The use of synchronous technology to support the delivery of EBL to campus and distance learning base students.

Abstract

The purpose of this article is to study the synchronous tools used to support Enquiry Based Learning (EBL). This report covers the use of such technologies, to assist the delivery of EBL to campus based and distance learning students. The main body of this paper describes how different virtual classrooms appeal to the diverse learning styles with emphasis on distance learning students. This report has identified that synchronised communication tools greatly enhance the efficiency of educational delivery for both campus based and distance learning students.

Introduction

Synchronised communication tools are a means of communicating simultaneously between users in a real-time and on demand environment, at the same time allowing users to share files and information (i.e. instant messaging, e-conference etc) (Mondofacto, 2009). This report will investigate some of the different learning methods available to students and identify the advantages and disadvantages of their use.

Common recognition identifies that teaching others is one of the most effective methods of learning (Rusczyk, 2009). This paper explores the potential use and future uptake of synchronised communication tools to support students in higher education and explores the use of enquiry-based learning as a delivery approach, evaluating various synchronised tools.

This report researches the roles of both Campus Based Learning and Distance Learning with more emphasis on the Distance Learning side. It will investigate how this will affect both tutors and students in the teaching environment, giving examples of the possible synchronised technologies that are available, also looking at how these tools suit to different learning styles.

What is enquiry based learning?

Traditional lectures are becoming out-dated, enquiry based learning (EBL) encourages students to go beyond the classroom, changing the traditional roles of students and teachers. Students find themselves more involved in their subject area being able to relate to their work often through personal experience (Dr Bill Hutchings), leading to increased knowledge and retention of information (Figure 1 - The Learning Pyramid). EBL encourages students to work in groups building on key skills, thereby increasing their employability and potential to contribute to larger research projects & publications.

"Enquiry-Based Learning inspires students to learn for themselves, bringing a real research-orientated approach to the subject."
Dr Bill Hutchings(2009)

In using EBL, students are finding themselves towards the bottom end of the learning pyramid and taking their learning beyond the traditional lectures and reading with the key outcome of retaining their learning. As figure 1 suggests, students retain only 5% of information when attending a lecture, whilst at the bottom of the pyramid, teaching others can increase their retention to a remarkable 90%.
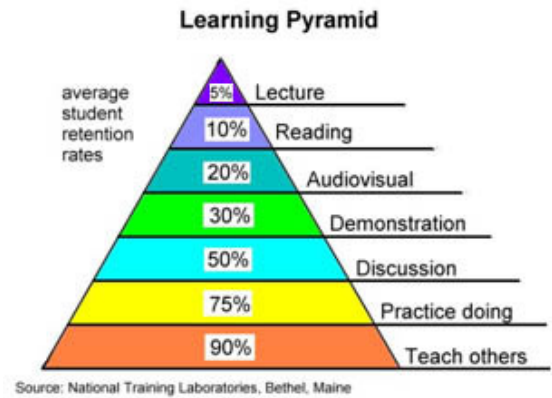
Learning Pyramid

average student retention rates

5%	Lecture
10%	Reading
20%	Audiovisual
30%	Demonstration
50%	Discussion
75%	Practice doing
90%	Teach others

Source: National Training Laboratories, Bethel, Maine

Figure 1 - The Learning Pyramid

Key characteristic of EBL

- Student centric
- Requires action
- Connects theory to practice
- Supported process
- Develops skills
- Sociable
- Enjoyable

Typical forms of EBL

- Problem based learning
- Case based learning
- Field tips
- Dissertations
- Research

The role of the lecturer

With EBL the role of the lecturer shifts from teacher to facilitator, instructing the group processes and learning including encouragement and motivation. Their role is to design the problem area for investigation with guidelines of enquiry and as Dr Bill Hutchings (2009) suggests, students are encouraged to learn outside of the classroom and enhance their own learning.

The Technology

Technology is playing a massive part in the move away from traditional learning styles with educational programs now delivered online, leading to an increase in the availability of synchronised communication tools.

With the rise of synchronised tools, asynchronous tools are taking more of a step back in the world of education. Students want to be able to communicate in a seamless fashion, however while asynchronous tools can offer conversation and collaboration, this is over a period of time and not immediate. Asynchronous tools could therefore be described as impersonal and unsociable as students have to wait before they have an answer to their question.

