What do students remember from lectures?: The role of episodic memory in early learning

Debra M. B. Herbert

School of Psychology, The University of Queensland
debra@psy.uq.edu.au


Recent research (Conway, Gardiner, Perfect, Anderson & Cohen, 1997; Herbert & Burt, 1998) has suggested that early in learning, students primarily have representations that are episodic in nature. As learning continues and schematisation occurs, students' knowledge is more likely to be dominated by semantic memory representations. This shift in memory and schematisation is shown through the investigation of the memory awareness involved when students are required to recall information; 'remember' awareness is linked to the episodic memory system, and 'just know' awareness is linked to the semantic memory system. The purpose of the present research is to investigate the role that episodic memory plays in early learning. A group of university students studied either episodically rich' material or 'episodically poor' material. Students completed a multi-choice test and short answer question after a two day and after a 5 week time interval. In comparison to students who studied the episodic poor material, students who studied the episodic rich material showed a greater quantity of 'remember' memory awareness on the first test but a greater quantity of know responses on the second test, as well as a greater degree of schematisation. These results are discussed in conjunction with those from a qualitative interview study of students regarding their learning experiences with university lectures. It is concluded that for effective teaching and learning, concepts should be illustrated by meaningful examples. This not only leads to better learning for students, but to greater enjoyment and involvement in the classroom.
Introduction

The process of learning has long been a topic for psychological study and many different areas of research have asked questions such as, "How do individuals learn or remember?" or "What do individuals learn or remember?". While both cognitive and educational psychology have contributed a plethora of ideas and research to addressing such issues, often the utility of cognitive psychology in particular, is questioned due to a suggested lack of generalisability to real world learning situations. However, recent research has attempted to apply concepts and theory developed from within cognitive psychology to more naturalistic learning settings. One such area involves research regarding the consciousness, or awareness, which is proposed to accompany different aspects of memory (e.g., Conway et al, 1997; Gardiner & Java, 1993; Rajaram & Roediger, 1997).

The origins of this research come from Tulving's (1985) proposition that retrieval from hypothesised episodic and semantic memory systems is associated with distinct experiences. Use of semantic memory, an individual's conceptual knowledge about the world, is characterised by memory awareness involving feelings of familiarity or just 'knowing', whereas use of the episodic memory system, which contains representations of personally experienced events, is accompanied by the conscious recollection or 'remembering' of these past experiences. Tulving (1985) argues that the recollective experience accompanying memory performance is characterized by a greater degree of remembering as the amount of episodic memory utilized increases.

Conway et al. (1997) were the first to apply these memory awareness constructs to a 'real world' learning situation, and examined how material processed in specific episodes, such as university lectures, can over a period of learning become conceptual knowledge rather than isolated memory episodes. The authors suggest that in early learning, knowledge is more likely to be retained in episodic form which students are able to 'remember' specifically. As learning progresses, these memory representations shift from being primarily episodic in nature to more conceptual, highly familiar, generalized knowledge which students tend to simply 'know'. During this process of learning, knowledge becomes schematised. However, unlike traditional schema theorists (e.g., Bartlet, 1932; Piaget, 1952; Rumelhart & Ortony, 1977), they proposed that students' schematised knowledge of their course material retains some details of memory episodes, rather than simply being an abstract framework. Conway et al. also argue that this shift is not an all or nothing phenomenon, and both types of memory and awareness can be involved with students' knowledge at the same point in time, and as such, memory awareness should vary systematically with the degree of schematisation.

In order to explore these hypotheses, students enrolled in first year psychology courses took multi-choice exams following each content or research methods course in the first year program. One of the content courses was also later re-tested. In conjunction with each answer students indicated which state of memory awareness accompanied their answer. For the content courses, students who performed best indicated a high proportion of 'remember' responses, while for the research methods courses and the later retest of a content course, students showed a higher proportion of 'know' responses. In addition, there were differences in the accuracy of remember and know responses. Accuracy of know responses was consistently high, but the accuracy of remember responses fell when the proportion of remember responses decreased, indicative of weaker memory for episodes in the methods course and the re-tested lecture course. Similar results were also reported by Herbert & Burt (1998) with first year and third year university students. Both studies indicate that the process of schematisation, the remember-to-know shift, is particularly dependent on the
level of learning obtained and the type of course or instruction. It is suggested that schematisation occurred at a faster rate in the research methods courses because of the practical nature of courses and the fact that they covered fewer topic areas or sub-domains than the lecture courses which tended to involve many different areas that were less interrelated. Moreover, those students who performed best showed more marked shifts in memory awareness.

