

# Virtual learning environments: educational requirements versus educational provision – an age old problem

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Abbreviations used

VLE – Virtual Learning Environment

CMC – Computer Mediated Communication

## INTRODUCTION

The proliferation of courses in recent years using blended provision with varying degrees of on-line support is astonishing. Commercial VLEs can be expensive, and both commercial and free software can be variable in quality, though many now offer a host of facilities, many of which are common. However the way these facilities work to support learning and the interfaces in which they are embedded are very different. These can have a dramatic effect on the success or otherwise of the VLE.

This report attempts to explain educational theory in relation to on-line learning and what might be required in a high quality VLE to support high quality learning. Traditional face-to-face systems of learning are frequently criticised, adapted and then criticised again. If VLES and on-line learning merely mirror the failures of the current face-to-face system or even worse, exacerbate them, then an opportunity for progress has been missed. For example the lecture has been identified as one of the least effective forms of learning (Wragg, & Dunne, 1994), yet universities and colleges still use it as a key teaching method and VLEs often emulate its extremely transmissive nature. If we are to use a learning model for our virtual environments, ideally it should be a high quality model.

All learning is contextual in nature and some courses, students, situations may require more or less support than others. A **needs analysis** should be a prerequisite for discovering what tutors and students require and perhaps even what administrators and institutions require and yet these needs will change and develop over time, so considerable lee-way needs to be inbuilt for meeting evolving needs, if the software is to serve more than a short time or more than a small range of people. Perhaps this is less essential in open source software but when one considers the huge amounts of time and effort put into producing resources and learning to use systems we do not want to dispense with them too easily. However, for institutions, administrators and tutors embarking on on-line learning as novices, a needs analysis is very hard to do. Without some experience of actually setting up courses and using them successfully it is hard to judge. They rely heavily on the advice of others, who relied on the advice of others, who maybe got their advice from a salesman or the software developer.

Learning is dynamic and interactive, it evolves and changes. What you see is not always what you get, a problem for HCI generally and compounded by the need to use CMC for teaching and learning, in which much of the process is hidden from view both consciously and unconsciously. There are numerous reviews of various kinds of VLES and their uses (Chapparo & Canas 2004; Browne and Jenkins, 2003), but more

detailed student and tutor reviews would be essential for the creation of a new open source VLE which would hopefully provide an improved environment for learning. The student voice gives us vital and refreshing perspectives on learning (Rudduck et al, 1996; Burke and Grosvenor, 2003). Few reviews of VLES however seriously address the issues of high quality learning and often name, for example, social constructivist theory but are not explicit about how they interpret that term or how their software actually facilitates it. User reviews are less common than bald assessment of functions, but functionality is only a minor part of the story. **The process of understanding and using those functions is the real narrative that needs to be understood.**

While the needs analysis refers to the design of the course material for the project and has been done based on a simple questionnaire (see appendix), the process of understanding and using the VLE functionality can only be assessed if the courses developed throughout this project are properly evaluated taking into account the users' (including both learners and teachers) perspective.

## **PEDAGOGIC UNDERPINNING**

Educational theory has always aimed to understand and model the interaction and learning process, from Rousseau to Gardner, from Dewey to Damasio. Linguists tend to focus on dialogue as the driver at the heart of learning, psychologists at wider human interaction including non-verbal interchange. Current educational thinking comes down heavily in favour of the Vygotskyian **social-constructivist model** which emphasises dialogue and interaction between humans as the source of learning. According to Vygotsky, advanced cognitive development is, at root, embedded in social relations:

*“all the higher functions originate as actual relations between human individuals”*  
(pg. 57, Vygotsky, 1978).

Many theorists in CMC now use **activity theory** as a model for understanding the interactional process between students, teachers and tools like computers, within specific educational contexts. Many designers of intelligent educational software use a Vygotskyian model of learning for understanding and informing both the design and interaction and evaluation process (Wood, 2001). Increasingly, the realisation that every context changes the nature of learning is influencing both theory and practice. However in the rush to produce VLE software, detailed understanding of how software supports the learning process is not always available. In addition, the interpretation of the Vygotskyian model is often assumed to be mainly cognitive, when experienced teachers and also some psychologists have often stressed the affective issues at work in learning contexts. This analysis links the two and offers its implications for learning with VLES.

Though practising teachers and some psychologists have understood the central importance of emotional issues in learning, more recently the development of neuroscience has added weight to their understanding and experience. In recent years throughout both the educational, business and computing worlds increasing emphasis has been placed on the significance of affective issues (Goleman, 1995) in creating effective learning communities through high quality interaction and trusting, valuing relationships. A recent large study at Bristol University in the UK has confirmed the

powerful affective factors at work in learning (Deakin–Crick, 2003). Many psychologists in the nineteen sixties and seventies (Rogers, 1975; Aspy, 1972) were convinced that affective issues played an integral part in learning, as was Vygotsky despite the fact that he is often quoted in relation to cognitive development.

In this regard then our VLEs may need to **take account of the affective and cognitive nature of learning** and as such will be more successful. Of course learning is also dependent on the quality of the tutors and students at either end of the communication lines in the VLE and though we cannot select these, we can be aware of need for sensitive tutors, who create a positive learning ambience, modelling supportive and encouraging behaviour to their students and provide a system which encourages this and puts up no barriers to communication.

Many factors within the immediate learning context in face to face classrooms affect the quality of learning for which a positive ambience is crucial (Cooper, 2003). We must assume that similar factors, see Figure 1, can affect the ambience on on-line learning.

