The Role of Virtual Learning Environments in the Online Delivery of Staff Development

Report 2: Delivering Staff and Professional Development Using Virtual Learning Environments

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0 Overview

There is a critical need for large-scale staff and professional development in the UK Higher Education sector, as identified by the Dearing report and others. The Institute for Learning and Teaching in Higher Education (ILT) has been established as the professional body for higher education staff involved in teaching and learning. Staff will gain membership of ILT through development of portfolios of their teaching practice and through accredited training and development courses. In future, it is expected that all new lecturing staff will be required to undergo some accredited training in order to complete their probation (this might be linked to associate membership of the ILT). Greater formalisation of Teaching and Learning skills will require an expansion in staff and professional development provision at HE institutions. Such large-scale professional development would benefit from a wider range of delivery strategies, which are effective, flexible and efficient. Online delivery of staff and professional development offers a solution that provides the flexibility and scalability required. Online delivery can complement face-to-face delivery or may entirely replace it.

Virtual Learning Environments (VLEs) offer an integrated solution to managing online learning, providing a delivery mechanism, student tracking, assessment and access to resources. Although some VLEs can be restrictive, if used effectively, they can provide a familiar, but functional environment for the user. As a unified environment, a VLE is simple and efficient to administer and therefore attractive to the provider.

Careful implementation of communications technologies can help to create and encourage communities of staff undertaking development at different institutions. Such practitioner networks may prove to be invaluable for the sharing of good practice and peer learning which will be central to high quality development.
1 Background

1.1 Introduction

As in all professions, there is a growing realisation of the importance of staff/professional development as a mechanism for fostering a motivated, skilled and adaptable workforce. This is especially true of Higher Education, which is undergoing rapid and fundamental change in response to a number of pressures. These pressures include - expansion of student numbers (especially those who are part-time or mature students), new funding structures where students contribute to their fees, the introduction of new technology and working practices which rely on technology such as networked computers, and the globalisation of the education market. As customers who pay directly for (at least part of) their education, students’ expectations of Higher Education are also changing fundamentally. Part-time students demand more flexible course structures to enable them to manage their learning time. Students are increasingly computer literate (whether through using home computers or through previous employment) and expect course materials to exploit technology where appropriate. Also, students increasingly see their education as a step towards gaining employment and choose courses with vocational content or which develop transferable skills. These students will increasingly reject poor quality teaching, inflexible course structures. Only those Higher Education institutions that examine and update their courses and teaching practice will flourish – and this requires staff that are motivated and able, to change and improve. Carefully planned staff development strategies can help the United Kingdom Higher Education sector respond to these changes.

Staff and professional development can be critical to career progression (e.g. formal management training), development of existing skills (e.g. sharing of best practise), and in the introduction of new systems and methods (e.g. student centred learning). The benefits of professional development should reward both the individual and the institution. The institution benefits through having a more skilled (and adaptable) workforce; motivation should be increased and individual employees more responsible. The workforce becomes a repository for expertise, ideas, and solutions to new challenges facing the institution. The

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1 For the purposes of this report, I consider staff development to be ‘training’ style development (such as gaining IT skills), and professional development to cover development which is more concerned with improving teaching practice etc.
individual benefits through gaining a wider range of skills; perhaps being more efficient (gaining more time to spend on research); being more employable; and even by earning more.

Recent studies of UK Higher Education [1,2] have highlighted the importance of professional development to the HE sector and suggested ways in which the skills of the HE community can be officially recognised.

The Dearing Report [1] recommended:

… (the establishment of) a professional Institute for Learning and Teaching in Higher Education. The functions of the Institute would be to accredit programmes of training for higher education teachers; to commission research and development in learning and teaching practices; and to stimulate innovation. **Recommendation 14**

and that in time,

… it should become the normal requirement that all new full-time academic staff with teaching responsibilities are required to achieve at least associate membership of the Institute for Learning and Teaching in Higher Education, for the successful completion of probation. **Recommendation 48**

This critical requirement for formal professional development on a large scale throughout Higher Education is reflected in the importance being placed on professional development by the funding councils. But the commitment to a greater role for professional development has raised significant questions regarding how best to deliver it. The ILT (Institute for Learning and Teaching in Higher Education [3]) is now established and plans to begin accepting members (initially through submission of refereed applications accompanied by portfolio’s) professional development for Higher Education in the 1999-2000 academic year. ILT will not deliver professional development directly, rather, professional development will still be run internally by institutions or (increasingly) groups of institutions. Institutions already deliver staff and professional development themselves, however the advent of the ILT brings two specific changes: professional development will be undertaken with a specific goal, and is likely to occur on a much larger scale because almost all staff involved in teaching will be expected to undertake development.
The Atkins Review of the Computers in Teaching Initiative and Teaching and Learning Technology Support Network [2] recognised the growing role of computer based technologies and learning strategies in Higher Education. The review identified a critical requirement for staff development in these areas, ranging from basic IT skills such as word processing to pedagogic issues such as integration of Communications and Information Technologies (C&IT) in the support and delivery of teaching.

Professional development is usually seen as an ongoing process with staff working towards gaining recognition through a mix of formal and informal study, completion of assignments and production of portfolios. Far less importance is placed on learning from textbooks as so much of the work is based on reflection of individual experience. It is vital that professional development should be personalised and tailored to the needs of the individual, and relevant to their situation. For professional development, the participant should be able to relate what they learn directly to their own subject area. A critical benefit of professional development comes through sharing experiences with others (and reflection on one’s own experience) and this can be maximised by establishing groups of similar experience who undergo their development together. Unfortunately creating groups can be difficult for a variety of reasons e.g. finding convenient regular meeting times, accommodating varying workloads (group members may fall behind at different times due to other commitments) and finding sufficient numbers of staff with similar development goals in smaller institutions. Similarly, mentoring, whereby a junior member of staff learns directly from a senior one, is an attractive and popular mechanism for professional development. This is also difficult in small institutions where an appropriate mentor might not be available.

Staff and professional development is normally delivered through training workshops, often all day or part-day events, usually (though not always) held within the individual’s own institution. Although these existing structures for delivery of professional development work well on a small scale, they are not easily scaled up. Furthermore, if professional development is to be encouraged (and in some cases made mandatory), then new, more flexible delivery strategies must be developed. Flexibility will be vital to any increased use of professional development:

- to allow combination of specific and generic components to create courses tailored to individual staff needs,
• to allow staff to undertake development when they have time – perhaps devoting little time during term time and more time outside term time,
• to ensure that the development achieved precisely fits the individual goals of each participant,
• to ensure that similar benefits may be gained by staff at all institutions regardless of size.

