

INTERNET STREAMING OF LECTURES: A MATTER OF STYLE

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Abstract

The lecture method is the most commonly used teaching method in higher education and is often translated for use in distance education using a variety of technologies. One technological approach that has emerged recently and is receiving growing attention from higher education institutions is audio and video streaming. However the value of the traditional lecture method continues to be a subject of debate, and so higher education institutions wishing to use streaming technologies to deliver lectures need to research the advantages and disadvantages. Past research has shown that relationships exist between teaching styles, learning styles and success in higher education. This paper seeks to investigate these issues in relation to a teaching innovation at the University of Western Australia.

Keywords

Lectures, lecturing styles, flexible delivery, streaming media, learning styles

Background

At the University of Western Australia (UWA) a distributed computer system has been developed to digitally record 'traditional' face-to-face lectures. The lecture recordings are converted into a variety of streaming media formats and students can access the recordings 24 hours a day, 7 days a week.

The iLecture System has now been in place at UWA since 1999. Previous research (Fardon & Ludewig, 2000) confirmed that the system meets its two primary goals. These being to allow the University to expand its programme delivery into new locations, both regional and international, and also to address one aspect of the Universities strategic priority (UWA OPP, 1999-2000) relating to the provision of flexible access to its teaching programmes. This research also foreshadowed a need for further investigation regarding changing attitudes and behaviour patterns of staff and students.

The most recent research, conducted during second semester, 2001, identified a number of broad groupings of students who access the lecture recordings:

- Students studying in remote locations - Albany, Geraldton
- Part-time students or students with difficulty attending face-to-face lecture, including students with a disability
- Students 'catching up' on the occasional missed lectures
- Students seeking clarification of lecture material, including students with English as a second language
- Students revising prior to exams
- Students choosing to access ilectures rather than attend face-to-face lectures

Despite the popularity of the Internet-based recordings among students, and the evolving acceptance by the majority of teaching staff, questions remain regarding the pedagogical aspects of the Internet-based recordings. In particular, how students and teaching staff use the face-to-face lecture and the Internet-based recordings in the context of the overall teaching and learning programme.

The iLecture System is capable of operating in a variety of modes:

- Audio only (records all audio in range of the microphone)
- Document camera video or “talking hands” (records audio as well as the video projected by the document camera). See Figure 1.
- Video (records audio as well as the video from a video camera)

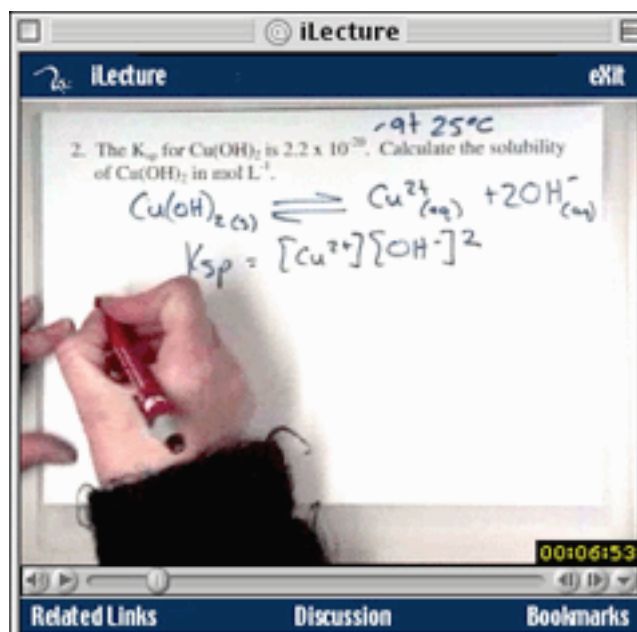


Figure 1. Still frame captured from “talking hands” ilecture.

Only the first two modes are usually used at UWA – the Video mode is not normally used. There are two main reasons for this. Firstly, to gain a good quality video recording a camera-person would need to control the video camera. Secondly, the high video compression that is applied to the video recordings mean that the resulting video is of low frame rate and small frame size (so that the video can be delivered to students via a modem-speed Internet connection). Note: These are limitations imposed by the current technology and the desire to deliver to modem-speed Internet connections. They could be addressed through currently available technology (voice and motion detection cameras) and evolving technology (improved compression formats and greater bandwidth availability).

