working on the other two projects scored each of these project phases as either working 'very well' or 'well'.

However, even students working on the 'Thinking Outside the Box' project recognised that participation on the Global Studio improved their skills in communicating across distance. It also exposed them to challenges associated with distributed communication as illustrated by these comments:

- *It has made me realise how difficult it is to communicate across countries.*
- *First time using Wiki pages and video conferencing, and I now know why it's so blooming difficult to at all!!*

The above comments were re-echoed by students working in the other two groups. Common themes expressed across all the three project workgroups included an increased confidence in speaking and presenting ideas in public and using various communication technologies. For example, a student working on the 'On the Move' project said that their:

- *confidence to talk through ideas to people from different countries has increased.*

Another mentioned:

- *I have more confidence with my communication skills due to the weekly meetings*

All students felt that the course improved their skills in communicating across distance and a vast majority of students indicated that the Global Studio helped them to better understand the challenges of working with distributed design team members/clients. The Korean students commented that the Global Studio provided them with the opportunity to practice and improve their English language skills.

Most students were positive in regard to their learning experiences and they recognised the learning gained from participating in the Global Studio, for example:

- *Through this project, I learned by experience. This brought me everything like the free thinking, confidence, challenging.*
- *Learnt how easily things can go wrong through communication over the internet*
- *Actually there were many difficulties while communicating by online component without body language so I think it was very challenging task to me*
- *It has made me realise how difficult it is to communicate long distances*
- *I developed my skills in communicating through a number of different media.*
- *Having to talk to a real client has been great and also Korean Students. Team work has improved.*
- *Learning to describe everything in detail both online and on the spot with no back-round caused me to improve my communication skills.*
- *I noticed how much I rely on speech and explanation*

4. Discussion

Overall student comments indicate that they enjoyed the learning experience while participating in the Global Studio. They all felt that their communication skills improved as a result of working with the international university and industry partners. However, students' comments also indicated that communication technologies especially the wiki pages were hard to use. A study titled 'The Great Expectations of ICT' [6] which explored first year students' experiences of ICT use and provision in UK Higher Education sector, reported that students are both unfamiliar and not conformable in using wiki pages. It is argued in this report that currently this technology is pushing students 'beyond their comfort zones' [7]. The findings from the Global Studio suggest that students will need to be better supported by training and accessible tutorial guides throughout the project on how to use the wiki pages. Another option could be to explore external wiki editors which could make the editing task easier. The academic team based at the Northumbria University is also working closely with their IT systems and Learning Technology staff to explore what support is needed to enhance interactions and

communications across the distributed teams working in the Global Studio. This multidisciplinary research team is currently exploring technologies that will enable student groups to initiate teleconference and/or videoconference with their counterparts located at other universities.

The data also suggests that use of frequent videoconferencing between the UK and USA student teams did not lead to greater student satisfaction. These students were the least satisfied on most of the indicators on both the progress and the exit surveys. Another contributing factor may have been that the industry partner in this project did not start interacting with the UK based work teams until the mid project progress review took place.

From the lecturers perspective, managing the three industry projects proved to be a complex task. Therefore, to reduce communication and management complexity only one industry project has been undertaken within the subsequent Global Studio.

In conclusion, we would like to suggest that Global Studio provides students with a rich learning environment by exposing them to complexities of communication and project management by undertaking design projects in distributed settings with international university and industry partners.

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