



Presentations with an explicit outline are recalled better than ones without: A randomized controlled trial

Alexis Puhon, Khalid S. Khan & Johann Steurer

To cite this article: Alexis Puhon, Khalid S. Khan & Johann Steurer (2010) Presentations with an explicit outline are recalled better than ones without: A randomized controlled trial, Medical Teacher, 32:7, e289-e293, DOI: [10.3109/0142159X.2010.489127](https://doi.org/10.3109/0142159X.2010.489127)

To link to this article: <https://doi.org/10.3109/0142159X.2010.489127>



Published online: 23 Jul 2010.



Submit your article to this journal [↗](#)



Article views: 600



View related articles [↗](#)



Citing articles: 1 View citing articles [↗](#)

WEB PAPER

Presentations with an explicit outline are recalled better than ones without: A randomized controlled trial

ALEXIS PUHAN¹, KHALID S. KHAN² & JOHANN STEURER³¹skilbuild inc., CH 6061 Sarnen, Switzerland, ²University of Birmingham, B15 2TG, UK, ³Horten Centre for Patient oriented Research and Knowledge Transfer, University of Zurich, Postfach Nord, CH 8091 Zurich, Switzerland

Abstract

Background: Lectures or presentations are frequently used for teaching large groups.**Aim:** We investigated if a structured presentation with an explicit outline enables better recall of the content immediately and 2 weeks after the event, compared to a presentation without an explicit outline.**Methods:** Twenty-seven medical students were randomized to receive a presentation with (experimental) and without (control) an outline. The experimental presentation initially delivered the key message with an outline made of four headline statements, followed by facts and examples and ended with repetition of the key message and headline statements. The control presentation delivered all the same facts and examples sequentially, concluding with the key message. Recall immediately and 2 weeks after the presentation was rated by two blinded assessors.**Results:** Immediately after the presentation, the mean scores were similar in the two groups (9.8, SD 2.6 vs. 9.0, SD 2.1). After 2 weeks, the experimental group achieved a higher mean score than control (7.0, SD 2.1 vs. 5.2, SD 1.9; $p=0.02$).**Conclusion:** A presentation with a structured outline enables the audience to recall the content better than that without an outline, a fortnight after presentation.

Introduction

Lectures are the main method of large group teaching. During the past decades, lecturing has come under criticism as an ineffective educational technique and has partly been replaced by interactive, often small group and problem-based educational methods (Gunderman 2004; Sutherland & Badger 2004; Di Leonardi 2007). However, lectures remain in widespread use for presentations to large audiences (Harter et al. 2009). There is a need to evaluate how their effectiveness can be improved.

Lecture effectiveness has been linked to content coverage and enjoyment of the presentation (Ware & Williams 1975). The structure of the content presented may also have an impact on the learning achievement by the audience. It may help deal with a common criticism of lectures that audiences often cannot recall the material presented (Bennett 1978; Findley & Antczak 1985). A presentation can be delivered in two basic ways (Minto 2002). The contents including facts and examples may be provided in building the lecture towards the main message delivered at the end, without an outline of the presentation. Alternatively, the main message may be delivered first, along with an outline of the content to follow. The content within each of the headline statements in the outline may then be presented relaying the associated facts and examples. The latter approach is frequently recommended by

Practice points

- In many medical schools, lectures are the main method of large group teaching.
- Lecturing has been criticized as an ineffective educational technique and efforts should be undertaken to increase the effectiveness of this widely used teaching method.
- Students who attend a presentation with an explicit outline remember significantly more compared to those who attend a presentation without outline 2 weeks after the presentation.

educationalists (Biggs 1987; Nilson 1998). Theoretically, as this method combines hierarchical structure and repetition, it may be expected to be sounder. However, a systematic review of lecture effectiveness showed that its superiority in knowledge transfer has not been evaluated in empirical randomized studies.

We conducted a study to test the hypothesis that presentations with the key message, the outline and the content of facts and examples within each headline statement of the outline, when presented in this sequence, lead to better short- and medium-term knowledge gain compared to deliver of equivalent content without the outline structure.

Correspondence: J. Steurer, Horten Centre for patient oriented research and knowledge transfer, University Hospital, Raemistrasse 100, CH 8091 Zürich. Tel: 41 44 2553198; fax: 41 44 2559720; email: johann.steurer@usz.ch

Methods

The study was protocol driven. Swiss regulations did not require approval by an ethical committee for this study.