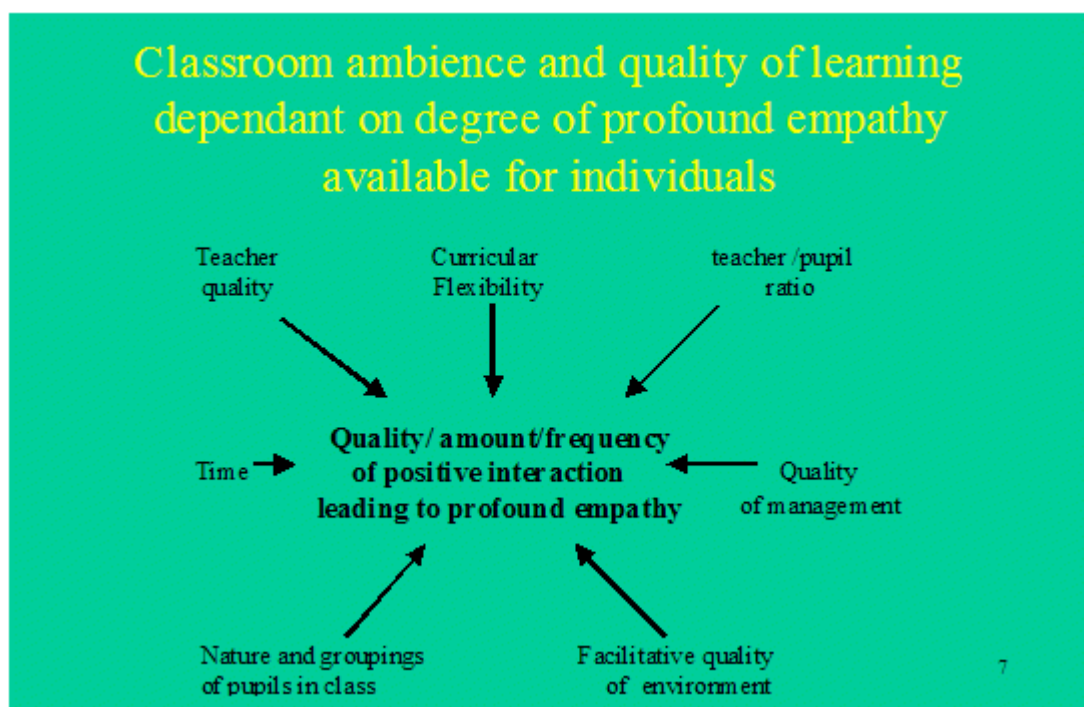


Figure 1: Factors that affect the quality of learning, from (Cooper, 2003).

**Profound empathy** involves the creation of an extremely rich mental model of others which facilitates assessment, scaffolding and enables students to feel that they are valued, understood and stand as more equal partners in the learning process (Cooper, 2002). Tutors learn about students and their conceptions and feelings and students learn about their tutors and their understandings

Students thrive best when they are part of larger learning communities and high-quality learning relationships are modelled by tutors and lecturers (Irvine et al 2000). Tutors who are proactive and take a real interest in their students, in effect continually model the learning process. Learning communities are primarily affective in nature and social and informal interaction is particularly important for establishing the high

quality relationships needed to ensure high quality internalised learning created through mutually respectful dialogue (Clark, 1996; Noddings, 1986 Watson, 1995). Off-task interaction is very important for the creation of relationships (Klein in Clark 1996). VLES can offer precisely this kind of interaction either in groups with sensitive tutors supporting and moderating the group discussion in combination with one to one discussion with tutors though this requires a high time factor or high tutor/ student ratio.

**Affective issues** need to be paid considerable attention in the development of our VLE's. Unfriendly or frustrating environments which hinder communication and interaction reduce esteem and discourage engagement which is so vital to learning (Purkey, 1970). These mechanisms are delicate and even fairly keen students and tutors can be easily dismayed by difficult interfaces or unnecessarily complex interactions. Moreover students used to being able to interact easily either face to face or with computers are all the more enraged and frustrated when the system is unintuitive. Though they might openly curse the system or software, they often blame themselves for any failures, reducing esteem and their desire to explore further.

A key facet of high quality teaching is **the teacher's ability to elicit understanding from the student** – this serves two key purposes. Firstly the teacher discovers what student do and don't understand in order to scaffold their learning most appropriately and secondly the process of interaction and eliciting from the student informs the student that their current knowledge is valued, exists and is a platform upon which further learning can be built. This elicitation sets the ambience for learning – ie the student already has valuable knowledge, experience or opinions which are acknowledged and valued by the tutor and which have been triggered so that the tutor can then provided activities to build on this current explanation, often reusing students vocabulary and concepts and extending or reshaping them (Cooper, 2002).

Research into the new literacies in life-long learning (Kress & van Leeuwen, 2001, Warschauer, 1999) reveal interesting developing concepts about understanding and communication. We are not text only beings, our literacy starts as sensual, emotional and visual experiences of communication with other humans. Understanding develops best in warm, caring environments where learners feel secure, cared for, where interaction is encouraged, modelled and where their activities are attended to and responded to in the continual dialogue with a teacher or other peers.

Our brain responds well to information which attracts and stimulates a wider range of senses. Learning materials therefore should be stimulating, exciting and varied to maintain interest with the possibility for differentiation and extension or simplification. It is important that VLES capitalise on the use of multi-media learning tools rather than focus merely on text. The Open University in the UK, one of the oldest and most successful distance learning organisations for example had always been renowned for the quality of its materials and their multi-media nature, tailored precisely to the needs of students including students with special needs. We want standards to rise not fall in the quality of provision and it is important that easy use of wide range of quality resources is available on our VLEs.

VLEs which support a range of methods of easy interaction are more likely to support high quality learning. VLES which adapt materials and methods for the special needs of some learners are also likely to be more effective for all learners, for understanding learners needs deeply is at the heart of high quality learning. Systems which offer

choice and share control between teacher and learner in a mutually respectful dialogue are more likely to promote trust, honesty and responsiveness which facilitate further desire to interact and learn.

