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Required Features of a Virtual Classroom Tool for Use in Higher Education

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Required features of a Virtual Classroom Tool for use in Higher Education

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Abstract

The integration of virtual-classroom systems into the arsenal of e-learning tools represents a major evolution in the landscape of modern distance education. For many courses, standard virtual learning environments (VLEs) provide only a foundation upon which to base a distance learning programme. However, synchronous live online-teaching software such as Microsoft Office Communicator and Adobe Connect allow educators to simulate a real-time classroom environment over the internet like never before. Since these tools are being used more and more within higher education, questions must be asked about how effective they ultimately can be in meeting student learning requirements. More importantly, what are the best practices to employ when conducting classes online in this way?

This paper examines what basic requirements a virtual classroom tool should meet for higher education purposes with much reference to a variety of commercial brands available. Obstacles and restrictions that arise based on these requirements will be discussed in order to identify and overcoming them.

1 Introduction

While virtual learning environments (VLEs) such *Moodle* [Moodle 2010] and *Blackboard* [Blackboard 2010] are now almost ubiquitous within most higher education institutes, virtual classroom software such as *Elluminate* and *Adobe Connect* are only gaining in popularity. Many incoming students with access to a VLE have come to expect that course materials be available online and as such, faculty have generally been keen to oblige. Early adapters of VLEs experimented with additional features such online testing and student forums rather than simply using them as a content management system (CMS). Even if content management is the primary use of a VLE in practice, the combination of meeting room software in conjunction with this represents perhaps the greatest shift so far in how distance education can be delivered. Rather than merely granting the student access to a course page that compliments their physical class, a lecture can now be fully conducted remotely without the need for a physical classroom.

In practice some sort of hybrid model is likely to emerge even if the vast majority of the course is conducted online. Examinations for example, are likely to require student attendance on campus. Also, the physical need for a server for installations, data and recordings still remains. Yet a virtual classroom object does not come as a standard feature of any VLE. It is a separate system that may or may not work easily alongside a VLE.

2 Advantages of virtual classrooms

The question should also be raised as to whether live, synchronous lectures should simply recreate the experience college students get by attending classes as normal on campus. Flexibility in terms of travel is often marketed as the primary advantage to prospective students, but the potential exists for other opportunities to be explored as the standard lecture/tutorial model comes under significant re-assessment in recent years. Problem based learning (PBL) for instance is now properly established as a viable delivery method [Hmelo-Silver et al 2006].

If a virtual classroom is to be used as a substitute for a standard classroom, the software should actually be capable of taking learning to levels beyond traditional approaches. One obvious enhancement is that sessions may easily be recorded. This opens possibilities for students to download and play back the sessions attended (or not attended) onto a range of devices. It has also been long established that online classrooms are particularly suited to a collaborative learning framework should appropriate technology become readily available [Hiltz 1990]. Many applications allow a facilitator to create 'breakout' rooms during the main session whereby several smaller groups can work together during a supervised session. Not all tools however offer this feature.

3 Required features of a virtual classroom

Software used to conduct meetings online is nothing new. Skype has been a VoIP success for a number of years. The creation of tools specifically made for educational purposes however is proving to be a niche market. Certain private enterprises such as *tutor.com* [Tutor.com 2010] and *tutorvista.com* [Tutorvista 2010] offer direct online tuition to a variety of students from primary level upwards. Such companies employ a network of teachers and generally develop their own software for various reasons. Not least of which is that students are charged per exact time online (usually per minute as in the case of tutor.com) rather than per course. Such companies cater to individuals and small groups. More suitable to a college environment however, is a package that can be installed and managed internally.

Adobe Connect [Adobe 2010] and MS Office communicator [OCS 2010] offer most features required for teaching, yet both are still marketed primarily as conferencing and meeting tools. This often means that some refinement is required for application to educational purposes. Neither for example, integrates easily into Moodle or any other VLE for that matter. While some features course specific, others are more generic. [Schullo et al 2007]. This section outlines some general requirements of virtual classroom tools in terms of meeting the needs of the educationalist to ensure a differentiated approach to teaching and learning. Specifically:

- VLE Integration
- Streaming and Recordings
- Breakout Rooms
- Desktop Sharing
- Microphone Sharing
- File Upload and Exchange
- Whiteboard
- Instant Messaging
- Costs

3.1 VLE Integration: One of the most popular VLEs in use is Moodle. Its popularity derives from it being open source and freely available. A survey by UK ICT agency *BESA*, concluded that Moodle was by far the most popular VLE in use within the sample secondary schools and it came third in the primary section. [Besa 2007]. Like most VLEs, Moodle does not however include a virtual classroom as part of its suite of objects.