**Remembering, knowing and schematisation**

Two processes are suggested to be responsible for the remember-to-know shift; a loss of access to episodic details, and the development of some kind of 'conceptual organisation'. Both processes are presumed to result from repeated experiences with the same information but in rather different contexts, such as students encountering the same concepts and facts multiple times across lectures and tutorials or laboratory classes. This results in a strengthening of the knowledge that is common to the varying episodic representations in memory. However, repetition of experiences and loss of episodic details will not alone result in schematisation. Rather, students need to actively take the opportunity to schematise their knowledge on a conscious level.

This is consistent with recent research involved in the long-term retention of knowledge taught in school (e.g., Conway, Cohen & Stanhope, 1991, 1992; Semb & Ellis, 1994). From their review of several studies examining long-term retention (e.g., Bahrick & Hall, 1991; Semb, Ellis & Araujo, 1993), Semb and Ellis (1994) suggested that it is not a simple strengthening of the instructional content which improves long-term retention, but rather qualitative changes in students' memory structures, or schemas, through active learning. For example, from examining student performance in a final year cognitive psychology course, Conway, Cohen and Stanhope (1992) reported that when students were actively involved in learning, completing practical experiments in which they designed their own studies, collected and analysed data, they tended to have more stable long-term memory structures and a higher level of memory performance. The authors propose that in the context of school or university, when schemas are formed and retained the organization of knowledge in memory is generally stable and effective access to the knowledge is maintained.

Other research has indicated that qualitative differences in episodic experiences during learning at school effect long-term retention of knowledge. MacKenzie and White (1982) found that high school geography students who completed a program including a 'processing' fieldwork excursion (involving observing, sketching, thinking and activities such as testing foliage for salinity) showed significantly more retention of knowledge over time compared to students who completed traditional classroom and excursion programs. It was suggested that the processing excursion provided easily recalled episodes that interlinked with the general content being taught and the active processing experiences aided students in generating meaning for this content.
Study one: Episodic 'rich' vs. episodic 'poor' instruction

From the above discussion it is evident that in some way, episodic memory plays an important role in the process of acquiring a new body of conceptual knowledge. How and when students experience particular 'episodes' or events and/or process specific details appears to affect the schematisation process and the long term retention of conceptual knowledge. Also, instruction should facilitate students in making the linkage between abstract knowledge and easily understood specific information. The present study was designed to examine the importance of episodic memory in the schematisation process. The primary aim was to manipulate the episodic quality of information presented to students and investigate the effect different instructional materials have on schematisation and memory awareness.

It was hypothesised that students who study material 'rich' in episodic cues will first 'remember' more but after a period of time will 'know' more than students who study material 'poor' in episodic cues. In order to further examine the schematisation process, a qualitative measure of students' understanding was included in the form of an open-ended question. This was assessed using the Structure of Observed Learning Outcome (SOLO) Taxonomy (Biggs & Collis, 1982) which was developed to measure the quality of student learning from tests requiring understanding of meaning. The lower to middle levels of the taxonomy represent little or no knowledge to knowledge of specific items. The upper levels represent knowledge of several items and the ways in which they are related in an overall framework. Based on the results reported by Conway et al. (1997) and Herbert & Burt (1998), it was hypothesised that when remember responses are dominant, students should score between the low and middle levels of the taxonomy, thus reflecting an ability to show knowledge of specific concepts and use of episodic memory. However, when know responses are dominant students should score between the middle and upper levels of the taxonomy, reflecting an ability to recall information about specific concepts but within a conceptual framework and use of semantic memory.

Method

Participants

A total of 39 students participated in the study in conjunction with their first year psychology research participation program. All students were also enrolled in a first year statistics course. Students were randomly assigned to two conditions; 19 students were in the 'episodic rich' condition and 20 students were in the 'episodic poor' condition. The mean ages were 19.05 and 21.03, respectively. In each group females were in the majority, comprising approximately 80% of participants, and most students were enrolled in either an Arts or Science degree, with a smaller number of students enrolled in an a therapies degree (e.g. occupational or speech therapy). The remaining students were studying in areas such as business, engineering, information technology, and law. Students were tested in groups of 5 to 10 persons.