The thrust of the arguments here is confirmed by the very latest research published into the use on on-line learning by the SOLT project which looked at e-learning in 6 European countries (E-novate, 2003). For both tutors and learners the human interaction aspect in the process was considered to be very important. The tutors survey highlights this issue:

*One of the key points to emerge from the survey may seem an obvious one, but it could nonetheless be crucial to the success of e-learning – the importance of human support to learners. In fact the survey results highlighted the importance of the human touch in other ways.*

*As regards learners, an overwhelming 92.5% of trainers felt that their students view contact with the trainer to be essential or useful to online learning. (pg1 Solt 2004)*

The importance of varied methods of learning was also revealed as a significant issue.

*The results also provide evidence for developers that blended learning approaches – combining elements of traditional training with technology – are favoured by trainers..*

The novice nature of both some of the tutors and the learners in relation to ICT and on-line learning was also a key feature and the combined effect of all these issues is that there are considerable problems related to on-line learning.

*Online training, both for trainer and trainee, often seems to present as many challenges as it overcomes. (pg 1)*

All the more important then that the software used for this purpose is designed and improved carefully in relation to these and other learning issues. The importance of efficient code and programming style is of less significance and it is important that in the search for something that works aesthetically in terms of programming, we do not subvert or override the learning issues.

## **PARTICULAR BENEFITS OF VLES FOR LEARNING**

VLEs allow for more students to access learning from a distance and at any time of day or night, this can benefit students in remote areas, students who are house-bound or have small children, disabled students, students who work in the day and study at other times. Effective VLES can produce a highly flexible support for learning and in a sense can facilitate human interaction of a tremendously wide social, cultural and geographical range. If all learning is at heart the result of the social relationships between human beings as Vygotsky would have us understand, then the effective VLE can support the very widest range of human interaction and interchange of a much more global kind. Courses rapidly assume wide international perspectives, as the dialogues between people who otherwise might never encountered each other learn what it is to understand another's thinking and the similarities and differences of historical cultural and social contexts in which both participants developed their understanding. VLEs can enrich courses, which use a mixture of methods allowing

tutors and students from across the globe to share instantly and easily all kinds of world- rich resources, documentation and activities. The use of the web can allow resources from across the globe to be accessed instantly and easily and to discuss them with other like-minded people.

Like all computer aided learning VLES empower student through their active participation and interaction. Such rapid multi media interaction supports processing and memory and increases students' sense of control over their own learning.

## **WEAKNESSES IN TEACHING AND LEARNING IN CURRENT VLES**

Three common key failings of VLEs and in fact much educational software is that **they are often designed by non-educationalists who have a very weak model** of learning on which they base their design. They understand education as:

- transmissive
- fragmented
- a purely cognitive process.

Their models of education are essentially Fordian, viewing the process mainly as a factory production line, in which the more students that can be targeted with any given piece of information the better, since the provision will ultimately be cheaper. Learning involves the swapping of learning objects, typically chunks of factual knowledge between some expert source and some less expert source. Alternatively students are given a series of tasks which can be ticked off as completed but often without reflection or consideration as to their validity or their relationships to other learning. Some of the early reasons for providing on-line learning, such as widening access and targeting less traditional students ensure that such weak educational models will fail in practice. These students often failed in traditional education also and need much more human interaction and more personal support than can be offered by a system with such a conceptual basis.

Many of these systems have been designed to support the administration of students and courses more successfully than the actually learning process and they are in effect huge registration and monitoring systems which pay scant attention to how students might want to or are able to learn. Frequently systems are designed by programmers as opposed to practising teachers and their interfaces are often fragmented, unintuitive and machine-like, the antithesis of what is necessary for high quality human learning and interaction. We would like students to have easy access to exciting on-line resources which engage both the emotions and the intellect with minimal barriers to resources and interaction. We would like to promote thinking and the sharing of ideas and understanding, not simply reading and absorption, though this naturally plays a part. Yet by simply placing materials on the web, how can any teacher have any concept of whether students have either understood it or internalised it or engaged sufficiently in its concepts to remember them beyond the course test or to apply them effectively in alternative contexts.

Gardner advocates an apprenticeships and mentor style of learning with much better teacher/ student ratios and lots of practical trialling of understanding combined with discussion and reflection. Instruction can be rejected as easily as it is delivered, in

that traditional fashion and unrelated knowledge can be difficult to transfer (Gardner, 1993). Increasingly one to one mentoring within a positive relationship where trust is created and real fear and worries are allowed to be expressed, shared and dissipated is advocated as a high quality method of learning. Here the personal, social, and academic, the affective and cognitive all interlink creating an ambience which supports self-esteem and learning. VLEs can enable precisely this sort of one to one support as well as group interaction but the nature of the interface and the responsiveness of the tutor are key factors in securing easy and responsive levels of interaction.

However as systems have developed their weakness have been and are being addressed gradually in the light of feedback from tutors and learners but the message is clear, **a quick fix VLE, which does not understand the learning process and does not therefore met the needs of learners and teachers will be of limited use.** At best it will be an accessible repository for data, something akin to an on-line library of resources and at worst it may even demotivate or exclude some learners from the learning process – perhaps never to return. On-line courses, like traditional courses, frequently lose students and tutors. They give up because the absurdity of trying to interact with software which was designed in parts, not a whole and which fragments rather than unites understanding. This is not always the fault of the environment however, but is produced by the actors and relationships on either end of the environment. Some students will always give up their courses whatever the learning context for a variety of reasons and some tutors may never care to engage deeply with students.

The common insistence on replacing face-to-face discussions with a chat forum also has repercussions for learning. Instant chat is praised for creating a sense of presence but it has drawbacks. Though chat can be very useful for small numbers (say two or three students) it can become unwieldy when there are more. The interruptions to the flow of conversation through disjointed questions and answers which students feel they have to respond to quickly, can be very disruptive to thought and argument and students with less established keyboard skills can be very intimidated. In terms of considered discussion and learning an asynchronous discussion lends itself much more to deep reflection and considered argument which can be backed by reference to resources and other people. Though there might be long waits between postings this problem can be overcome by agreeing time-limited discussions, ensuring decent sized groups and a tutor who knows when and how to intervene to maintain momentum and can ensure long and detailed interactions. Chat, by contrast, when many people are involved can be disjointed, shallow and superficial, often confusing and frustrating – it's a tool which supports small numbers more effectively than large numbers and superficial chat more effectively than considered argument. The small size of screen in chat often severely limits the ability to hold complex conversations or quickly grasp the over view of a conversation.