Preparation of the presentations

We prepared two 15 min presentations covering the topic ‘milk is an important source of calcium for human beings’. In order to avoid a pre-study knowledge bias, we choose a topic not being explicitly covered in the curriculum of the participants who were third- and fourth-year medical students. We asked the former professor for dairy science at the ‘Institute for dairy science’ at the Federal Institute of Technology in Zurich to prepare and deliver the two 15 min presentations. The two presentations had identical content but one was structured with an explicit outline (experimental group) and the other was with this outline (control group) (Table 1).

In the experimental group the presentation started with the key message and the outline with four headline statements.

Then the presenter presented the students the facts, enriched with examples, supporting and illustrating each of the headline statements in sequence. At the end of the presentation, he repeated the key message and the four headline statements again. The control group presentation covering exactly the same content delivered all the same facts and examples in a sequential order and concluded with the key message, without reference to an outline with headline statements. The two presentations delivered by the same person were videotaped. The videos were presented to participants in separate rooms simultaneously.

Participants

For this study, we planned to recruit 30 students. We invited third- and fourth-year medical students from the University of Zurich for participation. The association of local medical students sent a mail to all the eligible students informing them about the study. The announcement only included that they

Table 1. Key message, headline statements and facts, respectively, examples supporting the headline statements.

Key message	Facts, examples
Milk is an important source of calcium for the human body	Calcium is important for bone structure. The daily recommended intake ranges 1–1.2 g per day.
Headline statements	We store calcium in our bones until age 20. Peak bone mass remains stable for the following 20 years We start losing bone mass slowly but steadily at about age 40. The loss of bone mass depends on gender differences. The years after menopause most women experience rapid bone mass loss due to hormonal factors. Therefore more calcium should be ingested than excreted – mainly by nutrition and marginally by water. Ca in milk is inherently well suited for delivering the required substances for bone building to babies.
HS 1; The human body requires a daily intake of 1–1.2 g Ca from nutrition	One litre of milk contains 1.2 g protein-bound calcium. Casein is the major milk protein and it occurs as micelle. Micelles contain calcium and phosphate in their structure, are stable, and are responsible for the white colour of milk. Milk (400 mL) provides 40%–50% of the daily-recommended intake of calcium. In terms of energy, milk is the nutrition with the highest calcium density. All dairy products have a high availability of calcium, which can be used in your body. This particularly applies to dairy products with a high protein content like cheese. The demand for calcium can also be covered with calcium supplements like pills, but then valuable milk proteins are missing.
HS 2; Milk is one of the most effective calcium sources in nutrition since it has the highest calcium density in terms of energy	Inadequate bone density can result in osteoporosis. Thus, it is important to ingest sufficient calcium from food at any age. Osteoporosis is an imbalance between bone formation and resorption. Bone fragility increases with age because many (elderly) people are affected by osteoporosis. A well-balanced nutrition and sufficient ingestion of calcium and vitamin D ₃ is necessary to prevent osteoporosis at any age. In terms of energy, milk contains both, Calcium and vitamin D ₃ in high concentration. Therefore, milk and other dairy products are particularly valuable food.
HS 3; Milk plays an important role to prevent from the consequences of insufficient calcium absorption through nutrition	Milk intolerance can lead to reduced consumption of dairy products. It is important to distinguish lactose intolerance from milk protein allergy. Lactose intolerance, which is very rare in Northern Europe, is the inability to metabolize lactose, because the required enzyme lactase is absent in the intestinal system or its availability is lowered. Milk protein allergy is very rare and means basically the intolerance to whey proteins and in some cases the allergic reaction to casein. Milk and dairy products are often state-subsidized because of different production costs worldwide. New Zealand is one of the few countries where neither milk nor meat production are supported by the state. Production costs are relatively low because of favourable climatic conditions.
HS 4; Most people are able to consume milk and dairy products because intolerances are quite rare and dairy products are available at affordable prices	

had to follow a 15 min video presentation and to fill out a test immediately after the presentation and 2 weeks later. The 2-week interval has been selected because we suspected that the attendance rate would decline if the second test would be 2 or more months after the first one. We sought oral consent from the participants for anonymized analysis of their responses to the questionnaires used in this study.

