

A REVIEW OF OPEN ICT TOOLS FOR COLLABORATIVE TEACHING & LEARNING

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ABSTRACT

The Open ICT Tools project explored the use of open source Web 2.0 applications to facilitate collaboration between a School of Design at an English university and its international business and university partners. Using the Global Studio (<http://theglobalstudio.eu/>) as a research site, the project examined the suitability of various ICTs for enabling collaboration with external partners. Due to the confidential nature of the projects, provision of restricted access to the online project sites was required. Therefore, the ICT tools needed to enable information to be exchanged securely. With a restricted budget, we aimed to trial free Open Source Software. In this paper we provide a number of recommendations. We recommend that IT Services in HE and FE develop processes where the novel use of ICTs envisaged by academics (users) can be trialled in collaboration with IT Services and eLearning support staff. This would complement the established pattern of incorporating ICT where either IT Services or e-Learning departments sanction specific ICTs to support learning and teaching within these institutions. We also recommend that students, academics and partners are provided with support with regards how the ICT tools might be used to facilitate engagement with external partners. The paper outlines the trial of the ICT tools and the technical solutions implemented at the English university in order to incorporate these within the existing IT infrastructure.

Keywords: Industry based learning, international collaboration, ICT infrastructure, virtual design

1 INTRODUCTION

The Open ICT Tools project was funded by a JISC infoNet under its 'Trialling of Online Collaborative Tools for Business and Community Engagement programme.' The Trialling of Collaborative Online Tools for the BCE JISC-funded project investigated the use of collaborative online tools to support Business and Community Engagement (BCE) in a number of trials in colleges and universities within the UK [1]. The Open ICT Tools project investigated various open source Web 2.0 technologies that enabled cross-institutional design student collaboration without compromising the technical infrastructure of participating organisations. These technologies provided a common interface and space for students, academics and industry partners collaborating on specific design projects leading to the production of learner-authored content. The aims and objectives guiding the Open ICT Tools project were generated by academics in collaboration with staff from the university's e-learning technology support team (who provide technical and pedagogical support for the use of technology in teaching) and IT Services. These aims were based on staff previous experience while engaging with external collaborative partners to support novel ways of learning & teaching delivery [2, 3]. The key aim of the project was to collaborate with IT Services to trial open source ICT tools which could be used to facilitate engagement with external business and community partners and could be incorporated into the existing university IT infrastructure. A secondary aim was to enhance understanding on the use of ICT tools to facilitate secured collaborative learning with external business and community partners in a global context. Although the English university where the trial was conducted was named in 2007 as the most IT enabled academic institution in the UK, the overriding focus by IT Services was on the security of the University IT infrastructure. This resulted in many of the ICT tools which could support inter-organisational communication and data exchange such as Instant Messenger, IP Telephony, Wiki pages, Blogs, Social Networking and, FTP (File Transfer Protocol) not being embedded and/or prevented from being used within the university IT infrastructure. For example, as IP Telephony (voice over IP) such as Skype could not be used to communicate between the university and its international partners it meant both university staff and

students were limited when it came to communicating with their international project partners. These arrangements also limited university staff with experimenting and developing expertise on how to use diverse and constantly evolving ICT tools to support student learning experiences within a collaborative international environment. As a result there was a gap between how academics envisaged using ICT tools and how IT services supported the use of these tools. This created a tension between the vision of academics working on the Global Studio and the experienced reality.

2 METHODOLOGY

The Open ICT Tools project used an action research methodology. The project included two major cycles to trial ICT tools to facilitate business and community engagement. The first iteration cycle was undertaken within a project titled '*On the Move 2: Computing Now*'. This project was conducted between a semiconductor chip maker located in the USA and the School of Design at the English university. The second iteration cycle was undertaken within a project titled '*Entertainment on the Go*'. This second project was conducted between a mobile devices manufacturer's Design office located in Korea, a university located in Korea, a university located in the USA and the School of Design in the English university. Altogether, these two projects included: 5 industry staff members, 179 undergraduate students, one postgraduate student, and 8 academic staff members. Both projects were internally supported by a cross-institutional team comprising staff from the university's e-learning technology support team, and IT Services.

