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The Effect of Audience-Response System on Resident Learning and Retention of Lecture Material

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Rationale and Objectives

Techniques of physician post-graduate education have traditionally included didactic lectures and case conference "hot seat" formats. Previous studies suggest improved retention of new material using Audience Response Systems (ARS) software. In an era of increasing clinical volume and longer workdays, the time devoted to education may be diminished in many medical centers; therefore, developing techniques which optimize educational time are necessary and are well worth the investment.

Materials and Methods

In this study, 22 radiology resident physicians were randomized into one of two groups, for a lecture on an undisclosed topic. The identical lecture, on pediatric renal masses, was presented separately to the two groups, only the first group receiving the lecture with ARS integrated into the lecture. The intent of utilizing ARS software was to evaluate the effect of its utilization on the residents' retention of material both in the short term and in the long term. Upon conclusion of each lecture, each group was administered a post-lecture quiz to compare performance between the two groups. After 3 months, the post lecture quiz was readministered to both groups to compare long term retention of the material. The results of both sets of tests were analyzed for significant differences in both short term and long term retention of educational material between the two groups, using student's t-test.

Our ARS called GetFeedBack (MeridiaARS, Plymouth Meeting, PA) is a commercial product, the components of which include easily installed database software, 40 (or more) individual hand held keypads for audience voting and a wireless receiver that is attached to the PC from which the PowerPoint presentation is being given. Questions are easily built in the GetFeedBack database and are displayed throughout a PowerPoint lecture. Trainees use the hand held keypads to anonymously select from an array of possible answers to the lecturer's questions. The wireless receiver records the trainee's votes and the results can be displayed to the audience immediately or reviewed at another time. Various reporting tools are also available to analyze the response data (e.g., comparing the correct answers between groups such as first through fourth year residents). Results can be saved and/or presented in HTML format on a webpage accessible by trainees.

Results:

Initial Testing:

Group	Scores	Average
A	50, 50, 70, 70, 70, 80, 80, 80, 90, 100, 100	76.4
B	30, 30, 40, 60, 60, 60, 70, 70, 80, 80, 80	60

Group A = audience response group. Group B = control group.

p= .02

Three month repeat post-test

Group	Scores	Average
A	30 40 40 50 50 50 60 70 80 80 90	58.2
B	10, 20, 20, 20, 30, 40, 40, 40	27.5

Group A = audience response group. Group B = control group.

P= .001

Although there was a modest drop in the average score for the audience response group at three months, there was a dramatic drop in the average quiz score for the control group, underscoring the long term beneficial effect of utilization of this technique.

Discussion

Most people teaching at the medical post graduate have little or no formal training in teaching techniques; the result is a mix of naturally gifted individuals and people who have less intuition for the subtle psychology that exists between the lecturer and the audience.

There are two basic lecture formats in most post-graduate medical training programs: formal didactic lectures and teaching files or "hot seat" format. Each style carries its attendant pitfalls: boredom in the former and the often unintentional public embarrassment in the latter.

We propose that learning can be plotted against stimulation in a bell curve distribution, with retention of material represented on the y-axis and stimulation represented on the x-axis (Figure 1). On the left end of the bell curve, both retention (y) and stimulation (x) are insufficient, which results in an unsatisfactory outcome overall. Naturally, retention is expected to be poor when the audience is under stimulated or bored. On the opposite end of the bell curve, stimulation (x) is sufficiently high enough to yield a negative impact on learning and retention, and again retention is low. However, a crucial balance between too much vs. too little stimulation will place us in the middle region where the bell curve reaches its zenith and the retention rates (y) will be maximized. The challenge, then, is to discover what teaching methods embody optimal stimulation, or benign stress, to achieve the most efficient retention of material.

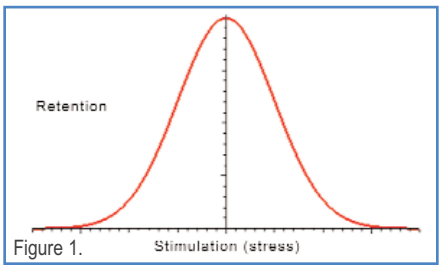

Figure 1.

The audience response software is one simple way to interject fun and incorporate the concept of benign stress application to enhance attention, learning and retention. The combination of game-show style interaction and the individual's opportunity to test themselves without being singled out or possibly embarrassed represents a potentially important step in recognizing the importance of teacher/audience psychology, even at the post graduate level. Taken a step further, depending on how it is used, the audience response software provides immediate feedback on the audience's comprehension of the material as the lecture proceeds, allowing the presenter to revisit or re-explain concepts that were not fully understood by the audience at initial presentation. This feature of immediate feedback for the lecturer has tremendous potential to fine tune lecture delivery style and enhance the presenter's understanding of what aspects of a lecture are more (or less) successful at conveying a point. This is an overlooked yet very powerful tool to teach the teacher.

Residents were polled several times by different lecturers to determine whether they enjoyed the ARS format. Not only do the audience members enjoy the interactive style, nearly all preferred it over the didactic format. Subjectively, the group which used the ARS software in this experiment was more alert during the lecture and asked more questions about the material upon conclusion of the talk.

Conclusion

The data obtained during this two-part experiment support the theory that utilizing a nonthreatening and interactive device such as ARS software results in statistically significant retention of new material not only in the short term but even more so in the long term, when the difference in the post test performance was even greater than immediately following the presentation of new material. Thus, utilization of audience response software in lectures at the post graduate level benefits not only the audience members due to the interaction with the presenter; it also provides the opportunity for the presenter to gather immediate and valuable feedback regarding the clarity of the material presented, thereby allowing instructors to recalibrate and optimize their teaching technique in real-time or in subsequent lectures. We wholeheartedly endorse and encourage the use of audience participation software use in post-graduate education.

References

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