Students were stratified by years of medical school attended and gender, and randomized them into two groups according to a randomly generated list. Before showing the video in a separate room for each group simultaneously, we asked them to follow the presentation attentively without taking notes.

Assessment and scoring

After the video performance, we informed both the groups with exactly the same wording about general structural aspects of an oral presentation. 'Each presentation contains at least one key message, headline statements supporting the main message and further facts and examples endorsing and exemplifying the headline statements'. Then we asked them to fill out a test form. The test form included one box for the key message on one page and six further pages with a box for one of the headline statements and six boxes for writing down endorsing facts and exemplifying examples. The students were informed

that the number of boxes for headline statements, facts and examples have not to be identical to the number given in the presentation. The study participants were asked to recall as many elements from the oral presentation and to fill it into the form. All the 27 participants filled the test form immediately after the presentation and 25 also did so 2 weeks later (Figure 1). For both the tests, the students had a time period of 20 min.

Two experienced persons in scoring examinations assessed each test form independently. They were neither informed about the objective nor the design of the study. They obtained a copy of the written outline of the two versions of the presentation, copies of the 52 original test forms, a sample assessment and exactly defined assessment criteria. They were informed that the participants followed a video presentation and took two tests. They were not aware that two different videos had been prepared and that two groups of participants had seen different versions.

The maximum achievable score was 22 points. For each correctly cited word from the key message (milk, important, source of calcium and human), 1 point was awarded. For a correct retelling of the meaning of the key message, 2 further points could be obtained. A maximum score of 16 points was possible for listing supporting facts and/or examples, four points for a complete list of facts and/or examples supporting

