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Attention breaks in lectures

Previous research\(^1,2,3\) into student attention patterns during lectures suggests that student attention declines steadily during a lecture, and that the rate of decrease is dependent upon several variables including subject difficulty.

From experience, and casual observation, we thought that the decline in student attention did not occur so much in terms of a smooth curve, but that at various times during a lecture, the class as a whole lost attention, and that the frequency of these general attention breaks, which have elsewhere been called 'micro-sleeps',\(^4\) increased with time during a lecture.

**Aims of research**

The first aim of the investigation was

- to attempt to gain some evidence for the existence and frequency of periods of general non-attention.

If this proved to be a real phenomenon, we would attempt

- to discover if there was a general pattern for these attention breaks in a lecture;

- to determine whether the pattern of attention breaks was related to lecture style;

- to determine which factors, if any, improved the non-attention pattern in a lecture.

**Evidence**

For the purposes of this study, an attention break was defined as 'a period of general lack of concentration during a lecture involving the majority of the class, and not merely isolated individuals'. Such breaks could be identified by an increase in background noise in the theatre, accompanied with the fact that many students engaged in various activities such as doodling, looking idly around, yawning, chatting etc. A general feature was a mood of restlessness amongst the class.

If attention breaks do exist on a general basis in a lecture, it was decided that it should be possible \(a\) to observe them, and \(b\) to identify a relatively poor performance on subsequent examination of the subject matter covered by the lecturer during these breaks.

**Observation of the class**

- During the course of the study, over 90 lectures, mostly first-year lectures in chemistry, were attended by at least one of us as observer.

The observer sat amongst the class where he could observe the majority of the class without drawing undue attention to his presence. A 'fingerprint' of the lecture was recorded on a specially designed 'tick-sheet' which, as well as having space for information on aspects of lecture style, also had a space where the time and duration of any observed attention break could be noted along with the precise piece of work being taught at the time.

At 12 of the lectures, two independent observers were present, so that findings could be compared.

There was no contact between the two observers during the lecture, and each sat at opposite sides of a large lecture theatre (capacity about 300).

Comparison of the two observers' tick-sheets always showed remarkable similarity, particularly in the identification of times and lengths of breaks in attention. This very close similarity suggested that general breaks in attention could be identified reasonably simply by observation of the students. The lapses in attention generally lasted from two to four minutes.

**Effect on performance**

Because of the large numbers (about 550) studying first-year chemistry, it was necessary to divide the class into two sections for lecturing purposes.

One section received the lecture in the morning while the other section received an 'identical' lecture in the afternoon.

To determine whether the observed lapses in attention had any effect on subsequent performances in tests, the precise topic being covered during an attention break was noted by the observer. Thus, for example, if the morning section had been judged to have been attending while a certain aspect of a topic was being covered, and the afternoon section were judged to have been not attending, it might be expected that the morning section would perform relatively better than the afternoon section in subsequent tests on the area of the topic in question. Diagnostic tests were given to the class monthly throughout the session and specially selected items were inserted in these tests in order to examine this theory.

For this part of the work, three independent lecture courses were attended by the observer(s) namely, \(1\) ionic solids—four lectures; \(2\) main group chemistry—nine lectures; and \(3\) transition metal chemistry—eight lectures. Each lecture was given twice per day.

In the diagnostic tests which immediately followed the completion of a lecture course, specially selected items were chosen to test the class in examinable areas of the course in which the observer indicated one section was attending while the other was not. Lecturers involved with each course cooperated fully, and checked the items chosen to ensure they were fair and related to the course objectives.

As the function of the diagnostic tests was not solely for the purpose of this research, and other lecture courses had to be tested, space in the tests was limited to a few items of particular interest. Of these, nine items (three from each course studied) were included in which one section or other had been judged to be not attending. In addition, seven other items were used, in which either both sections had been attending or both sections had not been attending. Of the nine items of specific interest, four involved non-attention of the morning section, while five involved non-attention of the afternoon section.

In each of these nine items in which a specific prediction was made, the section judged by the observer to be not attending performed more poorly than the other section, the differences being statistically highly significant. In the seven items where either both sections were judged to be attending, or both not attending, the scores in the test did not differ significantly.

