
'Learning matters' – adjusting the media mix for academic advantage

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This paper notes the move towards resource-based and distance learning within higher education institutions and briefly describes the Open University's approach to the development of such materials. In this context the need for clear evidence of the educational effectiveness of new technologies to support learning is explored. This is illustrated by reference to a course called 'E211 Learning Matters', which is currently being produced at the Open University (OU). A comparison is made of student activity on a 'traditional' OU course and E211. This analysis is based on a theoretical model presented to ALT-C96 by Diana Laurillard. This model involves looking at the distribution of student activity in terms of 'attending', 'practising', 'discussing' and 'articulating'. The outcome of the analysis supports the view that by changing the balance of media used on E211 away from paper and towards new interactive media, the quality of the course will be enhanced. However, the model is limited in that it only explicitly deals with the quantity of use of each media. The paper explores some of the implicit assumptions within the model and illustrates them with reference to E211. It also highlights ways in which changing the balance of media has been found to impact on the underlying view of learning implicit within the course.

Introduction

Current trends in higher education are towards a greater emphasis on resource-based learning, often in a 'distance learning' or 'supported self-study' mode. Traditionally this is how Open University (OU) courses are transacted.

Within the OU the typical model is for courses to go through a 'production' phase followed by a 'delivery' phase. During the production phase, which often lasts three years, the course materials are developed and tested. Once the course materials are completed, a course will be presented to one cohort of students each year for around five years. This model of production followed by delivery mitigates against changes to course materials once the production phase is completed. This means that course teams have to be totally confident about the educational effectiveness of their materials before the production phase ends.

A 'traditional' OU course uses a range of media including print, television programmes, video, audio, home kits, telephone support and face-to-face sessions. Over the last twenty-eight years the OU has developed considerable expertise in utilizing these media to maximum effect. Today new technologies appear to offer the potential to enhance students' learning, especially in contexts where it is not possible for teachers and learners to meet face-to-face. However, within the OU production/delivery model there has to be clear evidence of the educational effectiveness of new media before a course team can take the risk of relying on it within their course.

'E211 Learning Matters' is a course that is currently in production at the Open University. The course looks at issues relating to learning, knowledge and achievement. It has a particular focus on the potential for new technologies to alter what we learn and how we learn it. The academic members of the course team all hold 'constructivist' views of learning and believe that by using new technologies we can enhance the student learning experience. We also want to provide students with personal experience of the ways in which new technologies can alter learning. Thus we want to make greater use of new technologies within E211 than is typical for an OU course. This is a risky approach, and when we started developing E211 we needed evidence to support our claims that incorporating a wider range of media would enhance student learning. The first source of evidence that we turned to was Laurillard's Media Mix Model (Laurillard, 1996).

Laurillard's Media Mix Model

At ALT-C in 1996 Diana Laurillard presented a theoretical model (Laurillard, 1996) that analysed student activity when studying using a range of different media. Laurillard's model, which she linked to her 'conversational framework' (Laurillard, 1993), identified four types of student activity that are involved in any learning situation: attending, practising, discussing and articulating.

Laurillard presented an analysis of student activity with respect to media format over fifty hours' study on a traditional OU course. Table 1 lists the media forms featured in the study and Figure 1 presents an analysis of the use of these forms with respect to student activity. Laurillard went on to claim that by changing the balance of media one could change the balance

Media form	Abbreviation
Print	Pr
Audio vision: audio cassette plus artefacts to explore	AV
Television programme plus notes	TV+
Video programme plus activities	Video
Face-to-face tutorial(s)	Tut'l
Tutor-marked assignment	TMA
Computer-marked assignment	CMA
Computer tools (e.g. word processor)	Ctools
Computer resources (e.g. digital versions of reader articles)	Cres
Multimedia	MM
Computer-mediated communication (e.g. email, conferencing)	CMC