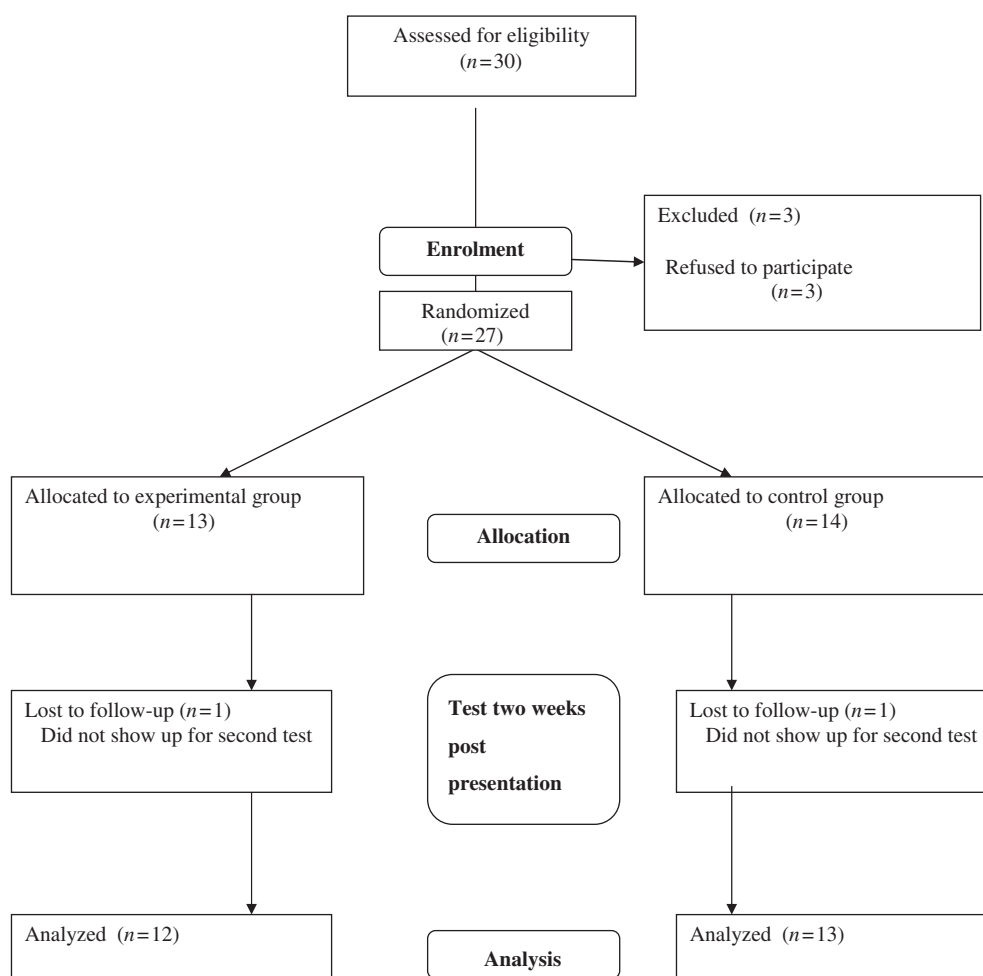


Figure 1. Flowchart.

each of the four headline statements. The two evaluators assessed the test results independently. For further analysis, the mean of the scores given by the two assessors was used.

Analysis

The degree of agreement between the two assessors was calculated with the intraclass correlation coefficient. The scores for each group were added separately for the two tests and the corresponding means and standard deviations (SDs) were calculated. The means for the two groups (experimental or control) at the second examination were compared with a linear regression model, adjusted for the test results immediately after the presentation.

Results

A total of 30 students originally subscribed to participate. As shown in Figure 1, 27 showed up and completed the test immediately after the presentation. Of the students, 25 students participated at the second test 2 weeks later. A total of 16 participants were female, 13 of the participants were fourth year and 14 third-year students. Of those who participated, 13 students (8 female and 7 fourth-year students) were randomized to the experimental group and 14 participants (7 female and 6 fourth-year students) to the control group. The mean age of students was 23 years.

The intraclass correlation coefficient between the two test assessors was 0.85. Participants in the experimental group achieved a mean score of 9.8 (SD 2.6) points immediately after the presentation. Their score declined to 7.0 (SD 2.1) points after 2 weeks. Those in the control group scored 9.0 (SD 2.1) points in the first test and 5.2 (SD 1.9) in the second. Participants of the experimental group achieved significantly higher scores in the test 2 weeks after the presentation ($p=0.02$), but not immediately after the presentation (Figure 2). The participants in both groups remembered the same amount of evidentiary details (facts and examples) immediately after the presentation. However, the experimental group participants reproduced the key message more precisely than the members of the control group. Contrasting with test one the control group remembered less of the facts and examples compared to the experimental group.

Discussion

Students who attended the presentation with an explicit outline remembered significantly more compared to those who attended the presentation without outline 2 weeks after the presentation. Participants at the latter presentation forgot more of the facts and examples endorsing the key message.

The strength of our study is that it is to our knowledge the first randomized study investigating the effect of structuring a presentation on memorization of the delivered content. A limitation of our study may be that we measured memorization only. However, memorization is a precondition for understanding and applying knowledge. A further limitation is the relatively small number of participants, but the statistically significant result excludes the possibility of observing a

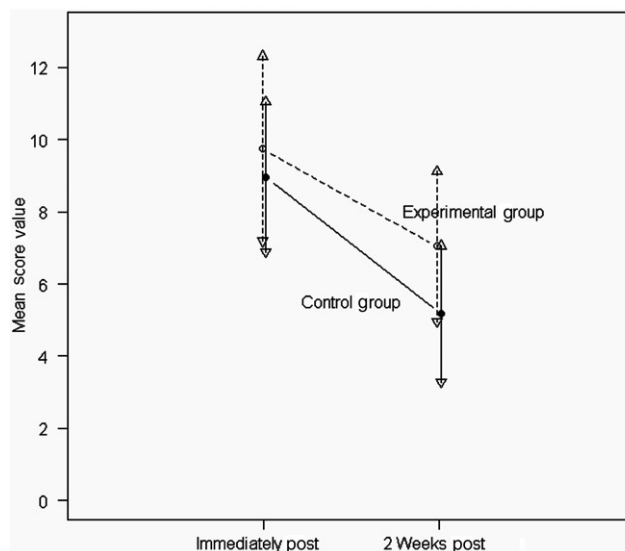


Figure 2. Scores for memorization (maximum 22 points) immediately after presentation and 2 weeks later.

Notes: Results are depicted as means and SD (control group ● and experimental group ○).

difference by chance. A further limitation may be that participants were not allowed to take notes during the presentation. Thereby, we wanted to control for the differences in skills of notetaking between participants, which could influence the rate of memorization (Kiewra et al. 1991).

