

# Design and implementation of technology-enhanced classrooms and video streaming

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## 1. Introduction

Guildford College is a microcosm for the UK educational sector. It has urban and rural campuses covering 400 acres. It offers degree programmes, Higher National Diplomas (HND), postgraduate certificates in education, vocational training, diplomas, A levels & GCSEs, access to English as a second language, and skills for life. Our youngest student is 16 - our oldest is 68. As a rule of thumb, if you can take a course on a subject, chances are you can take it at Guildford.

And people do. We have 12,000 FTE students across three campuses. These include school leavers preparing for university entrance, university-level students studying towards degrees, Adult learners returning from the workforce to retrain, and international students studying in England. Typical career options offered by the College include everything from veterinary nurse to garden designer to HR managers and computer programmers.

Guildford College is faced with challenges on several fronts – a remit covering the entire educational sector, different age groups, and a strategic directive to enhance both the provision of its ICT resources, and to use them more effectively in all of its taught programmes. Externally, organisations such as the Joint Information Systems Committee (JISC), British Educational Communications and Technology Agency (BECTA), JANET (UK Education and Research Network) and HEFCE (Higher Education Funding Council for England) drive forward enhancements in the provision of learning technologies.

There is also a commercial imperative – students want to see a return on their investment, and expect modern infrastructure, resources, and the ability to learn and access course-related information online. As a college, the ability to draw in fee-paying students is essential, especially in the current economic climate. This is essential to the economic viability of the college and informs its strategic objectives.

### 1.1 Strategic objectives:

The strategic objectives of the college are based around the e-cat model for elearning:

### **E-cat means:**

- C** consolidate outstanding ILT practice
- A** adjust satisfactory/good ILT practice
- T** transform unsatisfactory/ILT practice.

This strategy informs all aspects of curriculum development and delivery, and includes objectives such as working with employers to meet national and regional standards for specific curricula and incorporating distance learning into the provision of teaching.

So as an initial starting point, Guildford College covers almost all of the UK educational sector's training areas, has a disparate student body and is spread across three campuses, with associated access centres dotted throughout the region. It is funded by national bodies, but also relies on drawing in students in cooperation with industry and through its marketing programme. It is with this in mind that this paper addresses the design of technology-enhanced classrooms.

## **2. Objectives**

The objectives of the technology-enhanced classroom project are threefold:

1. To meet the strategic objective set down by the College for distance-based learning.
2. To support innovation in teaching and learning, in keeping with HEFCE directives for the strategic embedding of e-learning
3. To supply an easy to use tool that is non-technical, accessible, and intuitive, used across diverse subject areas.

The project itself concerns one of the more technically and pedagogically complex undertakings in e-learning development – the development of a capability to capture lectures “live” as they are taught, along with any slides or documents, transfer that information to a central server, and distribute it to the student body – either through the VLE, a Portal, or a third-party service.

### **2.1 Technology enhanced Classrooms.**

To accomplish this, Guildford has undertaken to create what we called *technology-enhanced classrooms*. Our pilot classroom has the following elements:

- A sealed desk/podium unit, containing all the technology required for teaching purposes (VCR/DVD, PC) laptop connection points, and networking/usb connectivity.

- A touchscreen interface embedded into the desk, working much like an iPhone – icon based, and capable of controlling all the devices in the classroom and initiating the recording of video/audio
- A dedicated phone line to the IT department, and the ability to control the classroom remotely – activating a projector or turning on a device remotely.
- High definition camera and audio facility embedded into the ceiling, and accessible to the hard of hearing.

### 2.1.1 Staff Expectations

This feature list is rather technical, but it highlights the social objective behind the individual technical elements. We wish to make the technology secondary to the practice of teaching. First by providing an easy to use interface, with the technology largely hidden. Second by creating a direct line to technical support – ensuring that small issues can be dealt with efficiently and without delay. And finally making the process intuitive – simply logging in and pressing the “Go” button initiates the lecture recording, with no further input required from the lecturer. When they log out, the recording stops. This is in keeping with the HEFCE strategy for e-learning to help teachers “use new technology as effectively as they can, so that it becomes a 'normal' or embedded part of their activities.”

In effect this allows us to meet the expectations of teaching staff. They have expressed satisfaction with solutions that are intuitive, well supported and effective. Understanding their technical support requirements and teaching and learning goals is critical to designing a learning environment that meets our strategic goals – both those we set for ourselves and those set externally.