Thus, it seems that attention breaks do exist, and occur generally throughout the class. Such breaks can be relatively easily detected by an observer, and these lapses in attention appear to cause relatively poor performances in subsequent diagnostic tests.

**Pattern of attention breaks**

During the study, over 90 lectures were attended; these involved 12 lecturers, each with his own style of delivery. It was possible to make some
generalisations on the pattern of occurrence of attention breaks based upon two broad categories of lectures, namely lectures without variation, and lectures where varied activity was deliberately included.

The general pattern
In typical 50 min lectures without variation of style, the periods of non-attention among the students were studied to see if a general pattern emerged. A general feature observed in most lectures was a period of non-attention right at the start of a lecture, due to the class ‘settling down’. The next lapse in attention usually occurred some 10-18 mins later, and as the lecture proceeded the attention span became shorter and often fell to three or four minutes towards the end of a standard lecture. This general pattern of shortening of attention span with time was found in every case where a lecture without a break was given. The rate of decline in attention span varied from lecture to lecture and from lecturer to lecturer. Although it was impossible to identify the extent to which certain variables affected this rate, the important factors appear to be difficulty of subject matter, delivery rate, legibility of blackboard work and lecturer personality.

Variation of lecture approach
Some of the lecturers who took part in the study adopted a varied approach in their lectures and deliberately and consistently interspersed their lectures with illustrative models or experiments, ‘buzz sessions’ (which involved short problem solving sessions), or some other form of deliberate break. Such lecturers usually commanded a better attention span pattern from the class and these deliberate variations had the effect of postponing or even eliminating the occurrence of an attention break. Variated activity in the lecture appeared to allow the student some measure of mental relaxation, and it is probable that learning time lost in providing variation in a lecture was more than recouped in terms of student learning. Also, variations such as an experiment or a short film in a lecture may often clarify a difficulty in the mind of a student, and the lecturer may not feel that any learning time has been lost at all. Lecturers who ‘did not want to waste time with breaks’ almost certainly lost out in effective class learning.

It should be noted that this study is not just an academic exercise, but has practical applications, both in improving the efficiency of a lecture and in assessing types of lecture courses. For example, the method of studying student attention span has been used in the chemistry department at Glasgow University as one method of assessing the efficiency of televised ‘overflow’ lectures. It was shown that if a live lecture was televised for an overflow audience, the attention span pattern was very much poorer for the televised lecture than for the same lecture given live.

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References

Keller plans in chemistry teaching

This article provides a short, comprehensive review of the application of the Keller plan to chemistry teaching. It describes how the Keller plan works, where it is used and reports on its effectiveness as a teaching method.

Since 1968, when Keller first reported his system,1 the Keller plan, or Personalized System of Instruction (PSI) as it is sometimes called, has spread through the US, the UK and other parts of the world. Two books have already been published on the method2,3 and there is also a PSI newsletter and a bulletin.5 A survey in 19744 reported 31 chemistry courses using the Keller plan and there are certainly more now. There have been several reports of the use of the Keller plan in chemistry courses in the UK. (Keller taught there) and it has also been used for chemistry teaching in Australia.11 While principally used in tertiary education, variations of the Keller plan and related methods have been used for teaching chemistry in secondary schools.12,13,14

In the Keller plan the course material is divided into a number of units each with specified learning objectives and a study guide. The study guide usually guides the student through a set textbook and contains supplementary notes, worked exercises, assignments and, of course, a list of unit learning objectives. Since the text book is essential to the course, students are obliged to buy it. Some units also refer to learning aids such as film loops, slides, chemical models which may be used to achieve the objectives. Students work through the units at their own pace with the proviso that before passing from one unit to the next they must pass a test on that unit. Testing takes place at tutorial sessions which may also be used for study and informal discussions. Attendance at these sessions is not compulsory. Complete mastery of each unit is required before the next unit is attempted. The pass mark on tests is usually of the order 80 or 90 per cent. However, there is no penalty for failing a test and students may attempt tests on a unit as many times as necessary. Units and tests are issued by tutors or

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