Effectiveness of skeleton handouts during ophthalmology theory lectures for undergraduate medical students

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Abstract

Background: Although lecture handouts are commonly given to students during theory lectures, students’ perception, as well as their performance, can vary depending on the type of handouts they receive for information processing. Methodology: This is a quasi-experimental study involving 6th semester medical students. The study was conducted during theory lectures on ophthalmology. The two types of notes given to the students were comprehensive handout and a skeleton handout, which included some lecture notes but required substantial annotation by the students. Pre-test and post-test in the form of multiple choice questions were conducted before and after the lecture session, respectively. Results: There was a significant difference of mean score of pre- and post-test between skeletal handout (pre = 1.85 ± 1.275, post = 4.85 ± 0.363) and full handout (pre = 1.92 ± 1.09 post = 2.61 ± 0.771) with P < 0.001. However, the students’ responses to questionnaires indicated a strong preference for much detailed handouts as essential to preparation for examinations. Conclusion: The student can improve their performance during examination while working on skeletal handouts during theory lectures in spite of showing a preference for complete handouts.

Key words: Handout, interactive, lecture, medical student, skeleton

Introduction

Traditionally, students learned in the classroom through interaction with the teachers, which required his physical presence and confidence in asking questions to clear his doubts. Many students may not take part in the discussion openly due to peer pressure and fear of asking a question that may appear silly and unimportant. If the absorbing capacity of the student differs from the normal, he may find it difficult to follow the lectures, which are usually done quite fast within the time frame allotted for that particular lecture and the teacher has to disseminate the information in a cramped style. The use of various aids like transparencies or PowerPoint slides has not really helped in learning as they do not stimulate the processing of information delivered by the student. During contemporary medical education, the lecture handouts were widely used as instructional tools. The handouts can make the lectures “portable and enduring” and might enhance the recall of information leading to improved test performance. Note-taking by students is generally seen as an integral and essential part of the process of learning from lectures. Few studies have reported that the lecture handouts could improve understanding of the topic and students’ test performance.

To further add on, many lecturers are now routinely publishing lecture handouts on the web for students to access. This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

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method of dissemination of information may provide many advantages over conventional paper-based distribution as it provides links to other online materials. The technological advancement has made all the other methods redundant in the sense that students can learn at their own pace, contact the lecturer anytime, they want to post him questions and get an answer, explanation or clarification from the lecturer. At the same time, the learning process is made easier by providing the students all the information in presentation slides.

Handouts could be a valuable aid to guide the students to study in an organized way and is easy for them to cope with their exam stress. Writing in the blank spaces in handout during a lecture allows the students to be alert and active, and they learn by writing.

The present study was undertaken to find out the efficacy of the skeleton handouts against full lecture handout during ophthalmology theory lectures.

Methodology

This was a pre- and post-test based experimental study involving $6^{th}$ semester medical students ($n = 108$). In our syllabus, the ophthalmology theory lectures are covered during the $6^{th}$ semester of medical training while the clinical posting in Ophthalmology takes place during the $7^{th}$ and $8^{th}$ semester. The interventions were done in the same cohort. The topics of nearly equal difficulty level were identified with lecture gap of around 1-month. During the first intervention, the full lecture handouts were distributed to each member of the class 4 days prior to concerned lecture. On the day of lecture, a pretest in the form of multiple choice questions was conducted for the whole class, and the post-test with the same questions was conducted soon after the lecture. The same type of intervention was done for skeleton handouts as well after a gap of 1-month. One lecturer (SS) took the class during both the settings. One hundred and eight students participated during the intervention with full handout whereas one hundred and four students participated in the skeleton handout intervention. The skeleton handout included some illustrations but required substantial annotation by the students. Closed question regarding preference of students to either type of handouts was asked after both the interventions and the percentage of preference was noted.

Data were processed using Microsoft Excel and analyzed using SPSS version 12 IBM, Malaysia. Descriptive statistics such as mean and standard deviation (SD) were described. Dependent sample t-test was used to compare the before and after test score in intervention groups, that is, skeleton handouts and full handouts. ANOVA with repeated measures was used to compare the change score from pretest between skeletal handouts and full handouts. The level of significance was set at 0.05.