VLES can pass costly printing on to users and they can become monotonous if not well-designed with communicative software. The danger of over use of standardised templates in open learning materials is clear. If the format remains the same, sufficiently interesting materials are not used and the screen/environment remains the same, learning could become pretty dull pretty quickly which will not inspire anyone.

## **SO WHAT IN GENERAL DOES HIGH QUALITY TEACHING AND LEARNING REQUIRE IN A VLE?**

If mutually respectful dialogue in which both personal and academic information is exchanged in a trusting and supportive atmosphere is at the heart of learning, then facilitating this as easily as possible should be the main goal of a VLE. The range of tutors, students and courses require a flexible environment, which offers both variety and simplicity of access - a real challenge for the software developer.

- **Extremely easy user interface for tutors and students.**

Why? Because many learners and tutors are novices (both in our courses and elsewhere) but also because as few anxiety producing barriers as possible are needed for communication, dialogue and information exchange. It may be hard enough for students to grasp the concepts in their subject area - this does not need to be made any more difficult by a system which complicates or obfuscates the learning process.

- **Multi-media communication**

Why? We learn best as we develop as humans, with a multi-sensory approach not just through text. A multi-media approach allows maximum transference of information including personal and social information which is intrinsic to learning. This speeds up processing, engagement and emotional involvement with learning, which makes it more enjoyable and easier to internalise and remember. It also enables learning for more students with different abilities, and different styles of learning and students with specific disabilities. Allowing easy use of a wide range of multi-media resources and communication will support learning and information exchange. Readily supporting widely used software teaching resources such as powerpoint slides would be essential.

- **Multiple channels of communication**

There are different benefits and disadvantages of different forms of communication and teachers have always used their judgement to use the most appropriate at any given time. There is a need for public and private communication, for large group, smaller group and one to one approaches, for instant exchange and response and for considered and reflective interchange. Students like to feel part of a group with whom they share experiences, but also they need to feel understood as an individual within that group. With several tools at their disposal and guidelines and training for each, teachers are most able to serve their students needs most appropriately. There is a need therefore for both asynchronous and synchronous communication and asynchronous conferences tend to work better with more students, whilst synchronous ones works better with less. The availability of audio-visual lines of communication such as telephone or video-conference or voice-mail can help to support the emotional interactions which in turn support relationships and learning but like the rest of the software these need to be very easy to use or they will create more anxiety than they relieve.

- **An interface which allows us to understand the whole picture quickly and easily**

People understand more deeply and remember more easily when they perceive the relationships between entities rather than just the entities themselves. Learning is easier when objects are encompassed in a meaningful narrative. To this end we do not need separation of entities (which unfortunately programming frequently ensures) so much as togetherness to allow for relationships creation. Interfaces need to reveal instantly their uses but also the relationships of the different uses to the whole process. To discuss complex concepts we need ease of communication with minimal movement from the immediate site or our efforts to find our way in and out of different, unrelated boxes only sap our processing power for greater things.

Deep menus and multi-click access are likely to reduce understanding and speed of access and increase frustration, disabling learning. Clear layouts, with uncluttered layouts and space between icons and human-like rather than machine-like arrangements of icons, develop confidence and understanding more rapidly. Combinations of icons and words are more effective than just icons which though intended to be user-friendly are often impossible to interpret and result in frustration, confusion and anxiety. Making all text easily audible also facilitates interaction and access for a wider range of users.

- **Easy creation of groups/ information exchange by students as well as tutors**

Facilities which are less hierarchical (more equal) and which empower students engage them more deeply as they feel they are able to take ownership of the learning process.

The easy setting up of discussion groups means courses can instantly be enriched if a need arises eg. a previous discussion reveals some students need more input in a particular topic or maybe would just like to know more about a particular area and this can easily be facilitated. For example trainee teachers might want more input on children with special or particular needs and it should be quite possible to provide this.

- **Provision for social as well as academic interaction**

Learning theory suggests the important integration of personal and academic interchange. This means that off-task as well as on task interaction should be valued and facilitated. Though clearly there must be a balance, having conferences where students can discuss social as well as academic issues is important and often creates supportive and collaborative relationships which develop both on and off- line. (two of my on-line students chatted, met and eventually got married as a result of studying together on line – others talked and then met up face to face to discuss course issues and support each other becoming good friends). In face to face teaching tutors often have personal and social chat in the entrances and exits to lessons or at appropriate junctures in longer lessons. This can happen on line too and can help to make students feel human and valued, more secure and ensure a relaxed and positive ambience for learning.

- **Instant support** -- ie faqs or other continual on-line support in addition to tutor support mean students can get different types of help whenever they use the system - many students will benefit from printable guidelines for basic

functions which they can view at their leisure in hardcopy. Accessing on-line help whilst simultaneously trying to use the system can be very confusing for novices.

Why? Again this addresses affective issues. Reducing anxiety, barriers and waiting times allows students to feel more confident each time they use the system - while they remain confident and positive they are more likely to use it and participate in learning but also more likely to want to interact with others and engage quickly and deeply in learning.