Materials

The topic for study was chosen from the range that would be covered in the 1st year psychology statistics course. It was important to choose a topic that was not to be covered until later in the semester so as to exclude the problem of students having already studied
the concepts. However, it was also important to choose a topic in which the students had covered the basic background knowledge required to comprehend the concepts.

Two samples of instructional material involving the explanation of the repeated measures t-test and independent groups t-test were developed by the researcher. One sample of instructional material contained examples that were 'rich' in contextual information, or episodic cues, and the other sample was lacking in these features. For example; "A psychologist wishes to test the hypothesis that memory for pictures is better than memory for words. A group of school children view 30 slides with various pictures on them, and 30 slides with various words on them. Each slide contains only one picture or word and is viewed for 4 seconds. After viewing the slides, children are given a recall test". This example is quite 'rich' in episodic cues in comparison to the following example. "A researcher wishes to test the hypothesis that memory for material A is better than memory for material B. A group of subjects view 30 slides with stimuli of Material A on them, and 30 slides with stimuli of Material B on them. Each slide contains only one stimulus and is viewed for 4 seconds. After viewing the slides, subjects are given a recall test".

The two samples also contained examples of research scenarios and students were directed to decide which of the statistical tests was the most appropriate in each case. These scenarios were also constructed as being either rich or poor in episodic cues. The two samples were tested for readability so as to determine their equivalence in all other features. The episodic rich and episodic poor instructional materials are very similar in terms of the number of words (2030 vs. 2027), grade level (10.67 vs. 10.86) and reading ease level (50.28 vs. 48.42 out of 100).

A test containing 18 multi-choice questions (MCQ) was developed in conjunction with the instructional materials. Approximately half of the questions were taken directly from information contained in the instructional materials (information which was exactly the same in both samples) and the other half of the questions were conceptually based where students were required to apply their knowledge in order to choose the correct answer. Each question contained three alternatives, and the two incorrect answers were taken from the instructional material the students had studied. Along with each MCQ, students were required to make a memory awareness judgement. A short answer question was also developed from the instructional material that required students to write a passage about a particular concept that they had studied. This question was designed as a method of assessing the degree of schematisation of knowledge for each student. Also, in order to examine the students' memories of examples provided in the instructional material, an exploratory open-ended questionnaire containing three questions was constructed. For example; "At the first session of this experiment, you studied some material that described different statistical tests...On the first page, an example was given to describe a repeated measures t-test. There was a table showing the scores for the two groups in the experiment. Can you remember what they groups were called, or anything else about this example?".

**Procedure**

The study included three separate experimental sessions. At the first session, students were randomly assigned to one of the two conditions, and were given a copy of the appropriate instructional material. Students were told that in this first session they would be introduced to some concepts that were relevant to their first year statistics course, and that in the later sessions they would be given practice questions pertaining to this material. The experimenter verbally read through the material in lecture format with the group, and then instructed students to spend the next 40 minutes reviewing the material as many times as they could. They were also encouraged to 'try out' their understanding with the example research scenarios. The second session was conducted two days after the first session.
Each student was given a multi-choice test and short answer question to complete. Standard instructions were provided at the beginning of the testing session on an overhead projector at the front of the room. The test took approximately 25-30 minutes to complete. The memory awareness response instructions that were presented to the students followed those used by Conway et al. (1997); when conscious recollection of a particular learning episode is involved in retrieval, the subject is instructed to make a 'remember' response. If, however, the information is simply known and is a part of the person's knowledge, the subject makes a 'know' response. When feelings of familiarity are associated with retrieval without conscious recollection or simply 'knowing', the person makes a 'familiar' response. When the person cannot retrieve the required information and simply guesses, he or she makes a 'guess' response. The third session, a follow up test, was completed 5 weeks after the second session. The procedure for this session was identical to that of the second session. Students completed the same multi-choice test and short answer question, as well as the exploratory open-ended questionnaire.

Results

Test one

Multi-choice test. For the multi-choice test analyses there were two main variables of interest; instructional material (2 levels) and memory awareness category (4 levels). These variables were analysed in a two-way design for both memory awareness quantity and accuracy data. For the correct MCQ answers only, the number of correct answers falling in each of the four memory awareness categories was calculated for each student. This measure is referred to as the 'quantity' of memory awareness and scores sum to 100% for each participant in each test. For all memory awareness judgements, the proportion of correct answers from the total of answers given in each memory awareness category was calculated individually for each student. This measure is termed the 'accuracy' of memory awareness. The data from the multi-choice test is presented in Table 2.