It is likely that online delivery of professional development (especially through the Internet and institutional Intranets) will be vital to attaining this flexibility. Electronic distribution of materials is efficient and enables simple revision and expansion of course materials. Delivery of courses online avoids the time and place constraints that can hinder face-to-face development programmes. This is especially appropriate if professional development is to be seen as an ongoing process. The utilisation of communications technologies to create groups and communities of learners will facilitate vital relationships such as mentoring and peer communication. The establishment of virtual groups, which may be geographically distributed, can circumvent (to some extent) the problems that small institutions may encounter when trying to establish groups of learners with similar goals.

The TALiSMAN (Teaching And Learning in Scottish Metropolitan Area Networks [4]) project has employed several alternative strategies to deliver staff development, as reported previously [5]. This report draws on our experience in delivering staff development face-to-face and online, and will examine some of the key factors for successful online delivery of staff and professional development. In addition, this report will assess a number of special software solutions (termed Virtual Learning Environments or VLEs) which can be used to support the learning process in the context of professional development. Other JTAP projects [6,7] have been funded to examine the role of VLEs in learning generally. The JTAP report by Britain & Liber [7] attempts to evaluate several Virtual Learning Environments pedagogically and examines how their use might fit with existing structures for delivery of teaching and learning in Higher Education. Although concerned with teaching and Learning rather than staff development, the issues discussed in the report (particularly the types of learning that are supported by individual VLEs) are of relevance.
2 Online Education

Computers (and above all computers which are connected to the Internet or some other computer network) are increasingly being used as a medium for the delivery of teaching and training; supporting, supplementing or replacing face-to-face learning. The use of computers can offer significant advantages over traditional teaching, e.g. providing organised access to many types of resources, more flexible delivery structures and new learning opportunities. Critically however, many of the benefits offered by computers can be lost if the medium is not properly utilised. Careful implementation (and integration with existing teaching delivered face-to-face or via directed reading) is vital. This is also true for professional development and for this reason, the decision to use computers for delivery must be taken not just for reasons of economy or flexibility, but also justified on the basis of quality of the learning experience and suitability of the technology to the learning objectives.

We will first consider some general principles and issues of online learning, before considering how online staff and professional development differ from straightforward online learning and how this impacts the design and delivery of online courses and materials for professional development.

2.1 Why do people teach and learn online?

We have already referred (briefly) to the benefits of online delivery of education and training. Let us consider some of these benefits surrounding online delivery in more detail. We will then move on to examine some of the problems associated with online delivery.

- **Online delivery can be extremely flexible.** When learning materials are delivered online, they need not be static as materials delivered on paper are. If errors are found they can be rectified quickly and easily. If new material needs to be added, then it can be integrated seamlessly rather than being delivered as a supplement. There is considerable scope for providing different paths through the same learning material, allowing courses to be tailored for different audiences. Similarly, within the same course structures, individual participants have considerable freedom to customise their own learning experience by choosing different blocks of learning material. This is especially true of materials which are highly modularised, and which support a task-based or resource-based approach to learning.
• **Online delivery is economical, scalable and efficient.** Online materials are far cheaper to deliver than printed ones with distribution costs being minimal by comparison and printing costs being negligible (or rather any printing costs are passed directly on to the learner). When delivery is online, there is no difference between providing access (we will discuss support issues later) to 5 or 5,000 learners. In a face-to-face course, larger lecture theatres would have to be found. Furthermore, learners need not be within travelling distance of the host institution and need not undertake their learning at set times. Together, these factors mean that online delivery of learning can be a viable option when traditional delivery is not feasible.

• **Online material can be of superior quality.** The very act of collecting together materials and resources for online delivery can significantly increase the quality of those materials as they should inevitably be revised and refined. In addition, a re-examination of the objectives of any learning experience can lead to improvements in the way that topic is taught.

This all paints a rather rosy picture of online learning. In reality, there a number of further factors to take into account. Consider the following.

• **Online learning is at best a substitute for face-to-face learning.** In reality, online delivery is only utilised when face-to-face delivery is not possible, for any of the reasons already considered (constraints of time, place, economy etc.). The benefits (formal and informal of everyday contact with other learners can not be underestimated),

• **Online learning is actually rather inflexible.** Being computer based actually places a number of restrictions on online learning. Although often billed as ‘any time anywhere’, the slogan forgets to mention, ‘as long as you are sitting at a computer, (probably with a connection to the Internet, and certainly with some IT skills).

• **Good online learning is expensive to deliver.** Although the general perception is that economies of scale, reduced overheads and savings on building costs or printing and distribution means that online delivery is cheaper than other modes of delivery, the reality is rather different. Merely providing materials and basic support for learning online is cheap, but it doesn’t work. Dropout or non-completion rates are high and the general quality of learning is perceived as being poor, perhaps on a par with reading from a book (but not as convenient). Good online learning requires far more imaginative design of
materials, and far more effort in supporting the delivery of learning. This involves tutors, and tutors cost money to employ.

2.2 What makes good online learning?

Good online learning relies on engaging the learner in the learning material. Merely using electronic delivery as a means of enhancing the presentation of learning material is not enough. This is because the face-to-face learner gets far more from (for instance) a lecture than merely the information that is written on the blackboard or spoken by the lecturer. In addition to this formal learning, they get the chance to meet and discuss issues with their peers, they have the opportunity to interrupt their lecturer when they fail to understand, they get an indication as to how quickly they should be progressing through the materials etc. This type of interaction also helps to reinforce learning, and catch misconceptions early. All these ‘extras’ have to be delivered alongside any online learning material.

Good online learning material must provide not just the knowledge or information, but also the opportunity for communication and reinforcement of learning through reflection, an inviting environment for collaborative activities, and clear information regarding the pacing of the course. Ideal online learning material should extend beyond being a virtual coursebook, to being a virtual classroom.