A major criticism of the Internet-based lecture recordings relates to the above limitations. A number of lecturers have expressed concerns as they feel their physical gestures, body language, hand motions, etc. are critical components of their lecturing style. On the one hand these criticisms may be dismissed as the lecturer exaggerating the effect of their own “performance”, on the other hand these issues may be inherent pedagogical limitations of the Internet-based lecture recordings.

Other pedagogical issues and questions have also emerged.

- Are students with particular learning styles disadvantaged by Internet-based lecture recordings?
- Are particular lecturing styles more effectively translated to the iLectures environment than others?
- What is the effect on student’s receptiveness to learning when accessing Internet-based lecture recordings?
- How important are the social aspects of face-to-face lecture to the learning environment?
- How effectively can alternative uses of the traditional lecture slot be translated to the ilecture environment?

This paper aims to investigate relevant literature regarding the lecture method, lecturing styles and student learning styles to facilitate the development of hypotheses for the use of Internet-based lecture recordings.

Review of Literature

The Lecture Method

The lecture method has been a primary component in the teaching and learning programs of Universities since the very early days of university education (Bligh, 2000; McKeachie, 1986). Given the increasing funding pressures facing higher education worldwide (Laurillard, 1993; Bates, 2000), the lecture will more than likely continue to be used extensively in higher education for many years to come.

A lecture is best defined as one person speaking, more or less continuously, to a group of people on a particular subject or theme. For the university administrator, a lecture is “a slot in the timetable where students are taught in a designated space, a lecture theatre, in a group whose size can vary from 20 to 800 and more, and where one lecturer has prime responsibility for ‘delivering content’” (Edwards, Smith and Webb, 2001).

The lecture method has been a subject of scholarship and research for quite some time. Literature relating to lectures can be divided into a number of categories: literature providing advice, examples and tips (Edwards, Smith and Webb, 2001; McKeachie, 1986; Brown, 1978; Powell, 1973), literature comparing lectures with alternative teaching methods (Jackson and Prosser, 1985; 1989; Bligh, 1972, 2000), literature investigating lecturing styles (Brown and Bakhtar, 1988; Saroyan and Snell, 1997; Behr, 1988) and literature seeking to understand how students learn to inform the appropriate use of lectures (Ramsden, 1992; Bligh 2000; Prosser and Trigwell, 1998).

Perhaps the most significant work on reflecting on the value of the lecture method is Bligh’s (2000) *What’s the Use of Lectures?* In the first chapter, Bligh presents an extensive argument (based on numerous studies relating to the lecture method) that the lecture method is as effective as other teaching methods for “transmitting information”. He also reported that there is little evidence to suggest that lectures are effective for the “promotion of thought” or for “changing attitudes”. Bligh concludes:

“Use lectures to teach information. Do not rely on them to promote thought, change attitudes, or develop behavioral skills if you can help it.” (p. 20)

Much of the research criticizing lectures needs to be considered in the context of the very real economic considerations. These considerations will only become more significant as the number of students seeking higher education grows (Bates, 2000; Laurillard, 1993). However as Bligh (2000) rightly points out, the economic value of a lecture is only significant if it is at least partially successful in meeting the objectives it sets out to achieve.

One discipline that has been most effective in introducing alternative teaching methods at the expense of lectures is health science where problem-based learning continues to grow in popularity (Bligh, 2000). However the number of students in medical courses is usually much less than undergraduate courses in the Physical Sciences, Social Sciences, Economics and Commerce, and Humanities.

However any analysis of the lecture method needs to consider the variation in the ways in which the lecture time-slot is used for teaching and learning. Within the broad parameters of the lecture method defined above, there is considerable room for varying approaches adopted by lecturers. It is the challenge for lecturers in higher education to use the traditional lecture time-slot into a good learning experience for students (Edwards, Smith and Webb, 2001).

Lecturing Styles

At the outset of the review of the literature on lecturing styles, the author would like to state that it is not the intent of this review to conclude a ‘right’ way of lecturing, rather to overview the research to facilitate the investigation of Internet-based lecture recordings.

As indicated above, this paper assumes a lecture is considered to be a 45-60 minute teaching time-slot in which a teacher (or lecturer) speaks more or less continuously to a class of students. As with most forms of teaching, there is no ‘one’ way, nor ‘right’ way to give a lecture. The literature on the lecture method contains a number of books, journal articles, research papers, and other teaching guides that provide advice,

suggestions, experiences, and tips. However none proclaim a 'right' way to lecture. With this in mind, it is not surprising that there is great variation in the way in which teachers use the lecture time-slot.