For test one, there was no significant difference between the mean MCQ's correct. The means for the episodic group and the episodic poor group were 9.63 (2.65) and 8.85 (2.16), respectively. A two-way analysis of variance (ANOVA) was conducted on the memory awareness quantity data with instructional material as a between-subjects factor and memory awareness category as a within-subjects factor. This revealed a significant interaction between instructional material and memory awareness category, $F(3,111) = 2.79$, $p < .05$. Simple effects analyses were conducted for each of the four memory awareness categories. There was a significant effect of instructional material on remember quantity, $F(1,37) = 4.31$, $p < .05$ and guess quantity, $F(1,37) = 5.11$, $p < .05$. Students who studied the episodic rich material made more remember responses and fewer guess responses than the students who studied the episodic poor material.
Table 2.

Mean quantity correct and accuracy of MCQ answers by instructional material for each of the memory awareness response categories.

<table>
<thead>
<tr>
<th>Test Occasion &amp; Response Category</th>
<th>Quantity Correct</th>
<th>Response Category</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>&amp; Episodic rich (n=19) Episodic poor (n=20)</td>
<td>Episodic rich (n=19) Episodic poor (n=20)</td>
<td>Episodic rich (n=19) Episodic poor (n=20)</td>
<td></td>
</tr>
<tr>
<td>Test One: Remember</td>
<td>(0.35 \ (0.18))</td>
<td>(0.22 \ (0.19))</td>
<td>(0.75 \ (0.28))</td>
</tr>
<tr>
<td>Know</td>
<td>(0.23 \ (0.15))</td>
<td>(0.19 \ (0.13))</td>
<td>(0.70 \ (0.31))</td>
</tr>
<tr>
<td>Familiar</td>
<td>(0.26 \ (0.14))</td>
<td>(0.32 \ (0.21))</td>
<td>(0.55 \ (0.26))</td>
</tr>
<tr>
<td>Guess</td>
<td>(0.16 \ (0.15))</td>
<td>(0.26 \ (0.13))</td>
<td>(0.35 \ (0.33))</td>
</tr>
<tr>
<td>Follow up Test: Remember</td>
<td>(0.11 \ (0.11))</td>
<td>(0.14 \ (0.15))</td>
<td>(0.73 \ (0.35))</td>
</tr>
<tr>
<td>Know</td>
<td>(0.44 \ (0.16))</td>
<td>(0.28 \ (0.20))</td>
<td>(0.70 \ (0.21))</td>
</tr>
<tr>
<td>Familiar</td>
<td>(0.27 \ (0.18))</td>
<td>(0.32 \ (0.17))</td>
<td>(0.62 \ (0.27))</td>
</tr>
<tr>
<td>Guess</td>
<td>(0.18 \ (0.15))</td>
<td>(0.25 \ (0.17))</td>
<td>(0.53 \ (0.34))</td>
</tr>
</tbody>
</table>

Note. Chance = .33. Numbers in bold are significantly above chance, p < .05

An identical ANOVA was performed for the memory awareness accuracy data. There was a significant main effect of memory awareness category, \(F(3,111) = 13.56, p < .001\). Simple comparisons showed that remember and know responses were similarly high in accuracy, but both were significantly more accurate than familiar responses, \(p < .01\), and guess responses, \(p < .01\). Familiar responses were also more accurate than guess responses, \(p < .05\). There was no significant interaction.

**Short answer question.** The short answer question was scored using the SOLO Taxonomy (Biggs & Collis, 1982). The table below illustrates each level of the taxonomy. Where an answer was very close to the next level, the student was awarded half marks. For example, a student may have demonstrated knowledge of several relevant aspects of the topic and attempted to integrate most of them together. However, on the whole, the student's answer could not be classified as 'relational'. In such a case, the student would be awarded 3.5. Students' answers were scored according to above system by two independent raters. Inter-
rater reliability was 81%, and those responses on which the raters differed were discussed and a single rating was agreed upon by both raters.

For the short answer question, students in the episodic rich group performed better than students in the episodic poor group, $F(1,37) = 14.84, p < .001$ (Ms = 2.05 (.71) and 1.35 (.41), respectively). Students in the episodic rich group were more likely to score between the unistructural and multistructural levels, however students in the episodic poor group were more likely to score between the prestructural and unistructural levels. Students in the episodic group had knowledge of at least one relevant concept and possibly two or more relevant concepts, while the episodic poor group either had no relevant knowledge or only some knowledge of one relevant concept. These results are consistent with the memory awareness quantity data, where remember was the dominant response for students in the episodic rich group, and these students made more remember responses than students in the episodic poor group.