Table 1: Featured media forms

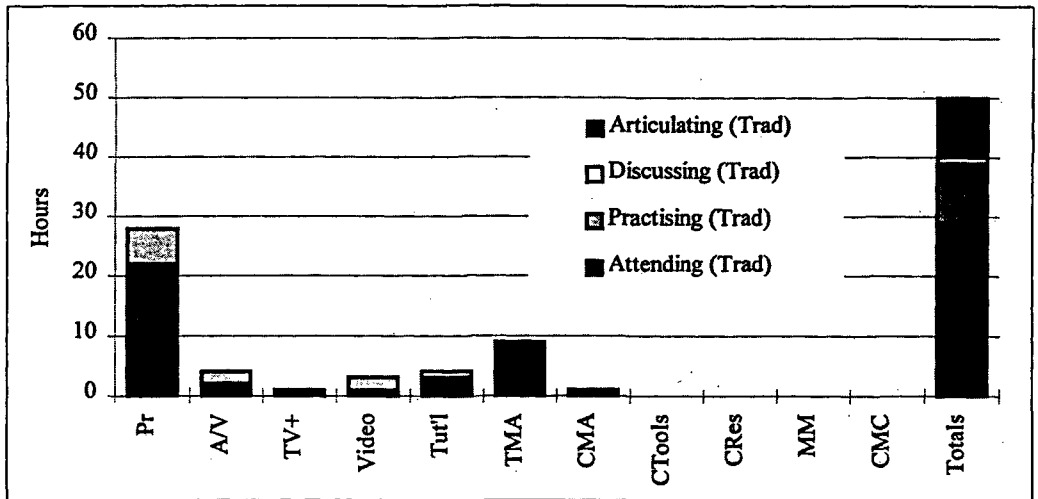


Figure 1: Analysis of 50 hours' student study time on a traditional OU course

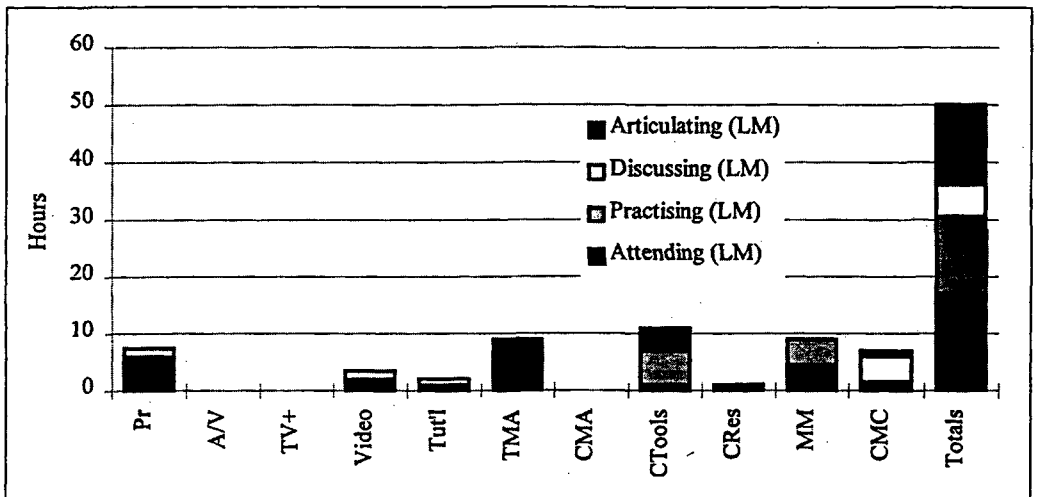


Figure 2: Analysis of the first 50 hours' student study time planned for E211

of student activity and hence improve the learning situation. Collis (1996) refers to this as 'pedagogical re-engineering'; enhancing learning by changing the balance or combination of the components used.