To create high quality online learning, the whole course must be re-visited and appropriate online technologies selected and utilised to create a rich learning experience. Inevitably, this will involve re-engineering of materials to make them something more than ‘online texts’ (where the first thing the learner does is to print the materials and read them on the bus). Materials must be made flexible, modular, formalised (so that they may be re-used in different courses, or different instances of the same course). Considerable thought should be given to making materials interactive (where appropriate) and to structuring materials in such a way as to make them stimulating. As far as supporting the learner is concerned, face-to-face learning is normally delivered through a mix of lectures (one lecturer and dozens if not hundreds of learners) and tutorials (one tutor and a dozen learners). For online learning, lecture style materials may be largely or wholly unsupported (and delivered as self-study materials), but the vast majority of the ‘learning’ will occur in tutorial-sized (or smaller) groups. Thus in reality, the tutor:student ratio for online courses approaches tutorial level (1:10 or so), rather
than that for a lecture. Although one tutor might be responsible for more than one tutor group, it is unlikely that individual tutors could support more than forty or fifty students effectively, both in terms of workload, and developing effective relationships.

Of course, we have been discussing a rather restrictive scenario: one where learning is delivered entirely online. It would be far more appropriate to consider online delivery as just one of many modes of delivery of learning, to be used to a greater or lesser extent, depending on the demands of individual courses. The following section describes some scenarios for learning which combine online delivery with face-to-face delivery of learning.

2.3 Forms which online learning can take

The term ‘online learning’ has come to represent a wide spectrum of learning scenarios, from courses which are supported in any way by learning technology to courses delivered entirely online (with no face-to-face contact between tutor and student, or between individual students). Within this, however, we can detect various types of online learning. Indeed, Robin Mason [8] has proposed a simple framework for categorising online courses, which works well and is described below. Her framework identifies three models of course: ‘content + support’, ‘wrap-around’ or ‘integrated’ in nature. A ‘content + support’ style course would be one for which the content might be delivered as booklets (perhaps distributed electronically) whilst support is delivered online. Assessment of the online components of the work is often trivial (in fact the online component may be non-compulsory) and could easily be dispensed with. As the content is separated from the support, it is possible to change the way in which support is provided whilst leaving the content unchanged. A ‘wrap-around’ course would be one where online interaction is far more important to the delivery of the course and where the delivery medium is wholly or primarily online, though perhaps still incorporating non-online elements such as face-to-face tutorials. Generally for a wrap-around course, participation in the online component would be essential for completion of the course. In a wrap-around model, course materials would still be static. Finally, an ‘integrated’ course would be one where the different teaching opportunities offered by online teaching would be exploited. Online communication, collaborative working, resource building etc., would all contribute to make a course fundamentally different to one held mainly or wholly face-to-face. In an integrated course, there is inherently less use of static learning material and more emphasis placed upon the establishment of a community of learners.
For staff and professional development, any of the three models above might be used. The integrated model, where most benefits of online delivery may be realised is more difficult to run. In contrast, the ‘content + support’ course, whilst easy to establish, brings only a few of the benefits of online learning. We will consider each type of course in the light of staff and professional development.

**Content + Support Model**
This model represents an evolution (in many cases a first step) of traditional face-to-face delivery. Instead of providing paper texts for reading, the course tutor may direct participants to resources held online. Mailing lists may be used to encourage discussion away from face-to-face meetings, though contribution to these would not normally be compulsory. This type of course model is not easily scaled however, as most support is dependent on face-to-face meetings. In terms of accredited professional development, there is scope for this type of model to be used with local staff development courses drawing on a central bank of accredited training materials available for use by staff at any institution. As highlighted, the online component (discussion lists etc.) performs a peripheral role and could be easily disposed of.

**The Wrap-around Model**
A wrap-around model could still make use of centrally written and held materials, but critically, some greater or lesser part of the learning process would come through online discussion and collaborative activities. This actually fits quite well with our view of professional development being more about reflection and discussion than learning by rote. An appropriate example here would be the delivery of staff development in the use of computers for teaching. Some of the course time would be devoted to delivery of centrally held training materials providing the fundamentals of using a particular computer technology or package. This could be delivered on site (in training rooms) or as self-study materials. In addition, discussion groups (working online, perhaps organised by subject, bringing staff from different institutions together) could be established to explore some of the pedagogic issues surrounding the use of computers as tools for teaching. A critical part of the course might involve the production of some learning material using the skills provided by the training materials, and ideas formulated in the discussion areas. This type of model would support learning on quite a large scale, with participants being assigned to small tutor groups where
they form close working relationships with a small group of peers (chosen to be of similar background – subject and previous experience). The typical mix of face-to-face and self-study suggested above provides a reasonable degree of flexibility.

**The Integrated Model**

The integrated model relies heavily on active learning and collaborative working. There may be little in the way of formal learning materials (more likely there would be a list of web-based resources and well-defined course objectives); most of the benefit to any participant will come from critical assessment of their own and others’ work. It could be argued that online delivery is perfect for this type of learning, as the interaction that must occur need only be asynchronous and not face-to-face (as in tutorial sessions). A more likely scenario would be that one participant might make a piece of material (or comments on it) available to others in the group via email or a shared collaborative workspace. Other members of the group would then comment on the work (or even annotate it using online tools), or submit their own pieces to complement it. For this type of highly collaborative learning, it is probably vital that participants in the same groups meet each other face-to-face as there is such an importance placed on developing a close working relationship. Once this is established though, face-to-face contact need not occur frequently.

**Offline vs Online**

I have used the term online learning to refer to learning which is undertaken via computer and made the assumption that the media for delivery of that learning will be a World Wide Web browser. One of the critical issues in learning online is whether learning materials (and any resources created by the participant or their fellow learners) can also be accessed offline. (i.e. without connection to the Internet). Requiring a connection for participation can be restrictive and costly, and if the cost is to be borne by the participant, then this may be a disincentive. On the other hand, for professional development, many participants will have free Internet access from their desk (or at least from their department) and so this may not be a problem. It would be normal for professional development to be carried out during normal working hours. Another advantage of online delivery is that, by holding all materials remotely, the participant is not tied to using a particular computer.

For some courses, an alternative approach would be possible, combining an online component (accessible only through an Internet connection) and course materials delivered separately.
Offline materials could be provided on CD or even on paper, especially if they are static materials as may be used in a content + support style course.