Table 4.
Classification of SOLO Levels.

<table>
<thead>
<tr>
<th>Score</th>
<th>SOLO Level</th>
<th>General Definition (Biggs &amp; Collis, 1989)</th>
<th>Definition in Present Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prestructural</td>
<td>incompetent learning outcome</td>
<td>no knowledge or incorrect knowledge of topic</td>
</tr>
<tr>
<td>2</td>
<td>Unistructural</td>
<td>one relevant aspect of material is known</td>
<td>task not addressed, or only knowledge of one relevant aspect</td>
</tr>
<tr>
<td>3</td>
<td>Multistructural</td>
<td>several relevant aspects of material are known</td>
<td>knowledge of several aspects relevant to the topic, but are not integrated</td>
</tr>
<tr>
<td>4</td>
<td>Relational</td>
<td>several aspects are known and integrated</td>
<td>knowledge of several aspects relevant to the topic, and is integrated in a meaningful way</td>
</tr>
<tr>
<td>5</td>
<td>Extended Abstract</td>
<td>relational outcome that is generalised to new domain</td>
<td>knowledge of several aspects is integrated with own applied examples</td>
</tr>
</tbody>
</table>

Follow up Test

Multi-choice test. Students in the episodic rich group performed better overall than students in the episodic poor group, $F(1,35) = 5.51, p < .05$ (Ms = 11.16 (2.48) and 9.22 (2.76),
respective). Identical analyses as for test one were performed for the memory awareness quantity and accuracy data. There was a significant interaction between instructional material and memory awareness category for the quantity data, F(3,105) = 2.94, p < .05. Simple effects analyses showed that students who had studied the episodic rich material made more know responses than those who had studied the episodic poor material, F(1,35) = 7.18, p < .01. Analyses of the accuracy data revealed a significant main effect of accuracy, F(3,105) = 4.27, p < .01, but no significant two-way interaction. Simple comparisons of the memory awareness categories showed that remember responses were more accurate than guess responses, p < .05, but there was no difference in accuracy of the remember, know and familiar responses.

**Short answer question.** Students in the episodic rich group performed better than students in the episodic poor group, F(1,35) = 3.57, p < .05 (Ms = 2.32 (.92) and 1.69 (.75), respectively). Students in the episodic rich group were more likely to score between the unistructural and multistructural levels, with a few students scoring between the multistructural and relational levels. This reflects knowledge of one, two or more relevant concepts with the few higher achieving students attempting to integrate this knowledge in a meaningful way. Conversely, students in the episodic poor group were more likely to score within the prestructural and unistructural levels, with a few students scoring between the unistructural and the multistructural levels. Students either had no knowledge of relevant concepts or knowledge of one relevant concept, with the few higher achieving students showing some knowledge of a second relevant concept. Again, these results are consistent with the memory awareness quantity results, where students in the episodic rich group made more correct know responses than students in the episodic poor group.

**Exploratory questions**

The data from this questionnaire was analysed in the following manner. A calculation was made for the number of students in each group who were able to correctly recall something about an example from the instructional material for either of the three open-ended questions. This data was entered into a 2 x 2 contingency chi-square with instructional material (episodic rich and episodic poor) and recall (recall and no recall) as the variables. There was a significant association between the type of instructional material that students studied and the students' ability to remember examples presented in the material, \( \chi^2 (1) = 6.79 \), p < .05. None of the students in the episodic poor group could recall something about one of the examples presented in the material, while 32% of students in the episodic rich group could recall something about one of the examples.