A good starting point is to first define exactly what is meant by 'lecturing styles'. In broad terms, lecturing style might be defined as the way in which a teacher uses the lecture time-slot in the context of their teaching and the student's learning. Or more specifically, lecturing styles consist of the characteristics of the techniques used and the frequency of use of the techniques (Bligh, 2000). For example, a lecturer may stand more or less stationary behind the lectern reading from a comprehensive set of lecture notes. Another lecturer may show a series of short video segments, and after each segment ask the students to work in groups of three for a few minutes to discuss aspects of the video clips. The lecturer may then request a response from a few groups before proceeding to highlight the relevant aspects in relation to the issues raised by the students. And yet another lecturer may speak "off the top of their head" to a series of PowerPoint slides that provide an outline of each segment of the lecture.

The research conducted in this area can be logically divided into two areas. The first of these is research that investigates the techniques and approaches adopted by lecturers and then seeks to identify appropriate classifications. The second area is research that seeks to identify factors that contribute to the characteristics and approaches adopted by a lecturer. It is the first of these areas that is focused on here.

A review of the literature has revealed that there has been very little published research about lecturing styles and the factors that affect lecturing styles. There may be a number of reasons for this paucity of research. Firstly, there has been a great deal of criticism of the lecture method in the literature and educational researchers may consider it an unpopular focus for their research. In a similar vein, much of the educational research in the past few decades appears to be focused on alternatives to the lecture method, problem-based learning, computer-facilitated learning and small group teaching in particular.

Over the past 30 years there have been relatively few studies that have sought to identify specific styles of lecturing. In fact, despite the lecture being the most widely used instructional method in higher education (McKeachie, 1986; Bligh, 2000) and there being staff development workshops on lecturing at a large number of universities in Australia and indeed internationally (identified by web search), there is not an accepted classification of lecturing styles.

The most recent study of lecturing styles by Saroyan and Snell (1997) analysed the lecturing styles of teachers from an introductory Dermatology program in a Canadian media school. The study focused on a very small number of lecturers (n=3) and involved a comprehensive analysis of the lecture characteristics at a detailed level for a single lecture from each lecturer. The results of the data collection (lecturer questionnaires, video-taped lectures, and student evaluation data) and analysis led to the classification of lectures into 'content-driven', 'context-driven', and 'pedagogy-driven'. Table 1 provides a brief description of each of these classifications.

Perhaps the most significant study of lecturing styles located in the literature was conducted by Brown and Bakhtar (1988) (preliminary results reported in Brown, Bakhtar and Youngman (1984)). In this empirical study, the researchers investigated the lecturing characteristics of a relatively large sample of lecturers (n=258) from Loughborough and Nottingham Universities. The results of the data collection (detailed lecturer questionnaire) and analysis five clusters of lecturers, each with a "distinctive pattern of lecturing style" (p. 135). The terms used to describe the lecturing styles were: Oral Lecturer, Visual Lecturer ("Information Giver"), Exemplary Lecturer, Eclectic Lecturer ("Self-doubter"), and Amorphous Lecturer. Table 1 provides a brief description of each of these classifications.

In a similar study to that conducted by Brown and Bakhtar (1988), Behr (1988) also adopted a self-assessment questionnaire to gather data from lecturers (n=200) from a residential university in South Africa. The questionnaire included a sub-set of the overall questions contained in the questionnaire used by Brown and Bakhtar. The analysis of data, including follow-up interviews with a number of respondents, led to an alternative classification of lecturing styles from that of the influencing researchers. The classifications identified were: dramatic presenter, information provider, structured presenter, and visual presenter. Again, Table 1 provides a brief description of each of these classifications.

Table 1. Classification of lectures and lecturing styles from the literature.