Results

All the 108 students of the class participated in the intervention through full lecture handout in comparison to one hundred and four students participating in the skeleton handout intervention. Hence, there has been drop out of four students in second intervention.

Table 1 reveals that the posttest score (4.85 ± 0.363 in skeleton handout and 2.61 ± 0.771 in full lecture handout) were significantly increased in comparison to respective pretest scores (1.85 ± 1.275 in skeleton handouts and 1.92 ± 1.09 in full lecture handouts) [Table 2].

ANOVA with repeated measures was used for the comparison of change score from pre-test between intervention groups. Skeleton handout has a mean change score from pretest 3.0 with SD ± 1.246, which is higher than full handout having mean change score from pretest 0.70 with SD ± 1.238. There was a significant difference of mean change score between a skeletal handout and full handout ($P < 0.001$).

In this study, 76% of the students preferred to have full handout against 24% preferring skeleton handout. We analyzed the open-ended survey question on the reason for their preference. The majority of the students preferring full handouts expressed that it was easy to revise at the last minute, and it could save a lot of work in the preparation and assimilation of the details about the subject taken. However, most of the students among those who preferred skeleton handouts expressed that it encouraged them to stay focused during the class and all of them concurred that they could add points in the skeleton handouts that were being elaborated.

| Table 1: Paired comparison of pretest and posttest scores in skeletal handout and full handout |
|---------------------------------------------------------------|
| Mean±SD            | t    | P         |
|                   | Pre-test | Post-test |
| Skeleton handout ($n=104$)                                  | 1.85±1.275 | 4.85±0.363 | 24.547 | <0.001 |
| Full handout ($n=108$)                                      | 1.92±1.09  | 2.61±0.771 | 12.031 | <0.001 |
| SD: Standard deviation                                      |

| Table 2: Comparison of change score from pre-test between skeletal handout and full handout ($n=104$; those who participated in both full handout and skeleton handout interventions) |
|---------------------------------------------------------------|
| Change score from pre-test mean±SD | F    | P         |
| Skeleton handout                                              | 3.00±1.246 | 167.491 | <0.001 |
| Full handout                                                  | 0.70±1.238 |
| SD: Standard deviation                                        |
in the class. They also said that they could get some more points and added on to the skeleton handouts by referring to information beyond textbooks.

**Discussion**

Handouts are a useful supplement that can support further learning in noncontact hours and also give a framework on which the students can learn. They clarify expectations during the lectures and can encourage focused note-making by leaving specific areas for students to add notes in their own words or connect to other areas of learning.

Provision of full slide presentation has decreased the students' attentiveness as they already have the notes on what the lecturer is going to teach in the class with the belief that they can always refer to it at their leisure. However, the skeleton handouts will provide an opportunity for the students to ponder over the subject and increase the understanding of the subject by the scaffold given. The students who were given skeletal handouts out-performed when compared with students who were not given.\[9,10\] In our study, the mean post-test value was significantly higher when the students were given skeleton handouts, which were similar to the one was done by Russell et al.\[11\]. They have concluded that learning by medical students was improved when they recorded notes in class. However, the majority of the students in our study, preferred to have full handouts probably for their easy referral during the examination. When students are given full handouts, they often substitute this for class attendance and are less likely to attend the lecture, which sometimes is disheartening to the lecturer.\[11\] Perhaps the compromise that best assists students is the provision of partial or guided notes. Skeleton outlines or handouts can provide a scaffold for accurate student note-taking while still requiring their attention, active engagement, and attendance. Guided rather than complete notes provided prior to class time can also allow students to prepare and review material for concepts in need of further explanation\[12\] with the added benefits of increasing student engagement with the content and improving their accuracy of note-taking.

It has been stated in one of the literatures that the students who generated their own outlines or study questions learned more from a lecture than did students who used materials provided by the lecturer.\[13\]

The strength of our study was the use of prospective cohort. The limitation of our study was that we could not conduct a randomized control study, but we plan to conduct a randomized control study with long-term outcome measure in the next batch of students.

**Conclusion**

Although the majority of the students wished to have full handouts of the ophthalmology lectures, they could perform better after going through skeleton handouts.

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**Conflicts of interest**

There are no conflicts of interest.

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