**Discussion**

Results were generally as hypothesized, with the instructional material studied by students effecting performance on both the first test and the follow up test. Those students who studied material with 'rich' examples made more remember responses on the first test and more know responses on the follow up test, than those students who studied the material with 'poor' examples. According to memory awareness theory (Conway et al, 1997; Tulving, 1985), this reflects the greater usage of episodic memory by students who were exposed to the rich episodic material during the earlier phase of learning. This difference in performance between the two groups is also reflected in their performance on the short answer question. Consistent with their greater amount of remember responses on the first test, students who studied the episodic rich material tended to perform within the unistructural SOLO level,
meaning that these students had knowledge of at least one of the relevant concepts. In contrast, the students in the episodic poor group tended to score within the prestructural level and therefore were less likely to show knowledge of even one relevant concept. On the follow up test, students in the episodic rich group had shifted to making more know responses than students in the episodic poor group and also scored higher SOLO levels. However, inconsistent with hypotheses, these students were still scoring within the unistructural level reflecting use of episodic memory rather than scoring above the multistructural level and use of semantic memory, which would be consistent with know being the dominant memory awareness category. It may be that, as the follow up test was conducted after a 5 week interval learning was still in progress and schematisation had not yet fully developed for the majority of students. However, regardless of this, students who studied the episodic rich material still performed better than the students who studied the episodic poor material on both the MCQ’s and short answer question.

Study two: Students' personal lecture experiences

It appears then, that students may remember examples presented in lectures and these memories then aid in creating a conceptual understanding of the material to be learned. However, while the above findings provide some evidence that students do actually remember examples encountered during learning, as in the exploratory questionnaire, it was considered important to examine this further. Moreover, to investigate what students actually remember from lectures, it seemed appropriate to examine this in terms of students' own 'first person' accounts of their learning experiences. Previous research investigating student learning experiences has tended to adopt a qualitative method of study such as the phenomenographical approach which utilizes personal or group interviews (e.g., Marton, Hounsell & Entwistle, 1997).

Method

Participants

A total of 48 university students participated in this study in conjunction with a research participation program included in first year psychology courses. There were 30 female and 18 male students, with an average age of 21 years. Approximately 40% of students were enrolled in social science courses (e.g., arts, education, social work), 38% were enrolled in science courses (e.g., science, health science, human movement studies), with the remaining students from either engineering, commerce or law. All students had completed at least one complete year of university study. Interviews were conducted in groups of approximately 6 students.

Materials and procedure

As part of a larger study, several questions were developed for student discussion, including learning from lectures, motivation and study strategies. Students spent a small amount of time 'brainstorming' each question individually on paper before discussion occurred with the group. This activity was designed to help group discussion flow more freely as students would most likely feel more confident if they had had time to think about each issue before having to participate. Interviews were tape-recorded and transcribed. Analysis of interview
data was conducted in the following way. After a complete list of student experiences was constructed for each question from the brainstorming papers and interview transcripts, any experiences which 'fitted' together conceptually were then identified within main themes for each topic. A 'cut and paste' technique was then applied to a copy of the data, in which extracts of the student notes or transcripts that belonged to each theme were collated so an overall description of the data could be more easily completed.

Results & Discussion

While student discussions included a number of issues during interviews, only that which is relevant to the present paper will be presented; what students remember from lectures. The things that students were most likely to remember from a lecture could be grouped according to whether they were relevant to life or work, unusual or interesting, in a different mode of presentation or as a result of interpersonal interactions. In some cases, where discussion was related to other sections of the interview not presented here, results of these sections were briefly referred to.

Relevance

From students' discussion in interviews regarding what motivates them to continue studying, it was evident that being presented with relevant and/or interesting material is a major motivating force. So, it is no surprise that relevant material is also one of main things that students remember from lectures. If students perceive relevant material to be important in their studies, and find it difficult to maintain motivation when they are not provided with such material, it is most likely that they will pay close attention to it. For example:

...examples like case studies more than just other information. Things I can relate to myself, heard of before. Like in psychology this week we're learning about the DSMIV and like with obsessive compulsive disorder I think about some of my friends! (2nd year female Arts student, 25 years).

...things that apply in everyday life that I can just put an image to. General content usually requires further study to sink in (3rd year male Business student, 21 years).

...interesting facts, especially if they relate to you, like your age group, gender, friends, home, family (2nd year female Arts/Education student, 19 years).

Unusual or interesting material

This factor also links in with the student responses regarding motivations for studying. However, experiencing interesting material during their course is not only an important
aspect in maintaining motivation and the type of material that students are likely to pay
attention to and remember. Some students have also found that incorporating funny or
unusual material in a lecture helps them to remember other information as well. For
example:

...like in PY103 statistics, he puts up cartoons all the time. It's really good
because you're thinking, if he says 'null hypothesis' one more time I'll go
mental! and then he puts up a cartoon or something and it takes you're mind
off the boredom and you do actually remember it...it brings back you're
concentration and even if it's not relevant you're still more likely to remember
what comes after it (3rd year female Human Movement Studies student, 20
years).