As has been discussed already, professional development is a fundamentally interactive process. It is less about learning from textbooks, more about learning from others, by sharing experiences and by reflection upon your own experience. For this reason, the development process will require little in the way of reading pre-prepared materials, (though it may involve searching the Internet for resources) but will require facilities for communicating in a number of different modes. Also the system must allow the learner to publish his or her own materials. For this reason, although it would be desirable to be able to work offline, it is recognised that many activities will take place online. Of course, submissions can be prepared offline, then up-loaded when complete.

2.4 What are the special requirements of professional development?

Professional development differs in many ways from traditional learning and can take many forms. There are a number of critical issues that should be considered:

• **Motivation is different.** Whilst the desire to succeed may be every bit as strong as with a traditional student, the everyday demands of work are always likely to take precedence over any staff development, so it is important to design courses that are flexible. Formal professional development (for instance as carried out towards gaining membership of the ILT) might be accompanied by relief from teaching duties. It is important to remember that many university teachers are also active researchers. The pressure to continue research will also make demands on this non-teaching time.

• **Learners will be part time and will almost certainly require a flexible timetable.** Even if a group goes through a course as a single cohort, it is unlikely that that they will all be able to devote a set number of hours each week or even month. Rather, it may be prudent to run courses over longer periods, with few set times (for face-to-face sessions).

• **Examination will be atypical.** As most professional development will require the participant to draw on their own experience, submissions for final assessment are more likely to be dissertation, projects or portfolios. A specific aim of these courses is likely to be to create an environment where staff can develop and practice skills concurrently. In this respect there should be considerable flexibility to allow participants to report on
changes they are making in their own teaching (rather than requiring that they prepare pieces which are not relevant to their current teaching).

- **Peer learning and mentoring will play a significant role.** Participants will learn by sharing good practice, examining failures etc. and it is vital that they have access to colleagues at all times. Online staff development may well be a powerful mechanism for bringing together new groupings of staff of similar types (who may feel isolated in small departments or institutions).

### 2.5 Helping People to Learn Online

Building a community of learners and creating an environment for learning is by no means a simple task. The flexible nature of online learning also means that it is easy to put off or do the absolute minimum (e.g. read the course materials, do the assessments, but miss the discussion sessions). If peer contact is lost, it can be easy to fall behind without noticing. This would not happen in a face-to-face course where regular contact with the lecturer or fellow learners would provide a natural pace to the course. Careful structuring of course materials, to provide this pacing, and careful design of collaborative tasks, learner groups and general support structures can all help to alleviate this significant problem. Let us consider some of the factors which will affect a learners enjoyment of their learning experience.

**Availability of materials**

In general, the learner should have ready access to all materials, to allow them to complete the course. This means providing materials in advance and retaining access to materials to allow participants to work at their own pace. Of course, it may be necessary to dictate routes through material – to ensure that access to some materials is only granted once earlier materials have been studied. Presentation of materials also extends to providing a clear and consistent look and feel to materials, to ensure that the learners can navigate efficiently through the materials. Subtle cues (like colour, or icons) should be used to lead the learner through materials. For materials where there is more than one route which may be followed, some sort of ‘site map’ can be used to allow the learner to orient themselves easily. The learner interface should be simple – a single password or single web address to remember etc.

**Access to other learners**

The participant should feel that they can communicate easily with other learners. This might be through email lists, or ‘social’ discussion forums (in addition to those set up for discussion
of specific topics). For larger groups, it is impractical to expect all learners to get to know all others, so small sub-groups should be set up and maintained throughout the course. These might be allocated according to background, geographical location, level of previous experience etc. It might be useful (and critical for courses where collaborative working is important) to set up face-to-face events (either social or practical) at set points in the course. If face-to-face meetings cannot be arranged (and even if they can) then photographs and biographies of the learners can be very helpful. Some participants may not wish to post photographs of themselves, as this can prejudice other participants' perception of them. For this reason it may be preferable to make display of photographs voluntary. Creating biographies (as student home pages) can be an initial task, designed to break the ice and allow participants to familiarise themselves with the learning environment. Participants will be much more at ease in discussion forums if they know (or at least can form a picture of) the person they are communicating with. On the other hand, anonymity is a powerful tool and for some discussion forums, it may be useful to permit anonymous posting as a means of encouraging candid discussion.

Support
The online learner needs more support than a traditional learner, as they do not have regular informal contact with their peers. Simple problems, which could be solved by a quick answer during or after a lecture or by short discussions with peers, can be difficult to clear up in isolation. All the responsibility falls, by default, on the course tutor.

Providing sufficient support for the online learner (whether it is information about when completed assignments are due, clear procedures for reporting of technical difficulties or providing appropriate forums for asking questions about course materials) is critical to the eventual success of any course delivered online. Stable channels for delivery of information and support must be established. Support structures should be created which pre-empt all general enquiries perhaps through the use of a regularly updated course calendar or comprehensive course manual. This should be backed up with a group listing any new issues which arise. FAQs FAQ (Frequently Asked Questions) may subsequently be incorporated into updated versions of course manuals. Email can also be a powerful for providing general and pre-emptive support. Even if a course does not have a set timetable, regular email messages can subtly pace the course, reminding the learner that they are not alone, and providing critical (and not so critical) information. This can also be a good way for the tutors
to develop a relationship with their groups. Even if personal emails are not sent, email
messages can be easily personalised (using a mail merge facility) to create individually
addressed emails (Hello Stephen, Hello Judith etc., rather than Hello Class.)

For general support, it is acceptable to create FAQs, showing common questions and answers.
To support the actual learning material however this may be inappropriate. Instead of being
able to browse a list of questions and answers, it may be an important part of the learning
process that the learners formulate questions regarding the course material themselves. For
information that is not already in the course material, participants can be encouraged to ask
questions either to the tutor (personally or in an email) or to their tutor group (through the
course discussion forum). For this reason, it is important to create a forum for discussion,
rather than a forum for answering questions: if the tutor answers all the questions all the time,
yany debate is stifled as the tutor gains too much authority. The use of more than one tutor in
each discussion forum (though more effort for the tutors) can be helpful in creating an
atmosphere of debate as no single voice has ultimate authority. Of course, encouraging
participants to ask questions of their peers fits with our general concept of professional
development, where the individual learners should be learning from themselves (through
reflection) and each other as much as from a tutor or coursebook.

In this section we have looked at some of the advantages and disadvantages of online
learning, discussed some of the ways in which online learning can be delivered and described
some of the critical issues for effective delivery of online learning. The next section will
survey some of the emerging tools for delivering and managing online learning; collectively
termed Virtual Learning Environments.