The E211 course team applied Laurillard's Media Mix Model to the planned first fifty hours of E211 (see Figure 2). E211 was planned as an integrated set of educational activities, or what Conole and Oliver (1998) describe as 'learning scenarios'. At this early stage in the production process we had to rely on judgements about the length of time and balance of student activity for each of the learning scenarios within the course. These judgements were based on prior

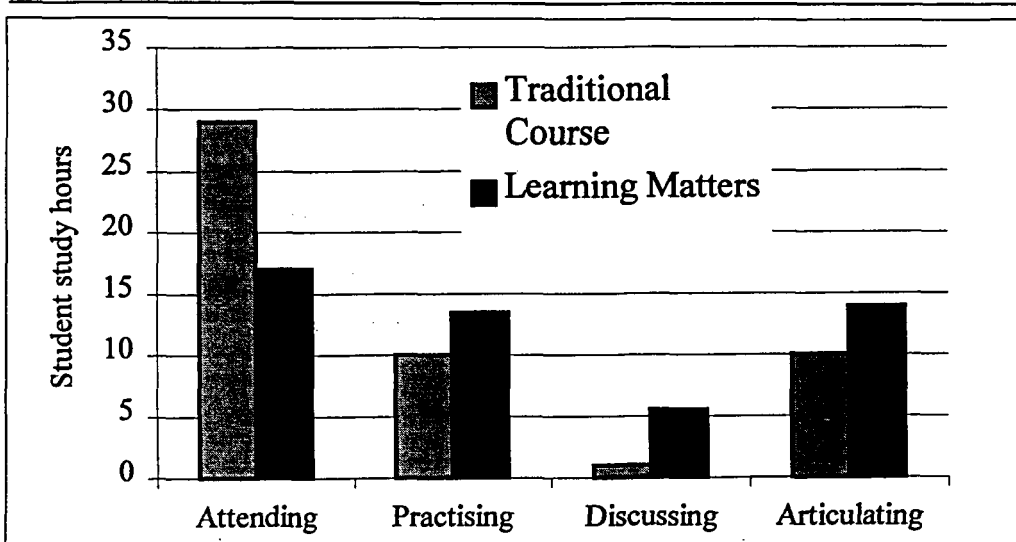


Figure 3: Comparison of student activity on a traditional OU course and E211

experience of similar learning scenarios and comparisons with the balance of student activity that Laurillard's model suggests for each media type.

This analysis of the amount of time students spend engaged in each of the four types of activity on a traditional OU course and the planned E211 indicated that for E211 the amount of (i) attending would be reduced, (ii) practising would be increased, (iii) discussing would be increased, and (iv) articulating would be increased (see Figure 3).

Thus, from a constructivist viewpoint, this analysis suggested that the plan to reduce the amount of print material on E211 and replace it with learning scenarios that made use of information and communication technology (ICT) would provide a better balance of student activity than a traditional OU course.

The course team then went on to develop E211 further. This included initial testing of each of the multimedia components in isolation, followed by developmental testing of the first 50 hours of the course as a whole. This latter evaluation involved a group of 20 students and one tutor working through the first 50 hours of E211 as if they were actually taking the course. The outcomes of this developmental testing suggested that changing the balance of media in the way that we had done had a much more dramatic effect on the student learning experience than our theoretical analysis had indicated. It thus highlighted some limitations of the Media Mix Model.

Limitations of the Media Mix Model

The limitations of Laurillard's Media Mix Model are discussed in terms of how the model simplifies real-world experience, the need to address the integration of the use of different forms of media, and changes in pedagogy.

Simplification

As one might expect, Laurillard's Media Mix Model is a simplification of the real situation. For example, the percentage of time that a student spends in each of the four modes of activity could

vary considerably within each of the media. Thus, the term multimedia is used to describe a wide variety of different types of applications. This includes using multimedia to deliver content to students as well as using multimedia to allow students to explore dynamic models. The former would involve significantly more 'attending' than the latter. Heppell (1998) makes this same point about the different ways in which media can be used with reference to the Web when he draws out the distinction between ICT and IDT (information dissemination technology).

