

## 4 Learners, Learning Styles and Learning Media

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### Abstract

The paper is an account of an ongoing research project studying the links between learning style and learning media. The particular focus of the paper is on online learning. For centuries the lecture was the standard method of teaching in higher education, but the widespread introduction of ICT into Higher Education has led to dramatically increased educational benefits for learners. These benefits can be summarized as increased access to learning material and increased learner control of that material, and this, in turn, makes individual differences between learners an important factor in the learning process. A series of studies are reported using second year and third year psychology undergraduates, whose detailed examination marks were obtained in order to establish whether examination performance was a function of teaching method. Results were inconsistent, but there was evidence to suggest that lectures were the least effective teaching medium. When learning styles were measured using the Cognitive Style Index (Allinson and Hayes, 1991), some effects of learning style effects of learning style were apparent and a comparison between learning style and marks from lecture-based and online-based examination questions showed significant interactions between learning style and teaching medium – with web-based learning favouring the analytical learning style and summarized material favouring the intuitive learning style.

### 1. Introduction

In this paper we suggest that the needs of individual learners have been overlooked in the expansion of online learning. In particular, we suggest that the learning style of an individual may determine the way the individual approaches and uses online learning and this, in turn, may influence the benefit gained from the online learning. We further suggest that the importance of learning style needs to be more widely acknowledged in higher education, given the trend to move away from teacher-directed instruction to learner-centred study.

For centuries the lecture was the standard method of teaching in higher education. Tutorials, seminars, practical classes and other forms of teaching were used, as appropriate, but the learning experience remained narrow and was almost always based largely on lectures.

Distance learning first began in Australia in 1911 and was first formalised on a large scale in Britain in 1969 with the creation of the Open University. Though very effective and more varied than traditional Higher Education, distance learning was initially lecture-based in the Open University model, with television and radio broadcasts replacing, but virtually reproducing, face-to-face lectures. Distance learning thus retained the narrow, sequential and non-interactive properties of the traditional system.

This picture began to change in both traditional and distance learning by the introduction of online learning, which is now becoming widespread. Indeed, it threatens to become the norm. Using Australia again as an example, significant numbers of students now choose distance/online learning in preference for traditional campus based learning for reasons of cost and convenience. The growth of ‘learner-earners’ is driving the demand for a flexible approach to Higher Education, in which online learning plays a crucial role.

The ‘flexible learning’ differs from the traditional approach in several ways, three of which are of particular importance in this context. Flexible learning involves:

- Matching the needs of the institution, faculty, school and individual
- Less lecturing
- More independent learning

As we shall see, introducing flexible learning successfully is less than straightforward in these terms.

### 2. The problem

In theory, if flexible learning really does meet the needs of the institution, faculty, school and individual, it will become the norm for Higher Education and will embed online learning in the curriculum. In practice, however, attempts to introduce a flexible learning approach have not been fully successful. At Griffith University in Australia, for example, students found the new approach difficult. They complained of being inadequately prepared for the new approach and of not having sufficient access to staff. There was a high student drop-out rate.

Griffith University addressed these problems by:

- enhancing their induction programme
- adding more ICT training

- offering more support during courses
- introducing a standard VLE
- re-introducing more traditional teaching methods: the view was generally that students did not like standard lectures, preferring to have the material available beforehand and to be able to discuss it afterwards with the lecturer.

The overall effect of these and other changes was to greatly improve student views of their overall experience of flexible learning and to reduce the drop-out rate. However, the Griffith experience has yet to demonstrate that the flexible learning approach offers a better learning experience than the traditional approach. This is the problem. It can be expressed in more general terms by saying that:

*no direct link has been established between delivery medium, levels of interaction and the effect of both on student achievement.*

As long ago as 1962 Schramm, in a meta-analysis of 393 studies comparing classroom teaching with televised teaching, found no consistent advantage of either medium. In 21% of studies television was found to be better, while in 14% it was found to be worse. This finding has been replicated in countless studies since – from meta-analyses of the effect of CAL to specific studies of the effects of, say, colour or moving images. Doubtless, in all studies there are many factors at work, which add noise to the data, but in an increasingly diverse curriculum and increasingly diverse methods of delivering that curriculum, one factor is becoming increasingly important – the individual learner.