### **Other issues**

Of course all of these features will work best if tutors and students have training in the use of the facilities, but also in the nature and process of learning. Students and tutors who do not realise the importance of interaction in the learning process for example, who see themselves as transmitters or recipients of knowledge, are likely to reduce the pace and quality of learning in the group. Students who are reluctant to participate fully or tutors who fail to see the need to respond to students comments, can quickly diminish the effectiveness of learning both in face to face and on-line teaching. Students drop out or fail to use the system, tutors log on even less. This usually has a powerful affective dimension. Students may be fearful of revealing ignorance, frightened of using the VLE or frustrated by it or disinclined to share their understanding for fear of giving advantage to others. These attributes may well be modelled to them by tutors and encouraged in the culture in which they find themselves.

Tutors may find the system frustrating to use for communication, may resent the time detailed responses take up, may be insecure in their own knowledge or how to teach, may be frightened of others seeing their work and may often be immersed in a culture of competition and overwork which makes them reluctant to share their resources and understanding easily and to give time to both the creation of high quality resources and the interaction and discussion they might require. Universities where research is valued very highly may not even have a culture which values teaching and the time and effort it requires at all. Equally some teachers do not value research. Again the competitive culture here can destroy the valuing of the two different perspectives and often the lack of time forces people to focus on one or the other, creating a polarised culture which has a negative effect on learning. The same problems occur with people who idealise face to face teaching over on line teaching. Actually they both have different things to offer to different people, it should not really be a competition.

Creating a positive culture of learning requires openness, sharing, a sense of value and security and frequent positive interaction. If the culture is negative and overly competitive it requires defensiveness and withdrawal from interaction in order to protect oneself and one's resources from appropriation.

If students have been accustomed to a very competitive, unsharing culture and isolated learning, as encouraged by some educational systems they may find it hard to change their attitudes. They may well have been discouraged from working together and sharing and discussing and challenging ideas. There is a great need for tutors to set the tone and attitudes towards learning for their students to enable higher quality learning to occur. The tutor must model very positive attitudes to learning and

discussion themselves and also encourage everyone to participate and share within the group. This means being proactive and intervening to encourage wary students and to facilitate discussion and to ensure that it is not dominated by a few or overrun with unchallenged misconceptions. The timing of when and when not to intervene is a crucial skill developed by teachers both on and off line.

They must also be prepared to think carefully through the learning process in order to ensure that students get a positive experience and learn successfully and encourage evaluation and reflection on that process by both themselves and students. Though evaluation is standard practice on many courses today it is perhaps not detailed enough about the process and to be fair unless students have something to compare it with they find it hard to evaluate. The SOLT report strongly confirms this for e-learning when it says that new students were much less critical of VLES than more experienced students (pg 1)

### **A SUMMARY ANALYSIS OF OUR OWN GROUPS.**

This section briefly summarises the analysis of the courses which will be offered in our own project and the immediate implications or issues raised are described in brackets. The full details of responses regarding our requirements can be seen in appendix A.

- **Project courses will be offered from the third year of undergraduates, through masters to PhD level.**

Clearly they are more likely to be more mature students and possibly more capable of independent study and should be mature enough to cope with the added burden of learning to use the VLE alongside the subject matter. However as their learning becomes increasingly specialised and individualised they may receive less face to face teaching anyway on these courses, experience minimal interaction and increased insecurity and isolation, which may also have implications for how they respond to the use of the VLE.

- **We will offer a wider range of courses with a strong computing/mathematical bias** – see appendix A for details.

This means that the VLE may be well tested for use in these areas but not for use in subjects in the arts/humanities domain.

- **We appear to have no very experienced VLE learners only those with very little or average experience.**

This has obvious implications for the need for training and support in using the system before and during the course.

- **We have range of experience in tutors from very little to very experienced**

This will be very useful for gaining different perspectives on how the software supports teaching and learning.

- **The system will need to consider its accessibility for students with special needs.**

This will be very important for wider and future application and useful for quality also because meeting the special needs of some users usually has benefits for all learners.

- **The system will be not be used to deliver entirely on-line courses but will be used quite substantially on some courses and for a wide range of tasks.**

Our sample is probably quite typical of the range of uses to which a VLE is put and few courses are delivered successfully totally on line. However discovering the problems with a totally on-line course might well highlight issues, which would improve the software for all courses.

- **Most partners will need discussion facilities for groups ranging from sizes of 3 - 20 with a need also for individual teaching.**

What makes an effective on-line group will be an issue worth exploring and giving guidance to tutors for here (this could be available – online) since student numbers and tutor intervention can be a key issue in making different facilities successful or unsuccessful.

- **Some groups will need discussions moderated by tutors.**

Again this has clear implications for human resources and skills. Tutors need the information about commitments/payments upfront to make such interactions work since they can be very time-consuming. Training and on line guidance in the moderation of on-line discussions could enhance the quality of the learning in these groups.

- **Some groups will need student-moderated discussions.**

As above but for students.

- **Some groups will need individual contact with students.**

Issues of ease and privacy are important here - positive one to one contact can be the most effective way of learning but as above it is very time-consuming and tutors need to know their commitments or they will resent them and limit interaction.

- **Some groups will need or would like synchronous chat facilities**

Again training and guidance about the strengths and pitfall of chats would be very useful for tutors and students.

- **All groups will require asynchronous discussion facilities.**

As above but for asynchronous discussion --- suggestions for netiquette within such on-line discussions would also be useful to have on-line or in hardcopy.

- **All groups will need students to access documents in the VLE from quite small up to 7 mb in size.**

These sizes are not problematic but requirements might change with increased use of audio-visual resources in coming years – many of Bridget's multi-media documents made available to students on-line are over 10 MB already, for example.

- **These documents will need to be downloadable, printable, readable on line and will need to be able to be constructed collaboratively between students.**

Most of these issues are straight forward, however constructing a collaborative document is quite a demanding task in itself face to face let alone on line and for

many students used to working alone, it is a new experience, so some guidance / support would be useful for this.

- **In terms of audio –visual material there will be a need for tutors to use audio-visual material of photographs, pictures and animations but there is not really a need for video streaming.**

Clearly student and tutor systems may need to cope with transmission and storage of large numbers of pictures/photographs animations on longer courses and the facility for video streaming, though not necessary currently would be very useful in the long-term as it is an excellent medium for learning and reflection particularly in professional training.