In addition, the balance of student activity when undertaking any learning scenario is determined by an interaction between the learner and that learning scenario. Squires and McDougall's 'Perspectives Interactions Paradigm' (1994), which was developed as a tool for evaluating educational software, highlights the importance of such interactions. Thus, for example, OU texts often include self-assessment questions (SAQs), which are intended to engage the student in what the Media Mix Model describes as 'practising' (i.e. rehearsing their understanding of the material being covered). However, if a student chooses to skip over the SAQs then the balance of activity that they are engaged in will not be as predicted in the model.

Integration

The Media Mix Model says nothing explicitly about the ways in which the different media need to be integrated. This seems likely to have a significant impact on the effectiveness of the course overall. As Laurillard (1994) has pointed out, 'individual media do not easily support all the aspects of the learning process' (p. 7), and 'that is why each medium has to be used in the context of its integration with any of the others that can complement the support it provides' (p. 16).

Thus, implicit within this Media Mix Model is an assumption that the different media will be used in areas where their particular strengths match the learning objectives and where they can complement and enhance the other media being used. This is illustrated in Table 2 with reference to our use of media on E211.

In this sequence of learning scenarios there is a close interlinking of the objectives of each of the scenarios. In addition, the media used were selected on the basis of their individual strengths and the need to compensate for weaknesses in the other media. For example, paper is used to deliver 'content' to the students (Learning Scenarios 9 and 10) but electronic versions of the reader articles are provided so that students can search for particular text, annotate sections and make links to relevant portions from their hypermedia note-taking tool. Multimedia is used to encourage the students to reflect on their own understanding of the knowledge domain being studied (Learning Scenarios 7 and 12). However, to enhance the level of feedback and meta-cognition that the multimedia can support, computer-mediated communication is utilized (Learning Scenarios 8 and 13). In order to enhance the effectiveness of the computer conferencing (Learning Scenario 13), the students first meet face-to-face (Learning Scenario 11). This face-to-face session also allows students to share and explore in some depth their understandings of the Reader Articles (Learning Scenarios 9 and 10).

Changing pedagogy

The Media Mix Model says nothing about the impact of altering the media mix on the implicit model of learning that the course materials engender. As highlighted above, the technology does not determine the way in which it is used (Mackay, 1995; Conole and Oliver, 1998); any one technology can support a variety of models of learning. However, we would argue that changing

Learning scenario	Medium	Description
7: The Trunk Flick Through	Multimedia	This is an exploratory learning scenario where the students are presented with a range of 'media artefacts' belonging to Bob McCormick (a member of the 'Learning Matters' course team). They are asked to explore the artefacts and select the five that they think tell them the most about Bob as a learner. They are expected to make notes about why they chose those five items.
8: Email re Learning Scenario 7	CMC	The students share the items they selected in Learning Scenarios 7 and their reasons for their selections in groups of 3, via email. At this early stage in the course they are not expected to enter into in-depth discussions electronically.
9 & 10: Reader Articles 1 & 2	Paper	The students read the Reader Articles, which address aspects of 'knowledge', 'learning' and 'achievement'. The students are asked to create a set of notes that relate their views of 'knowledge', 'learning' and 'achievement' from Learning Scenarios 7 and 8 to the views expressed in the Reader Articles.
11: Tutorial	Face-to-face	This will be the first time the students and tutors will have met face-to-face (at least in relation to the course!). The aims of the tutorial are: <ul style="list-style-type: none"> • to help students build relationships with each other and with their tutor in order to facilitate future computer conferencing (e.g. in Learning Scenario 13); • to extend students' thinking about learning, knowledge and achievement and the concept of a 'setting' (i.e. to extend work done during Learning Scenarios 7 to 10). The activities in the tutorial will include: working in the same groups of three that shared emails in Learning Scenarios 8 and discussing the similarities and differences between the choices they made in Learning Scenarios 7 and their reasons for them.
12: The Trunk Sort	Multimedia	The students are presented with a subset of the items that they explored in Learning Scenario 7. The software takes them through a series of progressively more refined sorting activities: they are asked to focus on categories relating to learning, knowledge and achievement. As the students move further into the program more options are made available. Throughout the learning scenario the students' ideas (as revealed by the ways in which they classify the objects) are used to extend their thinking further by reflecting it back to them in a variety of ways. The outcomes from The Trunk Sort are output in a format that the students can annotate (using the dedicated hypermedia software which they use throughout the course for taking notes, writing assignments, annotating media objects, etc.).
13: Conference re Learning Scenario 12	CMC	The students share the outcomes from Learning Scenario 12 via a computer conference. Using the 'Learning Matters' hypermedia software the students can look at: <ul style="list-style-type: none"> • the categories other students used; • how other students assigned items to each category; • other students' annotations on the above. The aim of this learning scenario is to extend the feedback that the students receive and to help them further develop their ideas through discussion with other students (moderated by their tutor).
14: Tutor-marked Assignment	CTools	The students create a hypermedia 'essay' using the 'Learning Matters' hypermedia software, which allows them to make links to the digital resources used in the Trunk, as well as to sections of the Reader Articles that are supplied to them in electronic form on the course CD ROM, and to any notes they have made in digital format during previous activities.