### 3. The individual learner

Interactivity and learner control lie at the heart of the educational use of ICT. In a cognitive, constructivist model of learning – rather than a behaviourist model – interactivity and learner control include such elements as:

- Learner control of navigation
- Non-linear access to content
- Immediacy of response
- Availability of feedback

all of which give learners freedom, which they can use according to their individual needs and learning styles.

Learning styles matter. Learners learn in different ways and have different strategies, which differ in terms of efficiency and effectiveness. Matching and mismatching learning style to instructional materials can have significant effects on learning outcomes (Entwistle, 1981), in particular with online learning (Ford and Chen, 2001). Learning styles develop during a typical undergraduate course (Busato et al., 1998; Severiens et al., 2001), which implies that learning styles can be taught or changed, but studies have shown that some

learners find adapting their learning style impossible and most find it difficult (Severiens et al., 2001; Smith, 2002; Vermunt and Verloop, 2000). Thus, if learners cannot easily adapt their learning style to match their learning material, it becomes important for teachers to be aware of:

- the relationship between learning style, content and teaching
- how learning style and learning material interact to impact on learning outcomes – student performance being the only quantifiable feature for comparison.

This paper focuses on these points. It summarizes a series of studies which were conducted between 1997 and 1999 using in total around 450 second year and 40 third year psychology undergraduates. Their detailed examination marks were obtained in order to establish whether examination performance was a function of teaching method. Two later studies are reported here, which extend the comparison of method of delivery and learning outcomes to include learning style.

### 4. Why study learning style? A summary of studies from 1997-1999.

Since the introduction of a multiple-choice section into a compulsory second year cognitive psychology examination, the marks of second year students from the multiple choice section of the examination were compared for questions based on material taught via lectures, CD-ROM, email and other methods and combinations of these methods. Results were inconsistent, but there was evidence to suggest that:

- lectures were the least effective teaching medium
- part-time learners show different patterns of performance to full-time learners
- specific aspects of a particular method of delivering learning material may affect the effectiveness of that material in terms of learning outcomes. For example, 450 word summaries of lectures of lectures were less effective than 1000 word summaries
- learning from a CD-ROM was effective and the combination of CD-ROM and lectures was no more effective than using the CD-ROM alone.

This approach produced sufficient data to allow comparisons to be made between the different methods of delivery, but it was limited methodologically by our inability to control for differences between teachers and for the relative difficulty of both the course material and the examination questions derived from it. Therefore, the failure to find clear differences between different methods of delivery was not surprising, especially given that it mirrored the literature over the past 40 years. Nevertheless, it seemed apparent that individual differences between students might account for a substantial proportion of the variability within the data. In particular, the

differences between full- and part-time students – the latter being mostly older students with a less sophisticated approach to learning - suggested that the way students learn might interact with the way the material to be learned is delivered. Accordingly, we sought to use an appropriate measure of individual differences, which might shed some light on the relationship between method of delivery and learning outcome. Learning style was an obvious choice.

### 5. Learning style, lectures and other forms of delivery.

In a subsequent study students learning styles were measured using the Cognitive Style Index (CSI) (Allinson and Hayes, 1991). The CSI gives a single score on an intuition-analysis dimension.

CSI scores were correlated with marks for the MCQ-assessed component of the examination for two cohorts of students for each of five delivery media, as is shown in Table 1.

| Delivery medium              | Correlations with CSI |                 |
|------------------------------|-----------------------|-----------------|
|                              | <u>Cohort 1</u>       | <u>Cohort 2</u> |
|                              | (n=51)                | (n=92)          |
| Lectures                     | 0.148                 | 0.025           |
| Lectures + CD-ROM support    | 0.064                 | -0.002          |
| Lectures + emailed summaries | -0.265*               | -0.078          |
| CD-ROM                       | 0.222**               | 0.015           |
| Emailed full text            | 0.004                 | 0.119           |

Table 1: Correlations between CSI and MCQ scores for five media (\*p<0.01, \*\*p<0.05)

Thus for Cohort 1 significant correlations were found between learning style and the MCQ examination performance which resulted from learning from both the CD-ROM and from lectures supported by emailed summaries (about 1000 words) of those lectures, but not from the other delivery media. In the latter case the correlation was negative, showing that intuitive students obtained higher marks on questions derived from material taught by lecture and supported by an email summary. Learning from the CD-ROM favoured analytical students.