...you know the lecturer who just studies the brain, which is really boring, but
his lectures are really interesting, with the case studies he uses (2nd year
female Arts student, 25 years).

...things that are remarkable, like hearing that over 30% of people have cysts
in their brain due to parasites, or things that are useful to everyday life like the
"chunking" of information (2nd year male Science student, 19 years).

If the lecturer uses a clear example, makes something interesting, tells a
story... (3rd year female Engineering student, 19 years).

Personal interactions

In some ways personal interactions may be a part of the above concepts of relevant,
interesting or unusual material. Interactions between students themselves or between the
lecturer and students are probably interesting and may also be relevant, particularly in terms
of being able to relate to the student participating in the interaction. However, it is the
personal nature of the interaction that makes it different from the types of relevant or
interesting material discussed above. In the age of technology and 'flexible delivery', it is
worth noting that students still see personal interactions as important in their studies. For
example:

When you come out with your friends and actually talk about something from
the lecture. If you have learnt something new and have formed an opinion on
it....I'm doing a political ideology subject for government and I think if you can
come out of that lecture arguing with the guy next to you over an ideology
then I think we've both learnt something about it and I'm more likely to
remember if than it I’d come out after just taking down lecture notes for an hour or two! (2nd year male Business/Arts student, 19 years).

...like in ED103, in our first lecture the lecturer took photos of everyone so she could know all our names and like that was intimidating at first but now she can just ask us by name to contribute something...and you remember those bits (2nd year female Arts student, 19 years).

...sometimes when they make you, like discuss within small groups in the lecture, and if they pose questions and say like 'discuss with your neighbour'...you tend to remember that (3rd year female Social Science student, 20 years).

...when the lecturer involves the students, like getting students to offer ideas...like in the first Journalism lecture I had, the lecturer asked us to write down what we think journalism is, and this one student said it's 'the contemporary recording of history', and I've never forgotten it (2nd year female Arts student, 23 years).

Different modes of presentation

It is a well established finding in the cognitive and educational psychology literature that changing stimulus gains students attention (Gage & Berliner, 1988), particularly when such changes serve as cues for information that is important for the student to remember (Glynn & DiVesta, 1979). Moreover, for many students, visual material may in fact be more memorable than hearing the lecturer explain the material verbally. For example:

...good overheads and visual items like videos (3rd year female Business student, 31 years).

If there's...like a flow chart representing the order of the lecture...graphs and pictures...I usually remember them (2nd year female Science student, 18 years).

...videos illustrating a concept in real life...I like to remember those (2nd year female Arts student, 19 years).
The findings reported in study one suggest that students are more likely to perform well and achieve a higher quality of learning if they initially 'remember' more, but then 'know' more further on in the learning process. Moreover, 'remember' and 'know' awareness are effected by the material studied by the students. Material 'rich' in episodic cues is more likely to increase both types of awareness, through first increasing remember awareness which in turn, increases know awareness. It is also obvious from the above interview results, that students do remember things from a lecture. However, these things are not likely to be simply the basic content, but the illustrations of this content which are experienced by the students. As one student said, "...general content usually requires further study to sink in...". Moreover, the illustrations presented to students are more likely to be retained in memory and used to aid learning if they are occupationally or personally relevant, interesting or unusual, or involve personal interactions with students or lecturers.

So, how do we facilitate the shift from experiencing 'remember' awareness most often, to experiencing 'know' awareness most often? In terms of the above two studies, one can argue that to provide the best environment for learning involves presenting information that includes illustrations of concepts that are rich in episodic cues, relevant, unusual or interactive. Not only are students more likely to pay attention in lectures or tutorials, and hence remember information, but they are also more likely to actively engage with the material and enjoy the learning process. As a result, students are more likely to then 'know' the material and schematise their knowledge of the domain, which aids in the long-term retention and understanding of the information. As Hodgson (1997) notes, teachers can inspire interest and encourage learning through students' 'vicarious experience of relevance'. This vicarious experience of relevance can occur as a result of the lecturer's enthusiasm for their work or personal experiences, or a vivid example illustrating a concept. Furthermore, this experience can aid in bridging the gap between having extrinsic interest and a surface approach to learning, and intrinsic interest and having a deep approach to learning. Surely, this is the outcome that both educators and students would like to occur.
References


Scottish Academic Press.