Synchronous tools possess the clear advantage of being able to engage people instantly to one another. However, a drawback of synchronous tools is that different time zones and conflicting schedules can create communication challenges. In addition, they can cost more than asynchronous tools. Nonetheless, it is clear that synchronous tools suit the characteristics of EBL.

Campus Based Learning- Pedagogical example

Campus Based Learning uses the campus as a teaching tool (Suzanne Savanick, 2009) which can provide hands-on, real world projects to assist the students learning. Several tools are now available amongst campuses that enhance communication and accessibility in order to aid students throughout their time at university.

Students can now be allocated areas on their academic university website where they can discuss and collaborate information amongst other students who may be in their group. This relates back to the learning pyramid, which suggests students learn the most when they are teaching others. The majority of academic websites now contain all documentation and information required throughout a period of study including lecture presentations and other learning materials. This ensures all information is accessible at any time and information that has been missed can always be revisited at a student's convenience.

The main reason campus based learning is advantageous is that it provides hands-on and real-time learning. Students having difficulty can get instant support and feedback from lecturers. Campus based learning is more also interactive than distance learning which may help make teaching more effective.

Campus Based Learning Example 1
Tutors could set students an assignment, which involves a group of students going away and conducting their own research. With this research, the students would collaborate their findings and present the information in a student run seminar, which is done in front of the seminar group.

Campus Based Learning Example 2
Tutors could set an assignment for students and then hold check up clinics with the students, to discuss problems or any further issues that need addressing. This would be very difficult to conduct as a distance-learning student, as it may be a specialised application or program which the work is created on, and therefore cannot be presented over an EBL tool.

Campus Based Learning Example 3
Extra facilities will also be available for campus based students, for example, the use of the university library and the printing facilities within the university, also access to extra media services such as cameras, webcam and microphones are available.

Distance learning students
Distance Learning is the process by which students learn course material from a location that is remote or away from the instructor (Asherian, 2007).

Historically a distance learner would have had to complete their course using self-study and both written and telephone correspondence. However, with advances in technology, the delivery of distance learning courses has changed. With the rise in use of the internet during the late 1990s and early 21st century, the majority of distance-learning courses moved online, with 61% of US institutions offering online courses in 2006-2007 (NCES 2008). The majority of these courses were delivered in an asynchronous format using discussion forums, wikis, blogs and email.

Improvements in internet speed have allowed distance-learning courses to utilise synchronous technologies, such as the use of screen-sharing and audio/video conferencing. In 2006-2007, 31% of US institutions offering online courses did so in a synchronous format, with 19% using two-way audio and video (NCES, 2008). This paper will look in more detail at the use of synchronous technologies and the way in which they benefit distance learners. Since the students never or very rarely come into contact, face to face with tutors. It is important that the web-based tools they use are suited to their needs and provide all the equipment that they require in order to succeed.

According to (Wagner, 1994; Sherry, 1996; Moore & Kearsley, 1996; Meyen & Lian, 1997; Tuovinen, 2000; Doerfert, 2000; Billings, Connors, & Skiba, 2001; Boyle & Wambach, 2001; King & Muirhead, 2001a, 2001b;) the importance of interaction between distance based learners and tutors is of a high importance. As said by Thurmond & Wambach (2004), it is supposed that distance based learners need four factors in order to thrive in a distance-learning environment. These are Learner content interaction, Continuous contact with content, Clarity of content design and Time.

Learner-content interaction
Learner-content interaction results from students examining/studying the course content (Moore & Kearsley, 1996) and from participating in class activities. It is said that the more students interact with the content presented in the digital environment, the more it contributes to what they attain from the distance-learning course.

Continuous contact with content.
 "Learning in a Web-based course may be enhanced by continuous interaction with the content" (Leasure et al., 2000; Swan, 2001). According to Thurmond & Wambach (2004), the Web-based format may encourage deeper immersion and interface with course content than the traditional course format. Research suggests that "continuous, extensive contact with the course content in the Web-based section increased enthusiasm for the course and may have resulted in improved grades for online students" (Leasure et al., 2000).