- **There appears to be no need for linked telephone conversations or video-conferencing or remote control of machines.**

For broader and future use the inclusion of these might be considered appropriate - again a telephone or video-conferencing system allows the transference of affective information through voice tone, facial expression or body-language, this can help considerably in the formation of relationships and more open and natural communication – a helpful substitute is personal resume/photograph area within the course in which students share some personal information to support the building of understanding.

- **There is a requirement by some partners for social as well as academic areas.**

This may involve students having more facilities for creating their own groups but can be a real enhancement to relationships and learning.

- **There is a requirement by some partners for inter-staff communication.**

Having easily accessible areas for staff working groups with threaded discussions beyond straightforward e-mail can help engender a sense of community and support the sharing of ideas and experiences and resources with the most appropriate colleagues - the increased interaction builds trust and supports group security and can accelerate learning and understanding.

- **There is a requirement by some partners for on-line assessment and facilities for marking.**

Some more detailed discussion might be worth having with the partners involved in relation to this issue - precisely what kind of assessment and whether some sort of security is needed might be important. It might be important to add here that high quality, continuous, formative as opposed to summative or normative assessment (which can be damaging for some students) is a key feature of high quality teaching and learning. Formative assessment of both an affective and cognitive nature takes place continually in human interaction and used well can ensure the most appropriate intervention and scaffolding by the tutor. People outside of education might not particularly consider discussion to be 'assessment' but it is in fact a very effective and dynamic assessment, which effectively drives learning forward.

- **There is a requirement by some partners for general web-based resources on-line.**

Will this involve the creation of special areas/facilities or would those resources be better situated within the course framework or at least with easy access to them from within the course framework.

- **There is a requirement that this VLE should be able to link to an administrative system in the future.**

It is probably better from an educational perspective, to design the VLE with an eye to a future link to an admin system rather than an admin system which might be added to a VLE. Some commercial systems seem to have been designed more for such administration than education and the learning process gets forgotten en route.

In addition our partners in Karlsruhe have very specific needs to those listed here (see appendix A and detailed paper on their needs) and colleagues in Prague would like to be able to run programs either from the web or downloaded from the VLE. These issues will need special consideration and more detailed discussion between developers and course organisers to establish how needs might best be met.

#### **Other issues:**

- **Reluctance of department/tutors to adopt web-based learning.**

The system will have to be very easy to use, facilitative and resourceful to persuade such tutors to use it - also the key role of training and on-line support will be vital in this respect.

- **Some modules/courses are new anyway so it may be hard to distinguish what exact role the VLE plays in their success or failure.**

Course evaluations will need to carefully distinguish the different factors here.

#### **Focussing on the affective and learning in VLEs**

So why then, when we see comparisons of VLES, are affective and learning issues almost entirely omitted. We see lists of features, of protocols etc briefly summarised in neat boxes, but what has this to do with learning from the users perspective? It is much more about concrete systems and set ups. Tutors and student ultimately want to know how the features work in practice. Learning is messy, complicated dynamic and contextually situated. Any teacher will tell you that their prepared lesson worked splendidly with one class and failed abysmally with another. Many factors are at work in a successful lesson: the nature of individual group, the nature of individual students within the group, the time of year, day, month!, the teacher's flexibility and adaptability, the historical relationships or lack of them between participants. **Our software must be reviewed in detail during the process of use if we are to understand its strengths and weaknesses.**

From our deliberations above are there VLEs which offer features which address the significant learning issues making access to memorable learning easy, transparent and relevant? Two commercial VLEs stand out for having user-interface which suggest community and or invite interaction, give an immediate understanding of 'the whole picture' and focus on exchange rather than delivery –these are **First class** (fairly widely used in Higher Education) and **WebEx** <http://www.webex.com> - business software used for communication. In First class the components are less divided and all resources can be uploaded within one group context. Web-ex offers a wider range of communication tools including telephone and video and remote control of other

computers on an interface, which suggests that interaction is the main aim. For this however and our own software we need detailed user information about how positive it is to use in order to make appropriate recommendations.

## **LEARNING MATERIALS**

The issues discussed above immediately create a problem for the creation and positive reuse of learning objects and materials which nearly always need to be adapted to the teacher, the group and the dynamic context in which they are used. Quite often set materials promote a one-way, transmissive approach and do not elicit or value student knowledge. Too often over emphasis on materials and content leads to a detached approach to learning where existing student knowledge and understanding and their feelings towards themselves and their understanding is neither properly assessed or valued. They are simply delivered knowledge as if the mere handing over of information constitutes learning.

However banks of learning materials can be very valuable for tutors setting up courses, provided that they are happy with their authenticity and can personalise them to both themselves and their students needs. Sometimes they are useful simply as ideas, which tutors can use a basis but which they adapt quite substantially for their own use. The important thing with these materials again that they are easily accessible (or they will simply not be used), easily adaptable and ideally include some guidelines for how they have been or could be used and in what contexts.

### **Relationships between open software development open learning materials development and learning theory.**

Many of the features of open software development described in a following document by the University of Lugano might be compared with understanding of learning theory generally. The ideas of a benign leader, of responsive and mutually respectful interactive relationships in which constant evaluation and feedback take place, of leaders who actively seek out interaction and value their evaluators, of evaluators who are self-motivated more by less visible internal than external rewards.

However it is clear also that the clientelle are different – both in gender, nature and motivation. Professors and senior staff who have to make decisions about choosing VLES are often the least experienced users. As has been pointed out they are not necessarily experienced teachers either. They may be choosing their VLE for all the wrong reasons and the creators of VLES are not likely to promote their own faults.