Vendors that produce virtual classroom software often provide a web services API for potential integration into a company's enterprise system which may not even operate as a VLE. The overhead involved however in implementation and maintenance can be high. For example, *DimDim* [Dimdim 2010] provide hosted virtual classroom accounts to users free of charge as well as a paid version for more than 20 participants including recordings. They have recently released an open source version that can be installed and managed on any network [SourceForge 2008]. The open source version is not without its critics, especially since there have not been further updates since its release in 2008. This coupled with the installation and maintenance on a Linux based server means opting for open source might yield some hidden pitfalls.

Ideally, any third party online classroom software should properly integrate into Moodle (and/or a selection of established VLEs) by means of some plug-in software provided by the vendor. Students and lecturers should have the feel that the package seamlessly integrates into the VLE, even though it may operate as a separate entity as illustrated in the example in Figure 1.
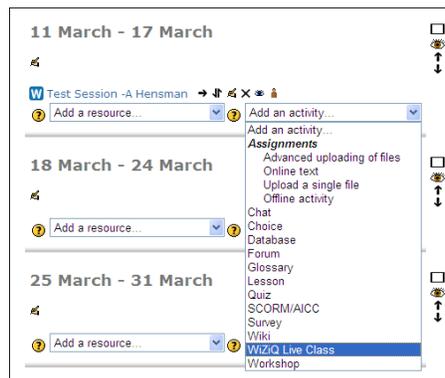

Figure 1 Adding a live WizIQ class object via Moodle

Dimdim, and *WizIQ* [WizIQ 2010] which both offer free hosted classrooms for small numbers do provide a full integration package for Moodle. *Dimdim* also has integrations for Claroline and Docebo.

Wimba [Wimba 2010] is another free hosted package that has integrations for Moodle, Angel and Blackboard. *Elluminate* [Elluminate 2010] goes further in that it currently offers integrations for Moodle, Sakai, Blackboard, Desire2Learn, PearsonLearningStudio as well as offering the standard API. The Open University now uses Elluminate Live as a replacement for an internally developed legacy synchronous collaboration system called Lyceum. [OU 2010]

Full VLE integration means that the date/time scheduler simply appears to lectures as another object when creating a new class, similar to the task of setting up an online quiz. From the student's perspective access to the class should be granted via a single sign in, i.e. a student's Moodle log in should suffice for entry into the classroom even though it is a separate entity. Figures 2 below show WizIQ adding and scheduling a live class as part of a Moodle integration.

Figure 2 Scheduling a live WizIQ class via Moodle

Adobe Acrobat Connect Pro (formerly *Macromedia Breeze*) offers a wide array of features but does not yet offer any VLE integration solutions. While classes can still be represented as links to a URL, it means the additional task of setting up this URL is necessary every time a class is run by a teacher.

This could perhaps be amended by Adobe for future versions since the upgrade from the original *Macromedia Breeze* now incorporates breakout sessions making it more competitive. *Microsoft Office Communicator* does not offer moodle or any other VLE integration.

3.2 Streaming and Recordings: In some cases, an additional video/audio capture tool such as *Camtasia* may be required to record the session. This adds yet another overhead to the mix not least from the lecturer's perspective that must run the capture software separately for every new class. This approach can add confusion for even the most technically savvy facilitators. Preferably the software itself should have an option to record the session and automatically provide a file for downloading at a later stage. There should also be high quality synchronization between audio and video in the recording.

Perhaps the greatest issue in relation to recordings is storage and storage management. With so many sessions potentially recording, accessibility and optimal use of storage becomes crucial. Vendors providing hosted accounts include storage as part of their offering. *Ellimunate*, *DimDim* and *WizIq* have features that automatically convert the link created on moodle to a link to the recording once the class is complete. All three also allow users to download this recording but further conversion to different file formats might be necessary to play back on certain devices. With the growing popularity of hand held devices and the use of mobile phones for video playback, both the ability to stream live sessions and download recordings in a suitable format becomes paramount. For example, the *iPhone* requires a plug-in to use *Adobe Connect*.