### 2.1.1 Student Expectations

A vital part of making use of lecture recording technologies is ensuring that students actually use the resource. This can be complicated by how the content is distributed. As the HEFCE strategy indicates, the goal is to embed technology into their activities. We also need to make the technology appealing and attractive – meeting the commercial requirements vital to our bottom line as a College.

The current VLE (Blackboard) and portal environment are used, but not by all students and staff. In some cases the VLE is not relevant to their teaching practice, or they find it difficult to find information online. Regardless of how much the web environment is improved, students still expect to be able to access information in a way that is convenient to them, and that does not necessarily require them to use what they consider “work-based” tools. So instead of bringing our system to them, we have undertaken to go to their systems and networks.

The technology-enhanced classroom is therefore linked to two external services – iTunes and Facebook. As an iTunes U partner, Guildford College sends recorded video content directly to its section in the iTunes store. This will be accessible minutes after a lecture is complete. To promote events and services, links to video materials are provided through the college's facebook presence. In doing so, we attempt to leverage social networks in which the majority of our student body are present. This removes both the technological barrier (video plugins and compatibility) and the social barrier (if they actually know about the material on offer).

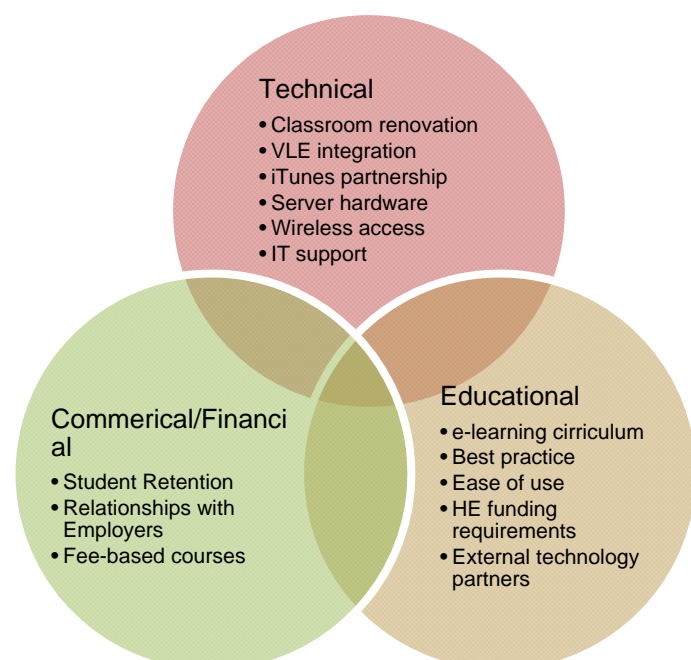
## 2.2 Balancing technical commercial and social objectives

The objectives for the project encapsulate the requirements and expectations of teachers, students and administrators across three sectors – Technical, Educational, and Commercial. The technical requirements are complex – curriculum planning, effective technical support, intuitive user experiences, effective use of social networks, and integration with other web services throughout the college. Ineffective strategy or implementation across any of these areas can lead to diminished expectations or worse – bad first impressions. Even if fixed, the damage is largely done – if the services fails once, people expect the service to fail again. This diminishes its value as a teaching and learning tool. The question in meeting our objectives are:

- How do we avoid providing an overly “technological” solution?
- How do we minimise the risk?
- How can we manage the expectations of funding bodies, management, teachers and learners?
- How do we make the solution fit the institutional culture?

## 2. Implementation

The implementation of the technology-enhanced classroom project depends on meeting multiple objectives, in Technical, Commercial and Educational sectors. For each sector, there is an overlap. Student retention is a financial as well as an Educational concern. The provision of an effective technical infrastructure informs how taught



materials are delivered. Each sector has different stakeholders, from the executive and board of governors tasked with ensuring the profitability of the College, to the IT director, who ensures effective service and support, to teachers who develop and deliver curriculum in concert with the Heads of Learning in each department.

Like many other universities and colleges, the organisational structure of the college is federated – there is a central authority but departments have their own budgets, responsibilities and targets. Some are set at a national level, some at a regional level, and others at a college level. In the case of the enhanced-classroom initiative, the Higher Education department was tasked by HEFCE with the development of a higher education ICT facility that offered media-based learning services, and enhanced the delivery of teaching at the HE level. For such an initiative to succeed, several departments had to agree on strategy, objectives and goals. The overall project had to be proposed to the executive, and adhere to funding criteria established by HEFCE.