3 Delivering Learning Online

3.1 What is a Virtual Learning Environment?

As we have seen, it is critical to create an environment for online learning that is simple to use
and easy to access. Various software packages have been developed to manage the different
elements of online learning. These are often referred to as Virtual Learning Environments
(though various alternative terms are used interchangeably - for instance: learning
management tools, online learning frameworks, collaborative learning environments, web
course design tools, online learning environments etc). There is no simple definition of what constitutes a Virtual Learning Environment. Strictly the term VLE should be used to describe software which resides on a server and is designed to manage or administer various aspects of learning; delivery of materials; student tracking; assessment etc. In this respect, a Virtual Learning Environment is essentially a database of objects, creating tailored web pages on request. Although there are various software packages that seek to control the entire learning process, there is no reason to presume that individual tools could not be brought together to create a loose (more flexible) environment for online learning. Here, I will adopt a broad definition of VLEs, considering not just single package solutions, but any attempt to create a unified environment for learning.

We can list a core set of features which it is expected a VLE may seek to provide.

- Delivery and management of course materials,
- Access Control: usually password based,
- Administration: student tracking, collation of marks, record of progress,
- Time-tabling facilities: some explicit means of pacing materials,
- Assessment: usually formative (e.g. for self assessment),
- Communication: on various levels, one to one, one to many, synchronous and asynchronous,
- Personal space for participants to exchange and store materials,
- A resource base: less formal than learning materials, perhaps an FAQ or database accessed by keyword search,
- Support facilities: for instance, online help about the environment.
- Maintenance tools for creating and updating the learning materials.

**Other Factors**

When using Virtual Learning Environments to deliver and manage online courses, it is important to remember a number of external factors which will greatly influence the format of an online course. It is vital to match the features of the VLE to the needs of the course. Some external factors might include:
• **Delivery mode:** whether fully online or part face-to-face, part online, this will greatly influence the use of communication, and pattern of use for online materials. If there is a significant face-to-face component, it may be unnecessary to have a discussion forum.

• **Tutor support:** depending on the level of support which is to be provided, it is important to make sure that this is provided ‘in the right place, at the right time’.

• **Class structures:** collaboration, mentoring, projects and portfolios, are all powerful ways of encouraging learning, but the choice of VLE can greatly influence the natural communication avenues between students.

• **Length of the course:** online courses work best when there is a flexible timetable – VLEs can be used to pace the learners properly.

• **Cost:** most VLEs store the learning material as data in a database (this helps with tracking etc.) rather than web pages. As a result, students must be ‘online’ (and incurring phone call charges?) to access the materials.

### 3.2 Types of Virtual Learning Environment

There are now many commercial Virtual Learning Environments, all of which offer a similar set of features. These VLEs typically place the learning material at the centre of the system and provide a set of tools which are of use as the learner progresses though that material. In other words, these systems manage the delivery of the learning material. Examples of such commercial packages include WebCT [9], TopClass [10] and Lotus Learning Space [11]. Within the United Kingdom, a few other packages have emerged which adopt a more educational approach. Examples include Merlin [12] and PIONEER [13].

Alternative models of VLE have arisen, particularly within UK Higher education. These adopt a learner centred approach and provide a set of tools to allow the learner to construct (around themselves) an environment for effective learning, by collecting together and constructing a set of resources relevant to the way in which they have understood the learning material. Examples of this type of VLE include COSE [14] and Learning Landscapes [15].

An extension of this learner centred model can be found in environments which support collaborative learning. Collaboration may be synchronous (through the use of video conferencing, audio communication or white boards) or it may be asynchronous (through the provision of shared workspace). An example of this type of VLE is CoMentor [16].
another two environments, the CVU project [17] and the Nathan Bodington building [18], merit discussion although not strictly VLEs.

3.3 Survey of Virtual Learning Environments

There are now tens if not hundreds of software packages which claim to be viable Virtual Learning Environments. Rather than survey all of them, I have tried to examine a representative cross section of different types. There are many bodies and projects which have carried out generalised comparisons and reviews of VLEs and anyone requiring this type of analysis should refer to web sites such as “the node” [19] and the Asynchronous Learning Network [20] or the Canadian Centre for Curriculum Transfer and Technology [21]. For a more pedagogy-based survey of available VLEs, the JTAP report, “A Framework for Pedagogical Evaluation of Virtual Learning Environments” [7] should be helpful. I have chosen to consider the following as representative of the range of VLEs available [Table 1]:

<table>
<thead>
<tr>
<th>Traditional VLEs</th>
<th>WebCT, Top Class</th>
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<tr>
<td>Extensions</td>
<td>Merlin, PIONEER</td>
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<td>Home-made</td>
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Table 1: A range of Virtual Learning Environments

We will use WebCT as a benchmark, as it is an archetypal VLE, and because it has been discussed in detail in the first report of this project [5] and should be familiar to many readers. All the VLE approaches discussed here use the World Wide Web (WWW) to some extent, and almost all use it as their prime or sole method of delivery. The WWW is an incredibly flexible medium and the current accessibility of online learning materials is largely due to the advent of the WWW. However the WWW does have its limitations and it is important not to be restricted by it.
3.4 Traditional VLEs

3.4.1 WebCT

WebCT (Web Course Tools [9]) provides a single environment for the delivery of learning material and management of learners. It has become popular for delivery of course materials within Scottish HE and is in use in at least 6 HE institutions within Scotland, as well as being used for the delivery of the TALiSMAN Online Study Centre (as described in [5]). WebCT provides an entirely web based interface for course designers, administrators, tutors as well as the student. Course designers have a number of tools at their disposal and they may add these to the student view as desired.

The course tools include support for asynchronous and synchronous communications. Synchronous communication is through the shared whiteboard and chat facilities, whilst asynchronous communication is supported as either one to one (email like) or one to many (as in the discussion forum, where individual students can be assigned to sub-groups). In WebCT, there is in-built (though rather rudimentary) support for assessment tests. This extends to multiple choice type questions, with automatic logging of scores and an opportunity for the test author to provide feedback for each answer. A calendar facility provides a convenient means of distributing announcements regarding the course, and the student can add notes to this calendar, either for their own private use, or made visible to the whole class.