3 ICT TOOLS REVIEW

3.1 MediaWiki Issues

The site structure proved to be a little confusing to some users. MediaWiki saves all pages and files in the database using their page title and file names. In other words in MediaWiki there could be only one file called for example 'me.jpg'. Consequently many pages and images were accidentally overwritten by users when they used the same name for their pages (e.g. 'Design Concepts' or 'Final Designs') or images files (e.g. 'me.jpg'). MediaWiki uses its own form of page editing language called 'WikiText'. This allows quite complex mark up to be employed using a text only editor. However, this language did seem to place a barrier between the user and the system. Initially students were prepared to learn the language; but on later runs they increasingly found it irritating. Essentially the online systems they were by then used to had completely eclipsed the usability of WikiText. Another issue was editing of long project pages which was difficult due to its 'messiness'. Feedback from students who participated on past projects which used MediaWiki pages indicated that they preferred not to use this system. Report titled 'Higher Education in a Web 2.0 World' [4, 5] suggests students are the least familiar and comfortable using wikis when compared to other technologies. This was a factor in prompting us to trial different Open Source online software.

3.2 Plone

The team decided to trial Plone as it provided a better user editing interface than MediaWiki. It also enabled the creation of online folders which facilitated the organisation of uploaded online files and project sub-pages. This also meant that files with the same name could coexist if each file was uploaded in a different online folder (internally Plone assigned a different names for each of the file. However, this process was transparent to a user). A useful feature was the ability to leave comments on individual project pages without needing to edit the actual pages. Students used this to post comments and reminders for their project group members. The industry partners and academic staff used this feature to comment on students work or to provide additional useful information. Industry partners have commented that they found Plone interface better than Wiki pages. They liked the versatility of how the files could be downloaded such as from folders. This was useful if the link was broken or the page would not display correctly. They also liked the facility which enabled them to leave comments on individual project pages. They and the academics used this facility during interim project reviews. They commented that although the pages seems to be better organised than when using Wiki pages they would have liked students to organise them in a way which would mean the pages better contributed to the facilitating interim project reviews. In other words they were suggesting that students should have been more selective in terms of what they included for the reviews. In many instances the amount of information included was too overwhelming.

Although, students recognised the benefits of being able to share the content online most of them found Plone ‘frustrating and at points a hindrance’ as it ‘limited the group as to what [they] could do’. They commented that the Plone editing interface was ‘difficult to learn and navigate around’ as it was ‘not user friendly and hard to use.’ Students also stated that ‘it [took] too long to upload multiple files’ and that they experienced difficulties with uploading larger files. The major problem we experienced was during presentations when more than one person was trying to access the same file from different locations as accessing files from the project website became unacceptably slow and in some instances the project website stopped responding altogether. The only remedy to fix this was to restart the web browser. This happened a number of times during the final presentation and in some instances a webcam was used to transmit the presentation via Skype. This solution was not satisfactory as the resolution was not as good as it would have been if the multimedia file could have been accessed from the project site. Because of this problem the final project outputs which consisted of movies (some up to 150MB in size) and PDF project files were uploaded onto a semiconductor chip maker staff password protected external storage space. In addition, students complained that Plone’s editor stripped their HTML codes thus preventing them from implementing their specific elaborate project webpage designs. Although, a number of the student groups overcame this issue using Javascript code snippets.

3.3 WordPress Issues

The use of WordPress was initiated by one of the student groups during the *On the Move 2* project which used Plone. This group run their online project site using externally hosted WordPress (with password protected access). This, as well as students dissatisfaction with Plone’s editing interface prompted the staff to investigate a trial use of WordPress in the subsequent international project.

Thanks to the large installed user base for WordPress [6], we have found remarkably few problems with this package, and those that we did encounter were solved relatively easily by visiting the WordPress site and installing one of the many user-generated plug-ins. File uploads were over HTML only, however WordPress includes a Flash file up-loader that at least offers the user upload progress. The only outstanding issue is the lack of a user batch upload facility. This is hardly surprising considering WordPress’ origins as a blogging tool. To overcome this we switched the user registration to self enrolment and monitored the accounts being created by spam bots. With regard to usability general feedback from students and industry partners was positive. Although some students would have liked to have more control over their project sites. For example, they would have liked to implement their own WordPress templates. This was not practical as they would have needed to have been issued with Administrator access rights.