Clarity of content design.
"Students may perceive learning in a Web-based course easier if the material is presented using a similar format for each content area" (Swan, 2001). Suggesting that if the content is presented in a continuous parallel layout, students may benefit from this as they become used to the way that the information is displayed.

Time.
Atack and Rankin (2002) collected data from 57 nurse participants and reported that one of the greatest obstacles to learning in the online environment was the lack of time available to devote to the course content. Suggesting that the environment in which off-campus students learn has a big impact on the time available to participate in their online studies.

EBL with distance learning student - Pedagogical example
As suggested, distance learning need no longer be limited to just a textbook environment. With the advance in technology, there is more room for students to be engaged as much as a campus based student. Distance learning students could use EBL to research into a particular topic. They then come together as a group to discuss their findings. This could take place in a student teaching student environment within a virtual classroom.

Distance Learning Example 1
A teacher would set the topic (problem area) and the students would research into the topic and generate their own questions and answers. Students could then engage within a virtual classroom to present their findings back to the group. This example clearly plays into the key characteristics of EBL, with the enhancement of the virtual classroom

In reference to figure 1, it is clear that students learn more when teaching others and, by allowing distance-learning students to collaborate their learning would improve. Students can therefore teach others to better embed their own knowledge.

Distance Learning Example 2

The use of Virtual Classroom also encourages the use of audio related interactive functions. The tutor can leave voice notes over certain pieces of information that can be relayed to students, who can then either leave a written comment or reply via voice notes that are visible for the entire tutorial group to view. This is again also represented in the figure 1, as it becomes a form of group discussion.

Distance Learning Example 3

Teachers would publish assignments, for students to complete. This could be discussed via instant messaging in real-time so the student is receiving an instance response from their tutor. This is a perfect example of EBL where the interaction is completely virtual.

How Virtual Classrooms appeal to the different learning styles of distance learning students

According to Kolb (1984), we each prefer to learn in one of four ways: Concrete, Abstract, Reflective and Active. This preference may not be fixed and we may sometimes fit in more than one category, but more often than not, we have a defined preference. However, when undertaking a distance-learning course, it may not be possible to study in the way we prefer. Research has shown that instructors on distance learning courses prefer certain methods of tuition. With their survey of college instructors, Shi and Morrow (2006) found that the use of polling tools in synchronous learning environments was the staff members' preferred way to communicate. Staff can easily find out if students understand what is being taught and gauge the effectiveness of their delivery technique. Virtual Classroom software like Adobe Acrobat Connect Pro and Webex make good use of this polling feature.

However, while a polling feature is beneficial to the tutor, students who steer towards an Abstract method of learning may not appreciate the level of interaction found in Virtual Classrooms. Methods that tutors prefer can often differ from those that students prefer. In a Virtual Classroom where user participation is encouraged, such as in group exercises, Koln (1984) claims that the student would feel uncomfortable. An Abstract learning student is much more likely to prefer an asynchronous method of distance learning where they are given the material and instructions and left to complete the work.

On the other hand, students who prefer Concrete learning are much more likely to thrive in a Virtual Classroom environment. The Concrete learner is the direct opposite of the Abstract learner and prefers feedback and communication from other students as well as being autonomous. Shi and Morrow (2006) found that the most effective method of communication in Virtual Classrooms was the use of Instant Messaging, both public and private. As Instant Messaging is built into almost all Virtual Classrooms, the Concrete student should find they are much more comfortable as they can freely communicate and receive feedback from their colleagues.

The Reflective student is one who enjoys lectures and can form opinions using their own thoughts and feelings. They enjoy the interaction of their teachers and focus on understanding rather than practical application. A Reflective student is therefore more likely to succeed in a Virtual Classroom that has both audio and screen sharing abilities. This can mimic a campus-based lecture whereby the teacher guides the students in what they need to learn before setting them off on their own tasks. However, they may struggle in situations where group interaction is necessary, so a Virtual Classroom that relies on Instant Messaging or Whiteboarding as its main form of communication, such as Twiddla, is likely to see the student take a backseat.