Students have a presence in the WebCT environment through the provision of home pages which allows them to post a single web page of information about themselves or link to external pages. Students create their home pages through a rudimentary WYSIWYG editor, so no knowledge of web page creation is necessary. Students with these skills can write their own pages, gaining more control than if they used the in-built editor alone.

As it is web based, WebCT material can be linked to external resources, though this is not encouraged – elements within WebCT can be easily tracked, resources outside cannot; so for administrative reasons, the WebCT environment is structured to discourage the use of external resources. Course materials, though created as simple web pages are held as database objects, allowing WebCT to track access to individual pages by each student. Individual resources within WebCT are arranged linearly, and extra internal links are not
encouraged (though not prohibited). Again this is to aid management of the access tracking process.

When a student logs in to the WebCT environment, they are given access to all courses on which they are enrolled, together with access to the course discussion forum, calendar, other student’s homepages etc. The course materials themselves are arranged linearly [as described before, see the left hand pane in Figure 1]. This provides a temptation to make the course material resemble an electronic textbook, with sections and sub-sections. For course authors, it is important to exploit the multimedia capabilities of the web, with pop up windows etc., rather than just create pages of text or text and pictures.

Although present, the communication tools are not directly available from within the course material. This makes discussion of the learning material a less natural process – a student might read a section of text and not realise that there was a discussion about that page and its contents in the course discussion forum. In contrast, a facility for making notes is available, and any notes made are tied to a particular page, providing them in context for future reference.

![Figure 1: Example screen from WebCT, showing Linear Structure](image-url)
3.4.2 Top Class

The Top Class virtual learning environment [10] addresses the same issues as WebCT and provides the same range of facilities. Although it provides a slightly more attractive interface, its adherence to a linear structure is perhaps more restrictive than WebCT’s. Whilst all learning ultimately does have a linear structure, it is widely accepted that learning requires construction and this benefits from non-linear structuring of learning material. Indeed the opportunities to move from a linear structure afforded by the Hypertext nature of the WWW has been one of the main reasons why educationalists have been attracted to the WWW as a teaching medium.

The creators of TopClass have invested considerable effort in creating a set of authoring tools which are simple to use, allowing content to be created quickly by non-experts. For instance, a set of ‘wizards’ are available which can take Microsoft Word and PowerPoint Documents and convert them automatically for presentation within TopClass (they are in fact adaptations of the Internet Assistants previously made available by Microsoft). Unfortunately, this rather misses the point: a word-processed file designed originally to be printed out and read has not been designed for reading on screen, and as such won’t make for appealing electronic learning material. Why not provide the original document (or an Adobe Acrobat PDF version of it), and allow the student to choose whether to view online or print out? By presenting the document in its original form it is kept as a distinct resource, rather than lost into the learning material.

WebCT and TopClass provide a simplistic environment to manage the learning process. All the tools for delivering learning online are present, but only just. These packages do succeed in a modest aim to provide support tools for online learning, however the compromises taken to allow these tools to work together is detrimental to the overall worth of the package. As a result, WebCT and TopClass excel as delivery mechanisms and are able to track students’ progress through learning materials and provide useful feedback to the tutor/administrator. But they are poor for assessment and fail in communication, an important feature. WebCT and TopClass will be useful in the delivery of ‘training’ for self-study. Anyone wishing to use them for activities that require extensive communication may well see their limitations.
3.4.3 **PIONEER**

The PIONEER Virtual Learning Environment [12] was originally developed at MEDC, a learning technology support unit for the Scottish Further Education sector and subsequently developed by SCET, the Scottish Council for Educational Technology. The VLE has similar features to WebCT and TopClass, including discussion, chat, whiteboard, calendar, and assessment area. Students can take notes in an electronic notepad.

PIONEER provides simple to use student management tools available on an extra set of menus seen only by tutors. Students can set their own preferences for the environment as well as update their own information. Organisation of the learning material is simplistic (as with WebCT), but the initial aim of PIONEER was to aid delivery of material within Further Education where materials are traditionally objective driven and naturally simple in structure. Within PIONEER, navigation is particularly good, with colour coding and standard layouts making the structure of the materials transparent and navigation intuitive. This can be critical for online learning where guidance is not immediately available.

PIONEER also offers a reflective log, a modified discussion area where individuals can post their thoughts on a particular topic then invite others to respond, or add further ideas themselves. Although developed in the Further Education sector, PIONEER is being marketed as a commercial product, and the release of a second version (PIONEER 2) is expected in late 1999. PIONEER is being used for training and professional development in the Scottish School of Further Education (SSFE) and the Glasgow Telecollege Network (GTN).

3.4.4 **Merlin**

Whilst bearing similarities to packages like WebCT and TopClass, the Merlin learning environment, developed at the University of Hull, provides significant benefits over these VLEs, at little cost to flexibility.

First, Merlin is far more attentive to the benefits of communication (the initial implementation of Merlin was actually for teaching languages). The Merlin environment makes use of Real Audio streaming [22] as an efficient and simple means of allowing users to create audio messages. Participants are encouraged to ‘post’ an audio portrait of themselves. In fact the
same technology could extend to the recording of video for streaming. Real audio is also used throughout the environment, to provide commentaries for presentations, feedback on discussion etc. Many users of online conferencing systems bemoan the impersonal climate of the text-based bulletin board. Using audio (sparingly – it could easily be overused) can alleviate this and personalise the community feeling within any course. Of course there are specific implications in the use of extra technology such as audio files. Participants may need to upgrade their machines and install extra software (which may in turn mean that they always have to work from a specific computer).

Second, the Merlin environment provides explicit support for the tutor to provide specific pathways through learning material, freeing them from an imposed structure. This freedom can be critical in tailoring courses to the needs of the student. Merlin encourages synchronous communication and has a ‘who’s online’ area to allow individual students to page others on the course. Thereafter they can communicate via the chat facility, or post audio messages and ‘virtually’ converse. With its sense of community, Merlin ‘feels’ more like an environment for learning, than simply an environment for training.

Whilst Merlin tries to use audio to bring alive the communication process and make the learning experience a more communal experience, it is still firmly centred around the learning material. The next section describes VLEs which use a different approach.