Brown and Bakhtar (1988)	<p>Oral lecturer This type of lecturer depends primarily on communication in the form of speech, rarely using visual presentation aids (OHP etc.).</p>	<p>Visual lecturer This type of lecturer uses a range of visual presentation devices (OHP etc.) to provide content to students, however they tend to focus on providing information.</p>	<p>Exemplary lecturer This type of lecturer is confident, uses a variety of oral and visual techniques and adopts approaches that facilitate student understanding as well as provide information.</p>	<p>Eclectic lecturer This type of lecturer lacks confidence in their lecturing prowess and tends to have difficulty preparing material. Lectures tend to go off-topic easily.</p>	<p>Amorphous lecturer This type of lecturer is confident but is not well prepared and tends not to structure their lectures well.</p>
Behr (1988)	<p>Dramatic presenter This type of lecturer emphasizes the presentation aspects of a lecture, developing a rapport with the audience through visual contact.</p>	<p>Information provider This type of lecturer tends to focus mainly on providing information or content by reading from notes.</p>	<p>Structured presenter This type of lecturer places a heavy emphasis on the structure of the lecture and tends to adopt a similar structure for each lecture.</p>	<p>Visual presenter This type of lecturer makes extensive use of visual aids (OHP, etc.) to deliver lectures.</p>	
Saroyan and Snell (1997)	<p>Content-driven Aims at delivering a large amount of information in the available time.</p>	<p>Context-driven Aims to use the context of the content to promote the goals of the teaching session.</p>	<p>Pedagogy-driven Aims to deliver a limited amount of content with clear learning objectives and provision of opportunities to implement ideas presented.</p>		

Based on this review of the literature on lecturing styles it is obvious that some lecturing styles are better suited to the Internet-based recordings than others. Moreover, Internet-based recordings may in fact be beneficial for some styles of lecturing.

Behr's "Information provider" and Brown and Bahktar's "Oral lecturer" focus primarily on the use of speech for communication during their lectures and would therefore seem well suited to Internet-based recordings as the iLecture System records all audio content. Behr's "Structured presenter", Brown and Bahktar's "Exemplary lecturer" and Saroyan and Snell's "Pedagogy-driven" lecturer would also appear to be suited to Internet-based recordings. These classifications of lecturers organize lectures logically with clear learning objectives and use appropriate visual aids and techniques as required. They have also been documented to be well-prepared and therefore are likely to ensure that any visual material that is used is formatted appropriately for the Internet-based recordings as well as the face-to-face lecture.

However, perhaps the most significant finding from the lecturing styles research relates to presentation or performance aspects of the lecture and the use of visual devices such as blackboards, whiteboards, OHPs, videos, and computer presentations. Behr's "Dramatic presenter" is documented as consciously attempting to make ongoing contact with the audience – playing acting for effect. Brown and Bahktar's "Amorphous lecturer" is the closest match to the "Dramatic presenter". It would seem from this that lectures from a "Dramatic presenter" are not as well suited to Internet-based recordings as important visual cues such as body language, smirks, gesturing and eye-contact are missed. Whilst the iLecture System is capable of operating in a Video recording mode it is unlikely that these visual aspects will translate effectively given issues such as video compression and frame rate.

Behr's "Visual presenter" and Brown and Bahktar's "Visual lecturer" both use a range of visual aids to deliver lectures. These lectures will only be suited to Internet-based recordings if the visual aids that are used are captured/recorded by the iLecture System, such as the document camera and PowerPoint presentations, and if they are well-prepared and organized.

Each study identified a classification of lecturer that tended to focus primarily on the delivery of content, often at the expense of student understanding. These being Behr's "Information provider", Brown and Bakhtar's "Visual lecturer" and Saroyan and Snell's "Content-driven" lecturer. It could be argued that students accessing the Internet-based recordings are at an advantage to the students in the face-to-face lecture in that they are able to pause the lecturer to reflect on what has been covered, they can review segments of the lecture that they did not understand, and they can ensure they access the lecture when they are most receptive to new information.

A similar perspective can be argued for Brown and Bakhtar's "Eclectic lecturer". This type of lecturer tends not to be well structured and goes off-topic easily. Students listening to the recording will have the opportunity to further pursue off-topic content to attempt to make connections to the main theme of the lecture.

All three studies discussed here sought to identify classifications or categories of lecturing styles. Two of the studies also identified a significant relationship between lecturing style and discipline or subject area (Behr, 1988; Brown and Bakhtar, 1988). This is perhaps not surprising given that most lecturers are likely to have been taught by lecturers from their own discipline – "inbreeding within subject disciplines means that teaching styles are characteristic of academic subjects" (Bligh, 2000, p. 166). Brown and Bahktar (1988) observed that lecturers in humanities and social sciences are more likely to be "Oral lecturers" or "Exemplary lecturers", where as lecturers in science and engineering were more likely to be "Visual lecturers" or "Amorphous lecturers". Therefore it is reasonable to assume that Internet-based recordings are likely to be better suited to certain disciplines, particularly humanities and social sciences.

In fact an observation supporting this assumption has been made at UWA where the take-up of iLecture System has been more prominent in disciplines such as law, humanities, and social sciences as compared with science and engineering.