3.4 Skype

We have found Skype to be more user friendly than using videoconferencing such as Polycom.¹ For example, students could call their counterparts by using their own computers without a need to book equipment. Students commented that they liked ‘using Skype with share screen as it allowed them to ‘be in control’ of the presentation. They also liked Skype as it ‘was nice to see who you were talking to’ and that ‘sometimes it was hard to communicate the [design] concepts, but through the use of Skype and gesturing a lot of clarification was resolved.’ However, Skype has a number of limitations when compared to a dedicated videoconferencing system. For example, Skype’s video and voice transmission is of a lesser quality than that of a dedicated videoconferencing systems. In addition, as voice transmission over teleconference is of a better quality than Skype’s audio, whenever possible we have used teleconference systems to conduct virtual project meetings; with Skype delivering the video between the sites. An additional limitation with Skype is that it can only transmit a video signal only between two sites. Interestingly, student comments indicate that they found it difficult at first to take into consideration the different time zones and they missed meetings with their counterparts located in different parts of the world.

3.5 Other Tools

In addition using the above tools we have used email, SMS, teleconference and videoconference to engage with our external partners. The teleconference was used during weekly review sessions in

¹ www.polycom.com

conjunction with Skype which was used to provide a video feed and the online project pages which were used to access the uploaded project files. The reason for using the teleconference was that it provided a better audio and more reliable connection than online tools such as Skype. However, without the sponsorship from our external industry partners the cost of the teleconference calls via British Telecom would have been unaffordable.²

Table 1. Summary of tools used

ICT Tools	Ease of use for users	Limitations	Cost to the Project
Teleconferencing	Reasonable	Voice only. Wired teleconferencing unit can be only used where ports were enabled by the university's IT services. Enabling ports takes time to arrange. It also means that only rooms with enabled port can be used.	The cost of the teleconference calls via BT unaffordable without sponsorship by external industry partners.
e-mail	Excellent	Limitations with size of files that can be attached. This might prevent distribution of larger files. Circulated information only accessible to those to whom an email addressed to.	N/A
Videoconferencing (e.g. Polycom)	Poor	Not every institution might have the equipment. If equipment is centrally managed then it needs to be booked well in advance. We experienced a number of problems with connection and at times were unable to make connections with our industry and university partners.	Initial setup cost of the equipment might be prohibitive.
VoIP (e.g. Skype)	Excellent	Only two participants can use the video facility at any time Poor video resolution	£150 for 10 webcams
Instant messaging	Good	May have potential security issues.	N/A – MS Commander licence purchased by the University
WordPress	Excellent	Not designed for blogging so needs to be creatively adopted for collaborative purposes.	N/A
Plone	Good	Strips custom made HTML codes. Becomes too slow (or even locks down) if more than one person trying to access same file.	N/A
Wiki Pages	Poor	Poor editing interface.	N/A
FTP	Excellent	Currently not allowed on University network for security reasons.	N/A
You Sent It	Excellent	Link expires after 7 days making files inaccessible after this time.	Basic account free of charge
Interactive Whiteboard Technology	Have not tried it	SmartBoard bridge too expensive.	Unaffordable
SMS (Short Messages Service)	Excellent	Only short text can be forwarded.	N/A – personal cost

The videoconference was not used as in the past we have experienced too many connection problems both within our university and with industry partners. In addition, as staff had to be present during the videoconferencing sessions, student access to these facilities was limited. Also as the videoconferencing equipment is centrally managed then it needs to be booked well in advance. This created a barrier to using the equipment. In addition to the tools mentioned above, students also used other tools to communicate and share files. For example, they used 'You Sent It' to share files. The basic account is free of charge; however, the link to the file expires after 7 days thus the file becomes inaccessible after this time. This created a problem when files needed to be accessed later on during the project. Unavailability of the files also hampered archiving online project sites as the related content files were missing. The tools there were used during the project are summarised in the Table 1

² We estimate that that if we had to cover the cost to cover the teleconference call we would needed a teleconference budget between £1,000 and £2,000 to support the teleconference calls for a duration of one of the collaborative projects

below. Another tool that students used was 'Dropbox', an online file storage service which is free up to 2GBs of storage. Compare to 'You Sent It' the advantage of Dropbox is that files were available unless they were deleted. However, in order to access the online files a person with the Dropbox account on which the files were stored needed to invite others to provide access to other to the online folders via their own Dropbox accounts. Students reported that this worked well amongst their group members. Limitation was that the rest of the class were not able to view these files as they were not invited.