### 3.5 Learner-centred and Collaborative Environments

Why not make the student the centre of the environment and construct (for each individual student) a set of tasks, links resources, submissions, communications routes, which will allow them to construct their own knowledge of teaching and learning – bringing significant input from their own experience? Instead of creating learning materials, the emphasis of learner-centred environments is on providing resources, which the course participants then organise (modify), add to and share. An extension of this model is to create environments primarily for students to work together.
3.5.1 COSE

The COSE learning environment developed at the University of Staffordshire [14] tries to do just that. This Virtual Learning Environment is a Java-based client which works entirely within a web browser. In contrast to the VLEs described previously, COSE places the student (rather than the materials) at the centre of the course and provides them with a set of tools to construct their knowledge around learning material which is presented as ‘pagesets’. Tutors and Learners can produce pagesets which can then be published and made available for viewing by all or a sub-group of students (and other tutors). These pagesets may include local resources, links to external materials, assignments etc. The general tools provided resemble file management tools and concentrate on ensuring easy organisation of information within tasks. Other tools provide access to course discussion forums, email facilities and, for the tutor, management tools. There are procedures for passing control of items in the COSE structure – when an assignment is submitted etc. Any file format can be passed through COSE, though HTML is the native format. Tutors (content creators) are encouraged to keep the HTML simple. As we discussed in the section on TopClass, sometimes it is better to leave the information you are presenting in its raw state rather than ‘over-engineer’ it.

3.5.2 Learning Landscapes

The Learning Landscapes Virtual Learning Environment, developed at the University of Bangor [15], takes a similar approach to COSE, by providing an efficient means to organise resources. Learning Landscapes differs from COSE in that it uses a stand-alone client, rather than residing within a web browser. In fact, the concept of Learning Landscapes is closer to that of an email client rather than a web browser. Learning Landscapes are structures of resources and students which have been organised by a tutor. These are made available by the tutor as modules within an individual student’s client. This approach actually supports offline working rather well. Each time the learner opens their Learning Landscapes client, the content is dynamically updated rather like checking and downloading email. The connection to the Internet can then be broken, allowing the learner to work without incurring any cost.

Although fundamentally an extended email system, the Learning Landscape client contains a rudimentary web browser and all materials are created as web pages. As external WWW resources are identified, individual students can add links from their personal Learning Landscape.
Both COSE and Learning Landscapes recognise the importance of activity in learning and each present environments which are ideally suited to task based learning approaches or methods of online teaching which encourage communication, collaboration and a significant amount of input from the student. Each of these environments provide options for access to web-based learning materials and courses, though for the most part, tracking of the student’s use of these resources is poor. It could be argued that the student tracking offered by WebCT etc. is of little practical use, especially in an area such as professional development. Neither COSE nor Learning Landscapes have built in Assessment tools, making it difficult to collect information on how the student is performing. Objective type testing at this level of professional development is likely to be used only for formative assessment. In this respect, the stand alone assessment tools provided by CVU [23], CASTLE [24], and WebTest [25], can be easily implemented, with the only loss being slightly limited integration (e.g. no link between student records and assessment test scores).

A final feature missing from both Learning Landscapes and COSE is navigation and pacing information. These environments rely wholly on the tutor to provide information about how the student should be progressing, and this in turn requires a commitment to provide feedback on their progress. This is permissible, as the ultimate success of the environment will depend on the interpersonal relationships built up between students, their peers and their tutors.

Although navigation is also lacking in these environments this should not be a significant issue. For the most part, students will be creating their own structure – so navigation will be intuitive. Within individual sections of learning material, good web page design and careful integration of course tools (course discussion, guidance etc.) should be sufficient.

Learning Landscapes and COSE clearly provide a less structured approach to learner management. They seek to enrich the learning experience, leaving construction of knowledge to the learner. This is in contrast to some of the other VLEs, which primarily seek to aid delivery or administration. COSE and learning Landscapes provide the type of learning environment which would be perfect for online professional development, with emphasis on the learner.
3.5.3 CoMentor

CoMentor was developed initially at the University of Huddersfield [16] to support final year philosophy students – to provide an online learning space for the management of resources, communication and collaboration. Students on the course met face-to-face and the CoMentor environment provided the opportunity for these students to effectively share resources and work collaboratively. The CoMentor environment uses a graphic metaphor of a series of linked rooms, the individual work room, the group work area, and the resource area, all linked to the entrance hall with communal facilities such as the course notice board. Extra rooms can be added as required. The individual work area contains resources for organising work within the system, whilst the group work area provides support for collaborative working and communication. The resource area contains individual learning resources made available by course tutors. The system can log use of the system, though as it is primarily a collaborative working environment, user tracking is of little importance. CoMentor is in fact MOO-based (MOO stands for Multi user dungeon, Object Oriented), so when you move to a new room, a message of the form ‘x has now entered…’ appears on the screen, rather like a role playing game. Although the interface is idiosyncratic, the different parts of the environment have a very familiar feel, with simple tools at hand.

There is an intrinsically synchronous nature to CoMentor. Chat facilities are always present on screen (in a frame at the bottom of the web browser window) as are details of other students online. For synchronous communication, role-playing is possible - the original philosophy students could choose to adopt the persona of specific philosophers and argue from their standpoint. Similar activities would work within a professional learning environment. The group work area is where CoMentor excels. With powerful tools to allow students to organise themselves into individual (ad hoc) discussion groups for individual topics. Sharing of resources is simple and students can annotate each other’s work within the shared environment.

Aside from the use of the course notice board, there is little opportunity for pacing or moving on the course. But in a way, CoMentor is less an environment for the delivery of learning material and far more of a collaborative workspace. This is borne out by the apparent emphasis on synchronous communication.
3.6 Home-made Environments

3.6.1 Clyde Virtual University (CVU)

A Virtual Learning Environment can be created from many smaller parts and such a system provides a very flexible approach to delivery. The Clyde Virtual University project [17], funded under the Use of MANs initiative by SHEFC (the Scottish Higher Education Funding Council) was initially set up to re-purpose existing CBL materials for web delivery. The original materials were being used in existing courses at institutions within the ClydeNet Metropolitan Area Network. Alongside the new resources created, it made sense to provide support for communication, collaboration and assessment separately from the learning material. Simple tools were chosen or developed and incorporated into a single, web-based environment. Access to the materials was restricted to computers physically located on networks at the participating institutions. When new materials are developed and placed within the CVU environment, the various tools are utilised as required. Thus a course might make use of the HyperNews [26] discussion forum, whilst another might make use of the integrated Assessment Engine [23]. CVU does lack student tracking and administration features, and these would be difficult to include in a system such as this where content is flexible. However these facilities are of less importance in professional development type courses.