Student Learning and Learning Styles

Student learning theory has been a major area of attention for quite some time, however it is an area of

education research that has gained momentum in the past two decades. This has coincided with a growing awareness of alternative teaching methods, student-centred learning, and the notion of student as 'client' or 'customer'.

The basis of student learning research is the individual learner – the student. However, the literature on student learning also focuses on other factors that contribute to the learning process, including aspects of the broader learning environment. A somewhat simplistic view that can be drawn from the literature is that not all students are the same and therefore students have different ways of learning. These different ways of learning are often referred to as “learning styles”. Two alternative definitions of “learning style” follow.

The concept of “learning style” has been defined as a certain specified pattern of behavior and/or performance according to which the individual approaches a learning experience, a way in which the individual takes in new information and develops new skills, and the process by which the individual retains information or new skills. (Sarasin, 1999, p.1)

“Students have different learning styles – characteristics, strengths and preferences in the ways they take in and process information. Some students tend to focus on facts, data, and algorithms; others are more comfortable with theories and mathematical models. Some respond strongly to visual forms of information, like pictures, diagrams, and schematics; others get more from verbal forms – written and spoken explanations. Some prefer to learn actively and interactively; others function more introspectively and individually.” (Felder, 1996, p.18).

A number of factors contribute to a student's learning style. On the one hand there are the physiological and psychological characteristics that make up a person – often referred to in the literature as *cognitive style* (Sims and Sims, 1995). On the other there is the environment, circumstances and motivations that surround the learning. In fact Schmeck and colleagues make an important distinction on this topic, reserving the label “style” to refer to *cognitive style* and using the label “orientation” to refer to a student's *approach to learning* (Schmeck, 1988).

Curry (1987), cited in Hickcox (1995), reviewed the research relating to cognitive and learning styles, conducting a psychometric survey of 21 learning style frameworks and instruments. She categorized the reviewed instruments into a three-layer system. The first layer of instruments focus primarily on distinguishing personality related preferences. It was indicated that these preferences tend to be more permanent. An example of an instrument categorized in this layer is the Myers-Briggs Type Indicator. The second layer of instruments focus on determining information-processing styles. These preferences refer to the way in which students assimilate information. An example of an instrument categorized in this layer is Kolb's Learning Style Inventory. The third layer of instruments are those focusing on instructional preferences. These preferences are the most observable and as they relate to the learning environment it is expected that they are the least stable over time (Hickcox, 1995).

Beard and Hartley (1984) also examine the research regarding learning styles, identifying so-called “stable characteristics of people” such as ability, extrovert-introversion, and motivation over which people have less control, and then various styles of thinking such as “convergent and divergent thinking”, “serialist/holist processing” and “deep/surface processing” over which people have more control. Laurillard (1993) presents a similar categorization of what students bring to their learning, again dividing into two categories. The first being “student-specific characteristics” in “motivation”, “approach to study”, “epistemological belief” and “intellectual development”. The second being “task-specific aspects important for understanding” in “conceptions”, “reasoning process”, and “representational skills”.

Based on these reviews of literature relating to learning theory and learning styles it can be assumed that there are various categories of behaviours and preferences that contribute to the variations in student learning styles. At one end there are more permanent behaviours that form a person's make up – their personality. And at the other there are student's preferences for teaching and learning approaches and environment.

The literature also suggests that students will learn more effectively if the educational experiences and modes

of instruction match their learning style (Irvine and York, 1995, cited in Heredia, 1999). It is this aspect of learning style theory that is most relevant to this paper. The remainder of this section will review three learning style theories – Myers-Briggs Type Indicator, Kolb's Theory of Learning Styles, and Sarasin's Learning Styles.

Myers-Briggs Type Indicator (MBTI)

Perhaps the most well known instrument for identifying personality types is the Myers-Briggs Type Indicator, developed by Myers it classifies students according to four characteristics and was derived from Carl Jung's theory of psychological types. Students may be *extroverts* or *introverts*, *sensors* or *intuitors*, *thinkers* or *feelers*, *judgers* or *perceivers*. The application of this model provides data on preferences for these four sets of preferences, resulting in 16 learning styles, each style being a combination of the four preferences (Felder, 1996).