The programmers who evaluate the software are a very different group to general users also. They are ICT literate and may be absolutely blind to the fears and illiteracy of a novice. Safe in their own knowledge, and their logical programming background they might not even see the problems for a more intuitive or artistic user for example. By dint of their involvement with the software, they have made their commitment to an exclusive club and just like a football team supporter they are likely to increasingly lose their objectivity the more committed they. Just as Manchester Utd. supporters curse the opposition and the referees eyesight, the committed users curse their rivals and the judgement of those who are as yet wavering on the fence.

Experienced VLE users however, as the SOLT report explains, are much more critically aware of the failures of VLES. They have more to lose immediately from an ineffective system and nothing to gain from a partisan approach. One should argue therefore that feedback from both novice and experienced VLE students as well as tutors setting up courses is a key factor in understanding their success. Many tutors have not used a VLE as a student, although most teachers have experienced typical face to face teaching and have a concept of what works and what doesn't. Typically tutors who have experienced on-line teaching and learning have a natural preference for VLES in which they have invested time and effort (like software developers). However not many tutors have experience of several systems to be able to compare them, so evaluations are still not terribly strong in terms of what works best for teaching and learning.

The changes in educational theory in relation to affective issues have not filtered widely into face to face institutions as yet and are unlikely to emerge seriously in software development for VLEs for some years, although the fact that teaching and learning theory is being reconsidered deeply in relation to on-line learning, perhaps suggest that new theory will influence computer mediated communication in a much faster time scale than it takes to enter the consciousness and slowly changing world of traditional education. High quality teaching and learning which recognises the significance of affective issues is however very time and tutor intensive, which makes it less economical in the short term, if perhaps much more economical in the long-term.

The voluntary nature of participation by software developers is not I suspect a sufficient method for educators and the development of educational resources. The time-scarce, student-rich nature of educators work would require paid professional support to facilitate the creation and support of groups and networks which might enrich the learning resource bank and set up e-mail networks for the discussion of learning using those resources. It would also require a sea-change in the culture of sharing, not particularly evident currently in the competitive university environment. Government organisations like BECTA in the UK have massively supported the development of resources and understanding about the use of ICT in teaching and learning in schools in the UK and something similar for university level teaching, perhaps on a Europe wide basis might be extremely helpful .

## **CONCLUSIONS**

If software developers and tutors are not attentive to affective issues of learning, VLEs will not be very successful. Lists of functions will help to understand what is on offer but will not give us value judgements and inform us about how easily and readily students and tutors can engage with learning and teaching through these functions. In terms of using and creating resources and adding them to the banks of facilities, it must be remembered that teachers and lecturers always have to work in a time-precious way. There are always more students to support than there is time to give that support. Good teachers who understand the importance of positive interaction would always want to give students more time than they have available –but there is never enough time (Cooper, 2002). Teachers and lecturers as yet do not have much time allocated in their roles either for resource creation or resource sharing, though there is plenty evidence that it is happening increasingly in school education in the UK at least, due to extensive government support through the hardware, software and

training infrastructure. Crucially the issues discussed earlier in this report need to be noted. Ease of access and minimal anxiety combined with flexibility of method of communication combined with increasingly multi-media teaching to make learning more human, more enjoyable and more memorable and student-centred are fundamental requirements of a successful VLE. Environments which make relational sense and which do not fragment learning, so that all materials and resources can be discussed and used easily within a coherent understandable narrative are more likely to support use and acceptance of the VLE by students and tutors.

How will we best create and evaluate our VLEs beyond the advice discussed here? Ideally we need to consult a wide range of students, both novices and experienced users and we need both novice tutors who will always need to use systems quickly and easily and experienced tutors who have had experiences of several different systems. We need to know how these people experience learning and teaching in more detail in these environments so that we can ensure that virtual learning is more successful than its traditional counterpart has been for many students.

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## **Appendix A: Detailed breakdown of teaching and learning requirements in Educalibre project groups**

Which academic group do you intend to use the VLE for? Undergrad Yr1, 2, 3, masters, PhD?

**Germany Karlsruhe - masters /independent study seminars**

**Prague PhD**

**Lugano Masters**

**Leeds UGyr3**

**Madrid – Masters 3<sup>rd</sup> year**

**Porto - Undergrad yr1, 2, 3, 4, 5 and masters**

**( mostly very mature students to date)**

Which subject do you plan to teach using the VLE?

**Germany Karlsruhe Industrial production – operations research**

**Prague Bayesian decision-making theory**

**Lugano Information visualisation**

**Leeds User adaptive systems**

**Madrid - Decision Analysis; Simulation; Statistics, Forecasting**

**Porto - Physics, Mathematics, Computer programing, and other Engineering subjects.**

**( wide range of courses)**

How experienced will the students be in the use of a VLE for learning – please \* the most appropriate answer?

**Germany Karlsruhe Very little**

**Prague Average**

**Lugano Average**

**Leeds Very little /Average**

**Madrid Very little**

**Porto Average**

How experienced will the tutors be in the use of VLE for learning – please \* the most appropriate answer?

**Germany Karlsruhe Average**

**Prague Average**

**Lugano Very experienced**

**Leeds Average**

**Madrid Very little**

**Porto Average**

Will you have any disabled students or student with special needs – please explain if yes?

**Germany Karlsruhe (not likely)**

**Prague (none as yet)**

**Lugano no**

**Leeds likely – dyslexia/dyspraxia/hearing or visual disabilities**

**Madrid – very unlikely**

**Porto - no**

What part will the VLE play in your course – choose one or explain if other?

1. Essential part -All on line?
2. Key part – mainly on line but with some paper-based materials /face to face sessions?
3. One of variety of methods- Blended methods of teaching and learning of which online is just one part?
4. Additional resources for enrichment through on line access–?
5. Reactive tool simply for sharing problems on line - but not for actively promoting learning?
- 6 Other?

Germany Karlsruhe 3,4,5,

Prague 2

Lugano 4

Leeds 3, 4,

( VLES more effective used in this way but lack of use means students slow to use them well)

Madrid 2,3

Porto - Most courses will be in category 3, but one or two in category 2

Teaching/learning Methodologies

Will you want your students to discuss work in groups?

