Creating a Memorable Lecture and Facilitating Comprehension

Arash Shahi¹, Mahdi Safa², Brenda McCabe³, Majeed Safa⁴, Seokyon Hwang⁵, Steven W. McCrary⁶

Abstract

All instructors hope that students will learn and remember what they teach in the classroom years after the lectures are over, an optimism challenged by staggering statistics showing that students only retain 10-20% of their lecture material even three weeks after the lectures. Despite many discouraging and demotivating statistics with respect to lecture material retention rates by students, we all have experienced at least one instructor whose inspiring lectures have had a long lasting and transformative effect on us. In this paper, the authors aim to inspire recognition in our role, as educators, to design effective lectures which promote optimal memory recall and learning. A number of specific strategies to promote long-term retention of knowledge are presented, including rehearsal and graphic representation of material, including the graphic syllabus.

Key words: Memorable Lecture; Teaching Techniques; Graphic Representation; Graphic Syllabus; Information Retention

Introduction

There is a great deal of research on memory and cognition and as educators it seems appropriate to be aware of what assists individuals with memory and recall. This also includes higher levels of conceptual understanding because fundamental knowledge needs to be accessible in order to use the information for levels such as analysis and synthesis.

One way to categorize memory is short-term versus long-term memory. Essentially you can think of your short term memory as a “supped-up” white board in your mind. We all know what a white board is, but imagine a “supped-up” windshield wiper attachment on the bottom of the white board. All incoming information is put on your short-term memory white board (so to speak), however, this information is not creating neural mechanisms in your brain for later recall. Just imagine that every 2-30 seconds (depending on the situation, while the average is 18 seconds), the wiper will clear the information in your short-term memory!

The only way in which you’ll have this information for later recall is if this information is “filed” in your long term memory. So picture yourself with a clipboard, actively selecting what information is important and/or meaningful for you to write down and file into the filing cabinet. There are many available tools for moving the content from the whiteboard to the filing cabinets, including the use of mnemonic, novelties, chunking, rehearsal, elaboration, and graphic representation. In this paper we’ll present the latter three techniques as examples on how to make

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¹ Postdoctoral Fellow, University of Toronto, Toronto, Canada, M5S1A4, arash.shahi@utoronto.ca.
² Assistant Professor, Lamar University, Beaumont, TX, 77710. msa@lamar.edu.
³ Professor, Civil Engineering, University of Toronto, Toronto, Canada, M5S1A4. mcabeb@evo.utoronto.ca.
⁴ Senior Lecturer, Lincoln University, Christchurch, New Zealand, 7647. Majeed.Safa@lincoln.ac.nz.
⁵ Associate Professor Lamar University, Beaumont, TX, 77710. seokyon.hwang@lamar.edu.
⁶ Associate Professor Lamar University, Beaumont, TX, 77710. steven.mccray@lamar.edu.
your lectures more memorable. The reason that we have focused on these techniques, is that as described later in this paper, they are also very effective learning strategies that could be integrated into the classroom.

Rehearsal vs. Elaboration Techniques

Imagine that your spouse phones and asks if you can pick up 5 things from the grocery store on the way home. When you get off the phone, you simply review the list the way in which it was said to you over the phone “milk, carrots, bread, oranges, eggs”. This is called rehearsal or simply maintenance. Elaborative processing or elaborative rehearsal takes the form of attention to meaning. This attention to meaning is called deep processing. Many studies have shown that deep processing leads to good memory performance later on even without the intention of memorizing the target material. The intention to learn had no direct effect on performance; what matters instead is how someone engages or thinks about the material to be remembered.

So returning to the grocery list, some people may prefer to categorize the food in terms of meals. For example they may view milk, bread, eggs and oranges as breakfast food, some people may think more in colors with 3 white foods (milk, bread, eggs) 2 orange foods (carrots and oranges), or others may think of what those foods are used at what meals (think of breakfast tomorrow and packing lunch for your son tomorrow). In any case, changing the grocery list to have meaning is called elaborative rehearsal and allows for deep processing and long-term memory recall. This is only one of the techniques that has been identified for transferring information to the long-term memory. (Readers are highly encouraged to investigate the other identified methods in order to deliver a more memorable lecture, including using the graphic representations as explained in the rest of this paper.)

Graphic Representation

Over the last decade, there has been a clear trend towards conveying information in graphical forms and decreasing communication in text, mainly due to the emergence of the younger generations being raised on video games, movies, and television (Fischman, 2001; Vekiri, 2002). Even researchers have put stronger emphasize on presenting their work in a number of graphical formats, including workflows (Shahi et al. 2015).

One of the important strategies in lecture design that utilizes the science of memory is “Picture Superiority Effect”, which indicates that concepts expressed in pictures will generally be remembered much better than concepts expressed with words (Plotnick ,2001; Fenker et al. 2008); Stenberg 2006). The reason behind this is based in evolutionary biology. Homo sapiens (or modern humans) have existed for approximately 200,000 years, while there is fossil evidence of Homo sapiens dating back to 2 million years ago. As language was developed, communication was achieved orally and through drawings or pictograms. On the other hand, while there are a variety of estimates out there, the written word has existed for less than 10,000 years, and perhaps only as little as 6,000 years. This means that through most of the hundreds of thousands of years of human evolution, and more specifically human brain evolution, we were hardwired to assimilate visual information from pictures, much more readily than from written language.