Finally, the Active learner favours more group discussions and peer feedback in their learning environment. They enjoy doing rather than learning and are not keen on lectures. From this, it can be said they would prefer a Virtual Classroom where Instant Messaging or Voice Chat is used so they can communicate with others and contribute to group discussions rather than a Whiteboarding or Screen Sharing based Virtual Classroom where they have no control or input over the tuition and have to sit back and learn. A Classroom such as Vyew would allow the Active learner to contribute to the class instead of take a backseat.

Overall, Skylar (2009) found that 80.5% of learners studied said they performed better when learning in Virtual Classroom Elluminate, rather than an asynchronous text-based environment. Therefore, the conclusion to be drawn from this is that whatever your learning style is, the majority of students prefer to study in Virtual Classrooms than by asynchronous methods. No method of learning will suit everyone, so picking a method that appeals to the vast majority of people, such as Virtual Classrooms, is the best way to undertake a distance-learning course.

Conclusion

The findings of this study suggest that the changes in educational delivery in the 21st century brought on by the improvements in modern technology have greatly supported the rise of synchronised technologies.

As Skylar's (2009) research suggests the use of Virtual Classrooms in an EBL approach to educational delivery enhances the quality of the students' learning experience. Through encouraging the student to take the initiative, EBL entices students, engaging them with the learning material, and therefore requires a Virtual Classroom environment in order to be successful with distance learning students. By relating this back to the Learning Pyramid, it is clear that this form of learning enables students to both discuss their work and help teach each other, leading to higher retention rates and an improvement in the learning experience.

The advances in mobile communication and the internet in recent years combined with synchronised communication tools mean that distance-learning students are able to experience the same quality of educational delivery as campus based students. This is because synchronised communication tools greatly improve the four main factors associated with learning as suggested by Thurmond & Wambach (2004). Campus based students will always have greater advantages simply due to further improvement in those four factors and also the campus itself as a teaching tool (Suzanna Savanick, 2009) enabling those students to experience hands-on, real world projects.

Although EBL is not a traditional method of learning, it is apparent from this report that the technology explored can enhance the educational delivery of EBL to both campus and distance learning students.

Appendices

Vyew

Vyew is a powerful platform for real-time and always-on interaction between people and content. Allowing a clear-view workspace enabling a transparent collaboration. The past can be reviewed, real-time meetings can also be held and preparing for the future can also be arranged.

Webex

Integrate Cisco solutions into a business or learning environment. Access is always available on-demand. Connection with colleagues can be made in seconds, anywhere, at any time.

Adobe Acrobat Connect Pro

Ideas can be communicated powerfully using Adobe Acrobat Connect Pro web conferencing software. Presentations and multimedia can be presented and shared securely right from your desktop.

WiZiQ

WiZiQ is a web based platform for anyone and everyone. Teachers and students use WiZiQ for its state of the art virtual classroom, to create and share online education.

vroom

Connect with colleagues create and share content in your own personal portfolio, join groups, engage in discussions, attend real-time online events using Elluminate's powerful web collaboration environment.

Twiddla

Twiddla is a web-based service that enables teams to meet virtually in real-time by providing tools to create mark-ups of live web sites, uploaded images and documents.

	Vyew	Webex	Vroom	WizIQ	Adobe acrobat connect pro	Twiddla
Package Price	$13.95/month - Professional	**£33 per host per month**	$199 annually	£49 annually - premium	$45 per month	$189 per month - Universal
Real-Time Participants	15	25	10	500	100	Unlimited
Browser Based	✓	✓	✗	✓	✓	✓
On Campus/ Distance Learning	✓	✓	✓	✓	✓	✓
Named User Accounts	✓	✓	✓	✓	✓	✓
Live / On Demand	✓	✓	✓	✓	✓	✓
Voice Notes	✓	✗	✗	✗	✓	✗
Online Whiteboard	✓	✓	✓	✓	✓	✓
Session Recording	✓	✓	✓	✓	✓	✓
Stream Videos	✗	✓	✗	✓	✓	✓
Simultaneous Meetings	✓	✓	✓	✓	✓	✓
Technical Support	✓	✓	✓	✓	✓	Email & Phone
Share Images, Documents and Email	✓	✓	✓	✓	✓	✓
Screen Capture	✓	✓	✓	✓	✓	✓
Voice Chat (Conference Calling)	✓	✗	✓	✓	✓	✓
Unlimited Storage	✗	+£6.59 5GB	10GB	✓		✓
Password Protected Private Meetings	✓	✓	✓	✓	✓	✓
SSL Security	✓	✓	✓	✓	✓	✓
Presenter/Moderator Controls	✓	✓	✓	✓	✓	✓
Who's it for?	Businesses, Tutors & Students	Businesses, Tutors & Students	Businesses, Tutors & Students	Businesses, Tutors & Students	Businesses, Tutors & Students	Businesses, Tutors & Students