## 2.1 Risks

The effects on the delivery of curriculum needed to be considered. The usage of learning technologies has the potential to transform the concept of teaching and learning by redefining the role of the teacher and transforming the meaning and content of the learning procedure (Anastasiades & Retalis, 2001) From an pedagogical perspective the project seeks to shift from a linear delivery of material to a constructivist endeavour where learning would be self directed and personalised. In essence, learners acquire knowledge outside the learning environment by exploring the materials available to them. (Anastasiades & Retalis, 2001; Buzzetto-More & Sweat-Guy, 2006; Connolly & Stansfield, 2007; DeVillers, 2007; Koohang & Harmon, 2005; Lewis, et al., 2005)

In the case of the enhanced-classroom project at Guildford, this constructivist approach to learning is not dissimilar to the internal approach to e-learning provision. The structure of the college necessitated different groups with their own desires, preferences, and expectations. This informed agency – how they approached the project and articulated their desires

## 2.2 Proposed Approach

To address this issue, the Web Services and e-learning teams decided to borrow from constructivist theories and take a social constructivist approach. We proceed on the basis that the most appropriate way to provision a service is unknown, and stress the importance of social interaction between groups as a means of building knowledge. (Palincsar, 1998; Vygotsky, 1978) In doing so we gain an understanding of requirements, expectations, and constraints on how individual groups teach.



So how does this take shape practically? We focus on the construction of knowledge through consultation and examples of successful projects undertaken elsewhere, but adopt a modular approach – develop a series of mini-projects that first solicit opinion as to what the desired teaching outcomes are, and then develop systems that can meet them in part or in whole.

These projects include:

- **E-learning action plan:** A web-based tool for teachers and heads of learning. Teachers are required to submit a plan indicating how they intend to use e-learning technologies, which is approved by the heads of Learning.
- **iTunes U integration:** Web services makes materials from our video archive available to the iTunes store, both as a promotional tool and a source of useful content.
- **Library resource integration:** Video materials from the library covered by our streaming license are made available to students, removing a need for booking out of dvds.
- **Facilities improvement:** Capital spending is allocated towards classroom refurbishment, which includes modernising IT in classrooms and ensuring the technology is well supported.
- **ICT Strategy Group:** A focus group comprising managers, teachers, directors and vice principles for the college meet to discuss provision of IT services and their concerns about their use in teaching and learning.

- **Task-based Pilot Projects:** A single classroom will be enhanced in the first stage of the project, allowing the development team to collect feedback from teacher and students at several technological levels. The initial task will be “lecture recording”
- **Marketing/Research initiatives:** Web Services and Marketing coordinate on the promotion of the streaming media initiative in local media and within campus, highlighting the work of “champions”. Web Services consults with other HE/FE institutions through publishing and conferences, gaining insight into best practice.
- **Technical Implementation:** Deployment of server environments, infrastructure and IT support resources to ensure ease of use.

In effect, the enhanced classroom initiative becomes nine projects, all focused on building knowledge about a project area, all contributing to the project as a whole. However, the absence of definitive results in any particular area does not negatively affect the project as a whole.

Building knowledge in each modular area allows us to mitigate the risk associated with competing priorities within the College. The decision to re-evaluate or abandon an element of the overall strategy due to changing circumstances does not mean that the project is perceived as a failure – instead it is the individual elements that are distributed amongst groups most interested in them and that contribute to the whole.

## 4. Conclusions

The dangers of implementing large-scale enhancements to teaching across diverse campuses are largely related to the often competing, sometimes complementary requirements of different elements within the organisations, external demands for provision of services and client expectation. While best-practice examples exist to guide technical developers, there exists a need for the construction of knowledge as to how teaching is delivered, what common expectations are, and what is perceived as a success.

Building knowledge through a modular approach to project development allows for a focus on both highly technical areas, and more amorphous areas, in which a consensus may not emerge so readily. It also ensures that the technology is multi-use capable. Instead of adhering to a list of functions that are marketed to the College community, the capability of the technology is explored, with additional pilots as needed. This strategy has proved successful in securing £290,000 in funding for the implementation of such a system, with benefits well beyond the target section of the College.

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