Most instructors have been taking advantage of the use of graphics in their teaching, most likely without understanding the evolutionary reasons behind its success. In this paper, however, a
specific use of graphic representation, the graphic syllabus, is investigated with the objective to complement the traditional use of course syllabi.

Growing Challenges of Text-based Syllabi

Over the last decade, the course syllabus has grown from a compact one or two pager of schedule of course topics and course objectives, to a five to ten page laundry list of information (Nilson 2007). While some instructors and institutions feel the need for providing a large amount of rather repetitive and text-heavy information on the syllabus, the main purpose of the syllabus has always been to provide organization and schedule of topics for the course and a list of learning objectives.

A previous poll by one of the authors at University of Waterloo was conducted on approximately 550 undergraduate engineering students and showed that only 16% of students read the course syllabus, while 40% ‘briefly review it’, and the rest only refer to it for deadlines throughout the course.

Something that most instructors may not realize is that even if students were to read their syllabus, they would not be able to make much sense out of it. Even though the topics are clearly and logically ordered in the instructor’s mind, since students have no prior knowledge of the topics and their interdependencies, they may comprehend the syllabus similar to what is presented in Table 1. Of course, there is some exaggeration in play in this figure, but it attempts to show the great miscommunication that could take place through a text-based syllabus.

Table 1: A course syllabus from students’ perspective

| Week 1: Overview of Something I Gotta Take |
| Week 2: The Composition of Apple Peel      |
| Week 3: Introduction to Giraffe Consciousness |
| Week 4: Cooking with Sugar and Eggs       |
| Week 5: Sugar and Eggs Continued: Challenges and Solutions |
| Week 6: Advanced Giraffe Consciousness and Introduction to Pineapples |

There may be more than one solution to solve this miscommunication between the instructors and students, but surveys of undergraduate students show that using more text is certainly not one of those solutions. In the next section, the authors describe the Graphic Syllabus, which could be used to significantly improve the impact of the traditional syllabi.

Graphic Syllabus

Nilson (2007) defines a graphic syllabus as “a flowchart or diagram that displays the sequencing and organization of major course topics through the semester. It uses spatial arrangement, connecting lines, arrows, and sometime numbers to show the logical, temporal progression of the course through topics within the subject matter. In addition, it may, but need not, use icons, pictures, and visual metaphors to convey the meaning of words, concepts, and relationships.”
Others have defined a graphic syllabus simply as a graphic representation of the course syllabus or that of the course content. While Nilson’s definition is certainly a more comprehensive definition, what everyone agrees on is that the graphic syllabus intends to replace words with figures and diagrams and therefore provide an understandable structure for the course content, acknowledging students’ lack of a-priori information on the course.

A sequence or chronology is one of the simplest forms of designing a graphic syllabus. Chronology can be defined as a succession of events based on logic or time. Courses that are best suited to this type of graphic syllabus are history courses or training courses. In a Culinary techniques course, Dr. Aubrey Coffee organizes her course as a logical sequence of topics and skills that student have to master, as shown in Figure 1.

![Culinary Techniques Course](image)

Figure 1: Culinary Techniques Course
As described in Figure 1, after teaching some history and introduction to the role of the professional chef, the instructor spends weeks 1 to 4 on topics that may seem unrelated to a student who doesn’t have this graphic syllabus. However, as shown in this figure, these are all related topics and are pre-requisites for learning the “course menu” lessons.

A graphic metaphor is another type of graphic syllabus that has an overall design or layout based on an object or set of objects. The object need not be related to the subject matter of the course, but the metaphor is particularly memorable when it is (Brinkmann, 2003). A metaphor adds value by providing a single symbol of the course structure that facilitates and strengthens students’ retention of the course material. The graphic metaphors are not a new concept, but using them as the graphic syllabus of the course has shown to receive very positive feedback from the students (Biktimirov and Nilson, 2003). Figure 2, shows Heynood (1986)’s model for an approach for technology education in Ireland. Each of the topics on the legs could represent one module within the course. In these metaphors, the contents of those three legs are based on a set of values and support the society as a whole. Other metaphors that could be used as a course syllabus include a factory, a tree, a building, etc.

![Figure 2: Graphic Metaphor as a Course Syllabus](image)

**Conclusions**

In this paper, the authors provide a number of techniques that could be used in the classroom in order to make a lecture and essentially a course more memorable for students. These methods are aimed at increasing the long-term recall of information by students and at increasing the comprehension of the course material, from a structural perspective. The more structure that is provided to the course content, the higher information retention rates that students tend to
exhibit. This paper covers creative and simple tools, such as the elaboration technique which could be used to enhance students’ information recall rates to a more comprehensive method of presenting the structure of a course in a graphic syllabus. While there are numerous other methods available to make a lecture and a course more memorable for students, this paper aims to show the potential that is available for instructors and motivate them to investigate this topic and choose what works best for their classroom.

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