Germany Karlsruhe yes

Prague no

Lugano yes

Leeds yes

Madrid yes

Porto yes

How large do you expect those groups to be?

Germany Karlsruhe 20 average

Prague individual teaching

Lugano 20

Leeds 3-5

Madrid 3 (plus whole class discussions 30)

Porto 10 to 200

Will you need tutor-moderated discussion?

Germany Karlsruhe maybe

Prague no

Lugano no

Leeds yes

Madrid yes

Porto yes

Will you need student-moderated discussion?

Germany Karlsruhe no

Prague no

Lugano no

Leeds yes

Madrid no

**Porto no**

Will you need private contact with students?

**Germany Karlsruhe no**

**Prague yes but not during VLE teaching**

**Lugano no**

**Leeds yes**

**Madrid yes**

**Porto yes**

Will you need synchronous discussion ie instant chat?

**Germany Karlsruhe no**

**Prague no**

**Lugano no**

**Leeds could be useful**

**Madrid yes**

**Porto yes**

Will you need asynchronous discussion (conference or bulletin board type discussion)?

**Germany Karlsruhe yes**

**Prague yes (personal)**

**Lugano yes**

**Leeds yes for collaborative work and sharing resources**

**Madrid yes**

**Porto yes**

Will students need to access documents in the VLE?

**Germany Karlsruhe - yes**

**Prague -yes**

**Lugano -yes**

**Leeds - yes**

**Madrid - yes**

**Porto - yes**

How large will these documents need to be?

**Germany Karlsruhe 7mb limit**

**Prague several pages**

**Lugano -**

**Leeds -text/html -not large**

**Madrid - 30 pages in pdf**

**Porto - up to 2mb**

Will these documents be for discussion? Downloading? Reading on-line? Printing?  
Other?

**Germany Karlsruhe discussion - Downloading-Reading on-line -Printing**

**Prague Downloading**

**Lugano Downloading-Reading on-line -Printing**

**Leeds -- discussion - Downloading-Reading on-line -Printing -other  
collaboratively constructed between students**

**Madrid - Downloading-Reading on-line -Printing**

**Porto - Downloading-Reading on-line**

Will you need to use audio-visual material?

Sound files  
TV clips/streaming?  
Animations  
Photographs?  
Pictures?  
Other?

**Germany Karlsruhe** sound maybe –animations –photographs -pictures

**Prague** -none

**Lugano** --pictures

**Leeds** - pictures

**Madrid** – photographs, pictures

**Porto** – animations, photographs, pictures

Will you need to combine computer with the telephone?

**Germany Karlsruhe** no

**Prague** no

**Lugano** no

**Leeds** no

**Madrid** no

**Porto** no

Will you need video-conferencing?

**Germany Karlsruhe** no

**Prague** no

**Lugano** no

**Leeds** no

**Madrid** no

**Porto** no

Will you need to remote control of students machines to support learning?

**Germany Karlsruhe** no

**Prague** - no

**Lugano** -no

**Leeds** - no

**Madrid** - no

**Porto** - no

Will you need social areas as well as work areas?

**Germany Karlsruhe** no

**Prague** no

**Lugano** no

**Leeds** -- not needed but would be good to have

**Madrid** - yes

**Porto** - no

Will you need inter-staff communication?

**Germany Karlsruhe - yes**

**Prague no**

**Lugano no**

**Leeds yes**

**Madrid - yes**

**Porto yes**

Will you need facilities for on-line assessment?

**Germany Karlsruhe no**

**Prague no**

**Lugano yes**

**Leeds yes**

**Madrid - yes**

**Porto – yes**

Will you need facilities for on line assignment /marking exchange?

**Germany Karlsruhe no**

**Prague no**

**Lugano yes**

**Leeds no**

**Madrid - yes**

**Porto - yes**

Will you need general web-based resources available on line?

**Germany Karlsruhe yes**

**Prague no**

**Lugano yes**

**Leeds yes**

**Madrid - yes**

**Porto - yes**

Desirable?

List any teaching and learning features which you would like/need in the VLE which are not listed above?

**Germany Karlsruhe - detailed additional needs – see attached paper –eg software support for supply of course material- post questions – multiple choice questions- course evaluation sheets –feedback systems –spreadsheet based tool incorporating multi-criteria decision support methods – typeable sheets with text boxes**

**Prague be able to run programs (from web or downloaded)**

**Lugano -none**

**Leeds -- facilities to enable the collaborative construction of documents**

**Madrid - none**

**Porto – file upload from both students and teachers**

Administration

Will this VLE need to be linked to larger student administration system or can it simply stand alone?

**Germany Karlsruhe stand alone**

**Prague stand alone**

**Lugano stand alone**

**Leeds stand alone**

**Madrid – stand alone but should be linked to the administrative system in the future**

**Porto – stand alone**

Briefly describe the course you intend to use the VLE for and the part you intend the VLE to play in it your own words if the questions above were not appropriate.

**Germany Karlsruhe see attached detailed doc**

**Prague show regression model of a controlled system and simulation examples of outputs with tasks of estimation and control**

**Lugano none**

**Leeds -none**

**Madrid - Decision Analysis ( A course for third year in Business Informatics. I'm using a VLE to leave notes, exams, messages and a discussion forum).**

**Simulation (As above). Decision Analysis. For Master students (This course will be fifty-fifty (Inet, conventional teaching))**

Briefly explain any concerns or anxieties you might have about using a VLE for teaching.

**Germany Karlsruhe see doc attached**

**Prague -perhaps some with running programs form the web - but can be downloaded and run off line**

**Lugano**

**Leeds - students want web-based learning but department doesn't –students can be critical and creating the resources requires more time**

**Porto – lack of an appropriate format for mathematical formulas exchange.**