The favourable effects may be attributed to the two key elements distinguishing the experimental from the control approach. The first element is to provide the audience with a framework of the presentation including the main message and the supporting headline statements at the start of the presentation (Brown & Manogue 2001). This allows audience an opportunity to activate prior knowledge, and to develop a semantic network linking concepts and facts (Foster & Jellic 1999; Brown & Craik 2000; Medin et al. 2004). The second element is the repetition of the key message at the end of the presentation. This is a memory enhancing educational technique. These theories are tested and proven empirically in our randomized trial.

In further studies, we will investigate the effects of the structure of a presentation on what students memorize after 2 and 4 months and on higher cognitive levels, i.e. understanding concepts and the ability to apply what has been taught in the lecture. Next to the structure of the presentation 'visualization' of the content may support memorization and understanding. In the last two decades, in our experience, visualization, as a result of technological developments, has increased enormously. Future studies should evaluate the effect of visual aids in facilitating memorization and understanding of the listeners of presentations.

Theories of memory and our findings should encourage lecturers and presenters to structure their presentation with an explicit outline. All facts and examples of a presentation should relate to this and the headline statement. Such presentations are likely to enable audiences to better remember the content presented. Our findings verify the truth in the

age old teaching adage ‘Tell your audience what you will teach them, than teach them and at the end of the presentation tell them what you have taught them’.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Notes on contributors

ALEXIS PUHAN, MD, INSEAD diploma in organizational psychology, founder of skillbuild Inc., a training and coaching boutique specializing in communications and leadership development, Zurich.

KHALID S. KHAN, MD, is the professor of Obstetrics-Gynaecology and Clinical Epidemiology, director WHO Collaborating Centre for Research Synthesis in Reproductive Health, Birmingham, UK.

JOHANN STEURER, MD, MME, is the director of the Horten Centre for patient oriented research and knowledge transfer, Medical Faculty, University of Zurich.

References

- Bennett M. 1978. How do students learn in lectures? *Med J Aust* 1:80–81.
- Biggs J. 1987. *Student approaches to learning and studying*. Melbourne: Australian Council for Educational Research.
- Brown SC, Craik FIM. 2000. *Encoding and retrieval of information*. New York: Oxford University Press.
- Brown G, Manogue M. 2001. AMEE medical education guide no. 22: Refreshing lecturing: A guide for lecturers. *Med Teach* 23:231–244.
- Di Leonardi BC. 2007. Tips for facilitating learning: The lecture deserves some respect. *J Contin Educ Nurs* 38:154–161, quiz 162–163, 175.
- Findley LJ, Antczak FJ. 1985. How to prepare and present a lecture. *JAMA* 253:246.
- Foster JK, Jelicic M, editors. 1999. *Memory: Systems, process, or function?*. New York: Oxford University Press.
- Gunderman RB. 2004. Resuscitating the lecture. *J Am Coll Radiol* 7:516–518.
- Harter C, Schallberg D, Möltner A, Kadmon M. 2009. Frontalunterricht oder interaktiver Gruppenarbeit? Ein Vergleich des Lernerfolgs und der studentischen evaluation für das Fach Biochemie. *GMS Z Med Ausbild* 26:Doc23.
- Kiewra KA, Dubois NF, Christian D, Mcshane A, Meyerhoffer M, Roskelly D. 1991. Note-taking functions and techniques. *J Educ Psychol* 83:240–245.
- Medin D, Ross BH, Markmann AB. 2004. *Cognitive psychology*. 4th ed. New York: John Wiley.
- Minto B. 2002. *The minto pyramid principle: Logic in writing, thinking and problem solving*. London: Minto Books International, Inc.
- Nilson LB. 1998. *Making the lecture a learning experience. Teaching at its best. A research-based resource for college instructors*. Bolton, MA: Anker Publishing Company, Inc.
- Sutherland P, Badger R. 2004. Lecturers’ perceptions of lectures. *J Higher Educ* 28:277–289.
- Ware JE Jr, Williams RG. 1975. The Dr Fox effect: A study of lecturer effectiveness and ratings of instruction. *J Med Educ* 50:149–156.