Introverts find energy in the inner world of ideas, concepts, and abstractions. *Extraverts* find energy in things and people. *Sensors* are detail oriented, they are merely concerned with facts. *Intuitors* seek out patterns and relationships among the facts they have gathered. *Thinkers* value fairness. *Feelers* value harmony. *Judgers* are decisive and self-regimented. *Perceivers* are curious, adaptable, and spontaneous. (Myers, 1995).

Kolb's Learning Style Inventory (LSI)

Kolb (1984) developed an inventory to classify learning styles using a two axis graph. On the horizontal axis he distinguished between Active Experimentation and Reflective Observation, and on the vertical axis between Concrete Experience and Abstract Conceptualization. By looking at the four quadrants of the graph, Kolb classifies "types" of people as *Divergers*, *Accommodators*, *Assimilators*, and *Convergers*.

Accommodators prefer to be active in their learning. *Assimilators* like to know the 'right' answer and prefer the organized delivery of information. *Convergers* are motivated by interactive learning environments. *Divergers* prefer to have detailed and structured information presented to them. (Kolb, 1984)

Sarasin's Auditory, Visual and Tactile/Kinesthetic Learners

According to Sarasin (1999), most learners can be categorized as Auditory, Visual or Tactile learners. Put simply, Auditory learners learn best by hearing the material, Visual learners need to see the material to learn most effectively, while Tactile learners are those who learn best by doing.

A large proportion of the criticism regarding the traditional lecture method relates to its inability to cater for diverse learning styles. Sarasin (1999) indicates that of her three learning style categories, only Auditory learners are suited to the lecture where information is generally delivered orally and in a structured manner. Sarasin's Visual learners are catered for some of the time, when lecturer's use visual aids or techniques. However Sarasin's Tactile learners are most disadvantaged by the traditional lecture.

As the Internet-based recordings are derivatives of the traditional lecture method, many of the limitations of the lecture method in catering for diverse learning styles are likely to continue to be apparent. However as students have more control over the pace of delivery, it could be argued that they are better catered for this way, in comparison to the face-to-face lecture. Conversely, Sarasin's Tactile learners may be disadvantaged by Internet-based recordings, missing the opportunity, even if limited, to interact with fellow students and the lecturer. This may also be the case for a Myers-Briggs Extravert who prefers interaction with others and is action oriented, and Kolb's Accommodators who prefer to be active in their learning.

Discussion

Much of the criticism of the lecture method highlighted earlier suggests that there is a need to move away from the idea that a lecture is 45-60 minutes of largely uninterrupted discourse from the teacher, with the students sitting relatively inactive (physically) and occasionally taking notes. However the implications of recording lectures in the fashion described may in fact change the very nature of the lecture itself. Perhaps the act of

recording a lecture provides lecturers with an opportunity to focus on the variety of learning styles that have been highlighted above. With planning, a lecturer may structure learning activities around the lecture recordings with the aim to actively engage students beyond the time constraints of the face-to-face lecture itself. This may be an area for future experimentation and research.

For students whose learning style does not match a traditional lecture well, the lecture recordings would appear to offer great value and flexibility. However it could also be argued that the mental dexterity required to learn from a traditional lecture is important, and therefore students should be encouraged to learn. "A learning style may become a learning disability if cultivated at the expense of other ways of learning." (Torrance and Rockenstein, 1988). An area of future research may be to analyze the learning styles of the local students choosing to access the lecture recordings in preference to attending the face-to-face lecture to see if any patterns emerge. It should be highlighted though that in any teaching and learning programme, a key feature is a variety of methodologies and approaches rather than relying on a single method that is most likely to cater for only certain learning styles.

The literature reviewed regarding lecturing styles and learning styles does seem to support the view that some components of face-to-face lecture missing from the lecture recording are important – particularly eye contact, visual gestures, and access to all visual aids. Some of these issues are by-products of the limitations of the current technology, and will be able to be addressed in the future. The literature, together with supporting observations at UWA, does seem to indicate that iLectures are better suited to certain lecturing styles and therefore certain disciplines where those lecturing styles are more common. This is also an area that may require future research.

Finally, one factor that is quite independent from the literature on lecturing styles and learning styles is that when lectures are streamed over the Internet, lecturing style limitations become readily visible. What may marginally work in a normal lecture, will probably not work in this new environment. Issues such as the clarity of speech, the use of audio-visual aids, the ability to write legibly and at reasonable size on the document camera, preparation and organization, all become much more significant. For many lecturers the experience provides an opportunity to reflect on their lecturing style to enhance the learning experience for all students, those in the lecture theatre and those at a distance.

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