3.3 Breakout rooms: The maximum number of students allowable during a session is often a decisive factor in selecting a particular tool. However, like the traditional classroom, if real interaction between teacher and student is to take place, numbers should be kept manageable.

Since collaborative learning is becoming more applicable to a variety of courses, it should also be possible within a virtual class. During a session the facilitator should be able to move small groups of students into a breakout room and then move them back to the main session after some time. The teacher should also be able to easily step in and out of these rooms. While the effect can still be created without this feature, logistics can be cumbersome and corporate addressing of all groups at the same time is not possible.
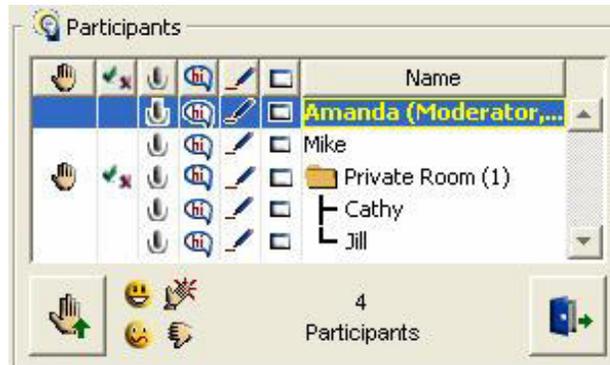

Figure 3 Elluminate's participants window is updated with
breakout rooms. [Elum BR 2006]

The breakout room feature has been severely lacking in most tools until recently. *Adobe Connect Pro* for example has only addressed the issue in its latest version. *Elluminate* and *Microsoft Office Communicator* both allow breakout rooms. Free tools such as *WizIQ* and *DimDim* which have only recently upgraded from their beta editions have a much catching up to do in this regard.

3.4 Desktop Sharing: A common use of desktop sharing is for teachers to move away from the whiteboard or presentation so that students can see what they are doing with some other application on their computer. A screen capture plug-in might be required on the presenter machine to enable desktop sharing.

This is useful for demonstrations but from the students perspective, showing work to teachers and gaining feedback is of primary importance in most learning environments. Two-way desktop sharing is vital in recreating what is taken for granted in a physical lab class. Obviously the primary control should belong to the teacher.

Recording the sharing part of a session can be problematic not least due to the fact that it greatly increases the size of the recorded file. For some tools this part of the session is simply not included in the recording. Audio is maintained but the visuals remain blank. When desktop sharing is recorded, audio and visual is often out of sync, requiring the addition of a third party screen/audio capture tool.

3.5 Microphone Sharing: Most applications easily allow students the opportunity to speak privately with the tutor or corporately to the class with the lecturer granting access each time. *Microsoft Office Communicator* includes a feature whereby the webcam image of the current person speaking is streamed to the all other participant screens creating a very natural effect. However for all tools in low bandwidth situations, webcam video can interfere with VoIP quality and is better temporarily disabled.

3.6 File Upload and Exchange: The ability to upload and share a variety of file formats with students is fundamental to a successful virtual classroom session. Uploading should be as quick as system specifications allow and should be possible both before and during the session. Standard files such as documents and presentations along with video and other media are important for a differentiated learning experience. Fortunately most tools do in fact provide for uploading a variety of formats at various stages of a session.

3.7 Sufficiently Sized Whiteboard: Whiteboards should be of high quality in that they are sufficiently sized and a full set of tools is provided for all standard classroom requirements. Ability to save the images of the whiteboard is crucial, especially for subjects such as mathematics. Again this is a way that using a whiteboard in an online classroom relieves students of any note taking that exists in a physical lecture. Of course while interactive whiteboards installed in many college classrooms can do this, online classroom whiteboards are a less expensive option.