3.6.2 Nathan Bodington Building

Another ‘home-made’ solution is the Nathan Bodington Building (NBB) at the University of Leeds [18]. This is a part of the University of Leeds web site and is the central store of teaching and learning resources, learning support tools and administration facilities for online learning at the University. As the name suggests, a building metaphor is used, with a reception area and stairs leading to different floors housing different schools/departments of the University. Within an individual floor, different corridors would represent different courses and different rooms correspond to different resources for a given course. Resources may be static (e.g. web pages), or interactive (e.g. discussion areas or assessment tests). The basement of the building is given over to Teaching and Learning Support, and it is here that course authors find tools to help them mount their material online. Navigation is clear, taking advantage of the building metaphor. Small icons representing the various levels (reception, floor, corridor, room) are visible on every page, and the learner can jump to any other level in
a single step. Access control is provided with each student at the university having a unique login. Access to individual course pages is mediated through this single username and password.

The NBB is an example of how a simple metaphor and simple idea can be scaled up easily. By creating their own structures, simple discussion and assessment facilities and security, the authors have been able to tailor the system carefully to the needs of the University of Leeds. Like CVU, the Nathan Bodington Building isn’t an off the shelf software solution, though it does highlight the benefit of tailoring (or creating, if the skills are available) tools to specific purposes.

The nine systems described above highlight the range of Virtual Learning Environments available. There is no single software solution for delivery and management of online learning. Rather, the delivery mechanism should be matched carefully to the type of learning it is mediating. The final section will revisit some of the critical issues governing the delivery of staff and professional development, and provide some general guidance. Before this, we will consider one further real life example of delivering staff and professional development online.

3.7 LOLA: Learning about Open Learning

It may help us to consider another example of an online staff and professional development course. This falls somewhere between being a ‘course + content’ style course and a ‘wrap-around’ course.

In 1999, the Institute for Computer Based Learning at Heriot-Watt University wrote and delivered a course called LOLA (Learning about Open Learning [27]) as web-based open learning delivered to 400 participants throughout Eastern Europe. All participants on the course were from post-secondary education and the professional development delivered would utilise ten UK-based tutors, each responsible for forty students (in groups of around 10, grouped by country). In addition, there was a local co-ordinator for each country involved. Tutors met their students once, for a workshop at the beginning of the course. Thereafter, all communication was through email, mailing lists and the course discussion forum, although the participants in each country did attend further workshops and were of course able to meet
separately. The course lasted six months, with assignments due at approximately monthly intervals, allowing considerable leeway for students to work at their own pace whilst still being a cohort-based course. The course delivery medium was WebCT, which suited the largely linear structure of the course (a paper copy of the course was also distributed, though all support and communication was carried out online). During planning of the course, it was recognised that the in-built communications facilities offered by WebCT were not sufficient to support the type of discussion expected to occur during the course. As a result, WebBoard discussion software [28] was used in place of the inbuilt discussion forum. This ability to replace components is in fact a significant strength of WebCT and is not possible in many other environments.

4 Discussion

If we think back to the three models for online learning described by Robin Mason (content + support, wrap-around and integrated), we can see that different VLEs complement different models of course. For instance, WebCT and other similar VLEs are most suited to the delivery of ‘content + support’ courses because the critical requirement is to deliver the learning materials and provide opportunity for communication. The ‘content + support’ course model, with its emphasis on generic materials held and delivered centrally, is appropriate for delivery of ‘training’: software courses, procedure training etc. Communication on such courses is unlikely to involve in depth discussion of issues, but would instead focus on answering questions. There would be little requirement for participants on such courses to demonstrate their competence to other members of the group – so collaborative working facilities are less critical.

A typical ‘wrap-around’ course might involve a combination of theory and discussion, with all participants running through set learning materials with concurrent discussion of the wider implications of what they are learning. Establishment of a learner community is critical for such study and this type of course would require more robust communications tools than WebCT or Top Class would provide, whilst still not involving collaborative working. The Merlin environment, with its more developed community spirit provides an excellent medium for this type of learning.
Finally, ‘integrated’ courses, where considerable communication and collaborative working is essential should utilise a learner-centred environment such as CoMentor, COSE or Learning Landscapes. A typical integrated course might be one where participants utilise few if any set resources, instead concentrating on their own experience, and that of their peers. These collaborative learning environments provide all the facilities for them to construct their own resources and share their work easily with others. As the ultimate conclusion of such courses might be to build up a portfolio of work as ‘evidence’, a learning environment which values student input should be chosen.

How real are the above scenarios? Well, probably quite typical: it is important to remember that staff and professional development will cover a whole spectrum of course types, from pure training to post-graduate level research. The LOLA course included face-to-face components, despite being very much an online course, delivered at a distance.

In fact, organised and accredited staff and professional development as would occur in preparation for ILT membership might involve a lecturer going on all three types of course. This lecturer might gain IT literacy as part of a new lecturer program, gain associate membership of ILT through courses in developing teaching practice, and gain full membership through a more rigorous self-directed examination of teaching practice. Thus it is likely that a lecturer will (over a period of time) have to undertake course delivered in different VLEs.

Interoperability is a key here – it is conceivable that materials created (notes taken) during one online course could be directly relevant to a course delivered in a different environment. The IMS project (Instructional Management Systems [29]) seeks to address issues such as interoperability of learning environments by examining structures and publishing standards for the ‘data types’ involved – (how does the assessment system describe question types and how does it provide feedback, how does the student tracking system store information on how far a student has progressed through the course). Most of the VLEs described here are working towards being IMS compliant, which in theory would mean that a learner could seamlessly transfer to a different environment, taking their own ‘preferences’ with them.

For professional development delivered online, as with any learning, it is vital that the medium should not restrict the learning which is occurring. Nor should the technology be
used just for the sake of it. Virtual Learning Environments help to manage the learning process which can be invaluable. Matching appropriate environments to specific course materials is the critical step. We should take this opportunity to design courses which exploit the flexibility offered by the Internet and online delivery. Whatever the learning environment, face-to-face contact will still be vital in creating courses which work. We aren’t about to embark on a programme of development where everyone goes off and studies alone, instead we should attempt to use the technologies available to create real communities, committed to improving teaching quality and continued development.
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