In other words, learning style and delivery media sometimes interact. But why should this happen and how do we explain the particular interactions we found? Our explanation is two-fold. Firstly, MCQ examinations favour the analytical student, because they are based on detailed questions. Hence four of the five correlations are positive – favouring the analytical student. Secondly, an individual’s learning style is pervasive and determines the first approach the individual makes to the material, which is to be learned. The email summary of a

lecture is thus the only delivery medium which favours the intuitive student, because it is the only medium which provides an overview, subsequently facilitating learning the details of the material. Analytical students are less able to benefit from the summary and so are less able to learn the details of the material. Conversely, the CD-ROM allows the analytical student to obtain the information on which they are assessed more quickly than an intuitive student.

Failure to match in Cohort 2 the significant correlations found with Cohort 1 is not easy to explain, other than by saying that they were different cohorts, who attended different lectures and were given a slightly altered MCQ examination.

A second study used students from Cohort 2 a year later, using marks from 2 third year modules. 16 of these students studied a third year course on the psychology of reading (PS3404), which was taught using three different methods of delivery, as follows:

- Web-based independent learning – where the students researched a topic for themselves. This was assessed by a compulsory question given to students at the beginning of the course
- Web-supported learning – where the topic was largely taught using web-based material
- Traditional lectures

The course was assessed by three essay-type examination questions. When the marks were obtained for the three delivery methods and were correlated with CSI scores, the results shown in Table 2 were obtained.

| Delivery medium                | Mark  | Correlation with CSI score |
|--------------------------------|-------|----------------------------|
| Web-based independent learning | 63.00 | 0.226                      |
| Web-supported learning         | 60.43 | 0.334*                     |
| Traditional lectures           | 57.03 | 0.008                      |
| Overall mean                   | 59.34 | 0.236                      |

Table 2: Correlations between CSI scores and marks for course PS3404 (\*p<0.05)

14 of the students from Cohort 2 studied the PS3403 Psycholinguistics module, which was also assessed by three essay-type examination questions, but which was taught slightly differently, having three delivery methods, as follows:

- Web-based independent learning – as for PS3404, but not assessed by a compulsory question
- Independent learning – assessed by a compulsory question
- Traditional lectures

The results for this module are shown in Table 3.

| Delivery medium                | Mark  | Correlation with CSI score |
|--------------------------------|-------|----------------------------|
| Web-based independent learning | 57.15 | 0.468*                     |
| Web-supported learning         | 65.43 | 0.002                      |
| Traditional lectures           | 55.38 | 0.109                      |
| Overall mean                   | 59.00 | 0.291                      |

Table 3: Correlations between CSI scores and marks for course PS3403 (\*p<0.01)

Again the results suggest an interaction between learning style and method of delivery, with analytical students obtaining higher marks on web-based components of courses. However, the pattern of results between the two modules was different, as were the modules themselves and most of the students on the two modules. It is thus clear that learning style is linked with the ability to benefit from teaching, but much work needs to be done to identify the detailed way in which learning style, teaching and learning interact to affect learning outcomes.

## 6. Conclusions and recommendations

The results indicate that the importance of learning style needs to be more widely acknowledged in higher education. The interactions between learning style and teaching medium mean that online learners, in particular, need to:

- be able to identify their learning preferences relative to the curriculum
- recognize when a particular experience may not meet their learning style
- be able to take steps to change their learning style to suit the situation, i.e. to consciously move out of their comfort zone and develop competence in a variety of learning styles, thus being able to update their learning skills as they progress through the curriculum.

Finally, ideally, learners need to be able to take steps to change the situation to suit their learning style.

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