3.8 Instant Messaging (IM): It is often claimed in the marketing strategies of courses taught with virtual classrooms that students, who would otherwise hesitate to speak up, are given a voice online. In the case of larger classes however, instant messaging might actually serve as a distraction, as waves of questions are posted arbitrarily on the message board interrupting the flow of the lecture. This would be the equivalent of many students calling out questions at the same time in a real world classroom.
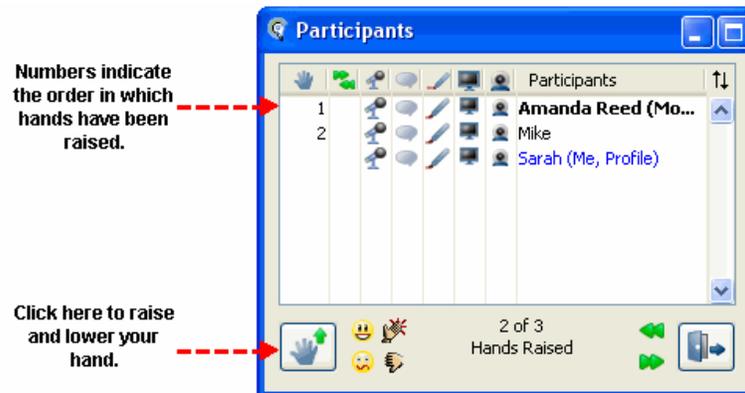

Figure 4 Elluminate's participants window with list of
raised hands and corresponding emoticons. [Elum RH 2006]

Using a system whereby students raise a virtual hand prior to posing their question would seem more appropriate then instant messaging. Microphone sharing allows the student to address a question as if in a real world classroom. It seems counter-productive that students would gain more from a situation where on one hand they continually bombard the message board and on the other, insist on private messaging the teacher during a class. Surely if proper interactivity is the goal, IM should be used in clarifying communications rather than being

the primary method. It is telling that the original purpose of these tools was for business purposes rather than educational when features such as visible hand raising and emoticons suited to students are generally only being added now to the later versions. The student interaction features of *Elluminate* stand far beyond its competitors for ease of use of visible hand rising with equivalent emoticons and alternative ways to pose questions. This type of interaction when using these tools in an educational setting is one area where further research and refinement is necessary.

3.9 Costs: Costs vary with each vendor but usually hosted account holders are offered discounts depending on the intended number of participants and the number of classrooms required. There are educational discounts but the primary overhead is not in classroom hosting, it is for the cost of storing recordings.

There are free online classrooms: *DimDim*, *Wimba* and *WizIQ*. However there is usually a cap of up to 5 participants per class and very few recordings are hosted for free accounts. Adobe Connect Pro offers a wide range of options for hosted and non hosted accounts. *Office Communicator* provides a basic educational version for a low cost, but fees increase with addition of advanced features.

4 Conclusion

This paper examined some of features an online classroom tool should feature if it is to be successful in both simulating and enhancing a natural classroom environment. Whether or not further software or class preparation is required on the part of the lecturer or the tool is easy to use, the same can results can generally be achieved. Due to the importance of VLEs to higher education, it seems reasonable that an online classroom should integrate easily into the environment. The need for breakout rooms should not be overlooked considering the increasing emphasis on collaborative learning. With the rising popularity of hand held mobile phone devices, it seems also reasonable that online classrooms become compatible with them for both playback and streaming.

When considering which tool to use, the college's IT infrastructure, student audience and technical competence of the facilitator must all be considered. From a teaching and learning perspective, there is much scope to incorporate any teaching methodology within a virtual classroom. As long as differentiated learning is achievable, there is no reason why such tools cannot at least provide the same quality as a traditional classroom. Of course, progress is better served by trying to enhance the learning environment with technology rather than merely simulating a standard classroom.

Unlike traditional teaching, there are still no official quality assurance standards in place for teaching online. This is likely to change as the market expands. Smaller groups seem well suited to online classes as demonstrated by the many one to one tuition services. A possible niche is thus in the provision of industry standard qualifications. Courses leading to certifications in *Cisco*, *Microsoft* etc. are generally delivered to smaller groups of adult learners who can afford little disruption to their schedules. If virtual classrooms are to have a positive effect on students, further research and pedagogical studies are necessary towards optimising teaching and learning within them. The profile of a successful online teacher for example, might in the end look quite different from that of a successful classroom teacher. With the technologies currently available, such reflection is quite possible.

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