Table 2: Integration of media on 'E211 Learning Matters'

the balance of student activity does necessarily lead to changes in the implicit underlying educational model that is operating. We found during the developmental testing of E211 that altering the balance of media in the way that we had done led to the following changes:

- The balance of content vs. process was changed. Within a traditional OU course there is a substantial emphasis on providing students with content and this is not the case for E211.
- Roles of both the tutors and the students were changed. Within the context of the computer conferences it is not possible for a tutor to respond to all of the students' messages. The tutor's role becomes that of 'facilitator of peer tutoring' rather than that of 'provider of answers'. Thus the students very often become the 'teachers' as well as being the 'learners'.
- Recognized sources of expertise were changed. Alongside the move towards more peer tutoring there is a move away from the course tutor being seen as 'the expert'. Alternative sources of expertise are available both in the form of other students and in the form of other experts on the internet.
- Students moved away from individual working and towards co-operative and collaborative working.

All these moves involved the students (and tutors) acquiring new skills. These included, for example:

- new technical skills, in terms of knowing how to operate the software;
- new social and learning skills, such as peer tutoring and collaborative working;
- new intellectual skills, such as how to find and evaluate information and how to represent their knowledge and understanding in a hypermedia format.

These changes have meant that we are having to devise new ways of assessing the students on E211. After all, if we require students to develop new skills we need to adjust our assessment in order to take these skills into account. This raises a vast number of issues. For example, how do you assess process skills (at a distance) and what criteria should be used for evaluating students' hypermedia presentations?

Conclusion

From a theoretical perspective Laurillard's Media Mix Model does provide support for the view that altering the mix of media within a course can enhance the student learning experience, from a constructivist perspective. However, this assumes that one is using the media in ways that draw on the strengths of each individual medium and that the media are closely integrated so that they complement and enhance each other.

It is important to note that the Media Mix Model is at best a simplification of the real situation in that it assumes that one can assign a balance of student activity for each media type across a course. In reality, the proportion of time that a student spends in each of the four modes of activity can vary considerably within each media type. This is dependent not only on how the media are incorporated within a learning scenario but also on the way in which a student interacts with that scenario. Thus the balance of student activity within any one media type is likely to vary across learning scenarios and students, and is thus not easy to predict accurately in the way that the Media Mix Model implies.

In addition, it needs to be recognized that altering the balance of student activity within a course significantly impacts on many, if not all, other aspects of the learning transaction. It changes the underlying model of learning that is implicit within the course. This needs to be recognized from the outset if student learning is to be maximized.

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