Interview with a distance learner

Out of distance learning and campus base lean which suited you best? And why?

I feel better suited to campus based learning opposed to distance learning for several reasons. Firstly I find it far too easy procrastinate which is never good as a distance learning student because of how long you can be away from the classroom for. I was in college for one day each month which meant a lot of work was left until the last minute. This also meant that it was difficult to get to know the tutor and my classmates, which can make campus based learning easier and more productive with the ability to do group work and form a better relationship with tutors.

What could have been done to improve your experiences?

The program was taught using a workbook around 900 pages long. This was given to us in the first session at the beginning of the year which wasn't the best start in terms of morale and motivation! If the work was split into smaller workbooks this would of helped, but further still, if the program was delivered online through software such as Blackboard then it would have been much improved. This would of allowed the material to have been handed out in manageable chunks, perhaps in modules. You could of then had some collaboration between staff and students

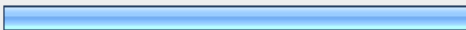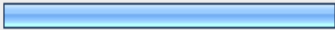### What tools would have assisted you with your learning?

Because the program was delivered through a paper based workbook there weren't really any tools available to assist with the work. Everything was based on the book alone. This really didn't help at all!

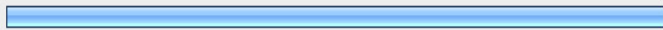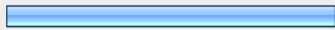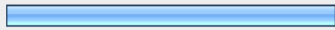### Do you believe a tool like a virtual classroom would have helped with your studies?
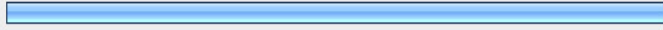
If virtual classroom software had been used it would have meant that I could of made contact with the teaching staff and also the other students on the course more than that one day a month. It would of meant that any problems I experienced would of been solved much quicker, rather than having to wait until the next month's day at college. The work could also have been more varied if the program were to be delivered online or an element of the course had some online capability, even if it meant working from the paper based work book still.

Whilst using a tool like a virtual classroom, which tool within the application/programme did you find most useful & how did it effect your studies?

1. Which type of student are you?

Create Chart ⬇ Download

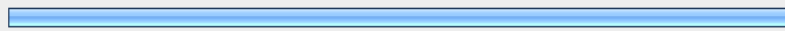|		Response Percent	Response Count
Campus based		58.3%	7
Distance learner		41.7%	5
	answered question		12
	skipped question		0

2. Do you feel any of the following have helped you improve your learning at university?

Create Chart ⬇ Download

		Response Percent	Response Count
Group discussions		83.3%	10
Instant messaging		41.7%	5
White board		41.7%	5
Presentations		75.0%	9
Lecture		83.3%	10
Demonstrations		83.3%	10
	Hide replies Other (please specify)		2

1.	Ability to save the 'conversation'	Mon, Nov 2, 2009 1:30 PM	🔍 Find...
2.	Quizes	Mon, Nov 2, 2009 1:26 PM	🔍 Find...

	answered question		12
	skipped question		0

3. Do you feel you would benefit from using these tools in one environment? e.g. a virtual class room

Create Chart ⬇ Download

		Response Percent	Response Count
Yes		100.0%	12
No		0.0%	0
	Other (please specify)		0
	answered question		12
	skipped question		0

Adsetts Group   10

4. How do you feel it would benefit your education?   ⬇ Download

	Response Count
Hide replies	11

1. I can improve my confidence of working with others. This will improve my group work for future projects; eg jobs etc   Mon, Nov 2, 2009 1:49 PM   🔍 Find...