4 LESSONS LEARNED

The engagement of IT Services through the project was one of the significant factors contributing to the sustainability of the outcomes achieved during this project. It was this engagement that led IT Services to enable the use of new ICTs such as Skype on the main University wireless networks; it has also led to the commissioning of a server specifically to support collaborative work with external partners. The next issue that IT Services and e-learning technology support team are currently exploring is how they might scale up making the services available on the collaborative server across the university. From the technology perspective we have learnt that it is preferable to select the current market leaders in open source software (such as Wiki/WordPress). The reason is that popular software has a good level of support from the online community. Another important lesson we have learned from the project was the importance for IT Services to work with the academics and e-learning support staff (such as LTech) in order to trial academic (user) led development relating to how ICT might support teaching and learning. The project demonstrated the importance of having the IT Service director on board. This support was crucial to the success to this project. The project contributed to enhancing the relationship between IT Services and LTech. This is important as it has led to increased collaboration between these two services.

Another lesson we have learned is that although students engaged in the Open ICT Tools project had relatively good expertise in using Web 2.0 technologies, project findings suggest students lack broader digital literacy skills, particularly the organisation of information and files. This affects collaboration between distributed project team members and potentially limits students' learning opportunities. Whilst Web 2.0 technologies provide exciting new learning opportunities, particularly the production of learner-authored content, there have been challenges for students in learning how to use these technologies to share and structure the content successfully.

5 CONCLUSIONS

The donation of a test bed server from IT services for the purposes of this work has been invaluable. Without a server essentially 'owned' by the project team, it would have been impossible to provide rapid installation and testing of new collaborative tools. The tools themselves proved to be of varied value. The risk with open source platforms was always that support could end as the online community moved on to embrace other ICT tools. For established systems (namely MediaWiki and WordPress) there was generally always a solution to problems we encountered (unless the problem was one of inappropriate tool use), this was not reflected in our use of lesser known systems. In Plone's case the relatively small installed user base meant there was little or no incentive for developers to update or fix 'bugs' in their plug-ins and extensions. For future development it would be advisable to look at what the internet community is currently engaged in, rather than systems designed specifically for (in this case) collaborative ventures. Although WordPress may not have been the appropriate choice 3 years ago; community and user pressure for new features has expanded it into an (almost) fully functioning content management system. In addition to the technical solutions, the inclusion of a variety of technical support staff from the beginning has helped progress the project and overcome potential technological barriers (both resource and security) that can be found in such a large institution. Without the inclusion of the IT Services director we feel that several of the more contentious areas of the project (in particular the use of Skype) would have been impossible to implement.

6 IMPLICATIONS

The success of the project indicates that HE and FE institutions should develop mechanisms to support academic (user) led initiatives trying to incorporate ICTs to support novel ways to engage learners and

the wider community. The project also illustrates the importance of teaching staff engaging with IT Services and LTech from the start of the project. For example, this led to commissioning a specific collaborative virtual server within the English university which facilitated a fast turnaround of fixes during this trial project. This in turn enabled implementation of dedicated secured online project sites hosted by the university. Thus, the secured project sites have provided our business partners with a confidence in the security of commercially sensitive project related material. Another implication of having access to online project sites available to only community members who were part of the collaborative project was provision of a safe learning environment for students.

This trial enabled the implementation of Skype on the main university wireless network which seems to be safe to use, with no adverse impact on university or partners' infrastructure reported. This implementation allows users to access their email, project websites and Skype at the same time using the same machine. In the past this would have been possible only with using three machine each access the different service (i.e. machine 1 = email, machine 2 = project website and machine 3 = Skype). Student surveys indicated that their perceived learning experience have been enhanced during the engagement with external partners. The transferability to other disciplines is evidenced by a number of academics for other schools that are currently in discussion with LTech staff to incorporate cross-institutional business focused learning activity into their programmes.

7 RECOMMENDATIONS

We recommended that IT Services in HE and FE develop processes where the novel use of ICTs envisaged by academics (users) can be trialled in collaboration with IT Services and e-Learning support staff. This would complement the established pattern of incorporating ICT where either IT Services or e-Learning departments sanction specific ICTs to support learning and teaching within these institutions. We also recommend that students and academic staff are supported with regards how the ICT tools might be used to facilitate a collaborative project with industry and community partners. We would like to highlight the importance of facilitating an early dialogue with the key players so that projects like these can internally supported and resourced. The proliferation of Web 2.0 technologies and their incorporation into the learning and teaching environment means that JISC might be more likely to support future projects exploring how staff and student can develop skills in digital literacy in order for them to be able to participate effectively in distributed project-based collaborative work within a Web 2.0 based learning environment.

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