2. I can learn without the need to travel and can take information quickly with visual reference   Mon, Nov 2, 2009 1:39 PM   🔍 Find...

3. I learn information easily. I believe I am able to advance at a faster pace if able to contact others from home.   Mon, Nov 2, 2009 1:34 PM   🔍 Find...

4. It would allow me to access information and maybe save the class on my own computer   Mon, Nov 2, 2009 1:30 PM   🔍 Find...

5. I can learn quickly in my own time and ask relevent questions about the subject in the virtual classroom.   Mon, Nov 2, 2009 1:26 PM   🔍 Find...

6. Whiteboards are very easily understandable. I believe a clear presentation can show information with ease. It is easier for me to answer / ask a question without being worried about raising my hand and getting it wrong   Mon, Nov 2, 2009 1:21 PM   🔍 Find...

7. Easy contact with lecturers when I am unable to get into university   Mon, Nov 2, 2009 1:14 PM   🔍 Find...

8. Easier access, can work from home   Mon, Nov 2, 2009 1:11 PM   🔍 Find...

9. You can study in the comfort of your own home   Wed, Oct 28, 2009 12:30 PM   🔍 Find...

10. ensures u can go back and check anything at any time   Wed, Oct 28, 2009 12:28 PM   🔍 Find...

11. I haven't used a virtual classroom before but I feel that it would be a huge benefit to education. For example, when a student is ill or distanced based, it gives them that "classroom feel" and gives them an interaction with group members and tutors which one would not get from asychronious tools such as email and discussion boards.   Mon, Oct 26, 2009 10:09 AM   🔍 Find...

25 responses per page ⌄

answered question	11
skipped question	1

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5. What features are most important to you?   ⬇ Download

	Response Count
Hide replies	11

1. Demonstrations and presentations help me clearly understand a topic and gather the relevant information afterwards.   Mon, Nov 2, 2009 1:49 PM   🔍 Find...

2. Instant messaging is most important. I can work from home and the info is sent straight to my computer   Mon, Nov 2, 2009 1:39 PM   🔍 Find...

3. Instant Messaging is a far faster method of communication than message boards or asking one-on-one   Mon, Nov 2, 2009 1:34 PM   🔍 Find...

4. Presentations and demonstrations are very important to one's learning. However, with the ability to learn in my own time, I would like to experience different learning techniques.   Mon, Nov 2, 2009 1:30 PM   🔍 Find...

5. Presentations and lectures   Mon, Nov 2, 2009 1:26 PM   🔍 Find...

6. Whiteboard, presentations, group discussions.   Mon, Nov 2, 2009 1:21 PM   🔍 Find...

7. A simple design with the ability to contact lecturers immediately through Scheduled lectures   Mon, Nov 2, 2009 1:14 PM   🔍 Find...

8. Visual representations must be clear and easy to use   Mon, Nov 2, 2009 1:11 PM   🔍 Find...

9. real-time interaction   Wed, Oct 28, 2009 12:30 PM   🔍 Find...

10. use of notes and voice notes   Wed, Oct 28, 2009 12:28 PM   🔍 Find...

11. Webcam, whiteboarding, file sharing, application sharing, instant messaging.   Mon, Oct 26, 2009 10:09 AM   🔍 Find...

25 responses per page ⌄

answered question	11
skipped question	1

6. Have you ever used a virtual class room?		Create Chart	Download
		Response Percent	Response Count
Yes		58.3%	7
No		41.7%	5
Hide replies Other comments & experiences			3

1. I like the freedom in virtual class rooms. While Presentations in the classroom are important, I can then study the information learnt in my own free time. — Mon, Nov 2, 2009 1:26 PM — 🔍 Find...

2. I use a virtual classroom through university , it is very enjoyable and I find it far easier to converse with others through the application. — Mon, Nov 2, 2009 1:21 PM — 🔍 Find...

3. Through college, Lecturer created a room for questions about project — Mon, Nov 2, 2009 1:11 PM — 🔍 Find...

	answered question	12
	skipped question	0

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