

TEACHING STYLES AND APPROACHES: MEDICAL STUDENT'S PERCEPTIONS OF ANIMATION-BASED LECTURES AS A PEDAGOGICAL INNOVATION

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Background: Despite over dependence on PowerPoint, few studies have focused on the value of animations versus static illustrations in Physiology teaching. This study was aimed to assess first year undergraduate medical student's response towards the effectiveness of Animation-based Lectures (ABL) in Physiology and its comparison with other existing teaching modalities.

Methods: A questionnaire with a five-point Likert scale rating ABL effectiveness on various aspects was administered and its comparison with other teaching methodologies was done.

Results: Students had an overall positive attitude towards ABL and it was perceived as more useful than equivalent static learning material of PowerPoint or transparency which provided a passive unsuitable learning environment. **Conclusion:** This study suggests that educators should encourage use of ABL to sustain interest and try to achieve a balance between old form of board teaching and the new innovative world of animations without too reliance on PowerPoint to sustain interest and promote student engagement in lectures which may have a stimulatory effect on student learning methods

Keywords: Animation-based Lectures (ABL), PowerPoint, Educator, Board Teaching, Teaching Methodology, Learning Preferences

INTRODUCTION

Abraham Flexner once quoted that Medical education is not just a program for building knowledge and skills in its recipients; it is also an experience which creates attitudes and expectations.

First-year undergraduate teaching is stressful, voluminous and challenging for the beginners. Their learning styles and preferences too are different. In view of this it has been proposed that teachers should assess the learning styles of their students and adapt their classroom methods to best fit each student's learning style.¹ The traditional board teaching is gradually being replaced by transparencies and PowerPoint (PP) slides, however these are often considered passive forms of learning and are unable to sustain interest for a longer time.

To counter it educators are enthusiastically taking up alternate teaching methodologies to reinforce didactic instruction in lectures like Problem-based Learning, Case-stimulated learning, Patient-centered learning, Early Clinical Exposure (ECE)², Multiple-format sessions,² VARK³ and Animation-based Lectures (ABL).

We all agree that a picture can be worth a thousand words.⁴ Paivio's dual-coding theory states that learning is best achieved when a lecture is coupled with an animation, because this combination provides a reference from which students can appreciate the knowledge presented in the animation.⁵

To grab the attention of the students, ABL may be an ideal choice. It incorporates animations for the specific purpose of fostering learning and sustains interest. As animations can explicitly depict temporal

changes they are best suited to the teaching of procedures and processes in Physiology.

Learning research has demonstrated that visualizing processes in three dimensions aids learning, and animations are effective visualization tools for novice learners and aid in long-term memory retention.⁶

ABL is said to foster learning by having an affective function whereby they engage learner interest and sustain motivation.

We were keen in finding the preferred learning styles of our first-year medical students so that we could develop appropriate learning approaches. There appears to have been little research done in the area of animated learning materials in a higher education setting. Against this background we incorporated ABL in physiology lectures with the objectives: (i) to assess medical students' attitudes towards ABL in sustaining interest, visualizing concepts, remembering facts, understanding better and applying knowledge; and (ii) medical student's comparison of existing teaching modalities to foster interest and learning.

MATERIAL AND METHODS

Design

We introduced animations in the lectures on acidification of urine, regulation of pH, physiology of thyroid- parathyroid gland, calcium homeostasis, gustatory and olfactory physiology. A questionnaire was circulated at the end to examine the role of ABL as a teaching tool. As it was regarded as a teaching evaluation in line with standard departmental teaching policy full ethics approval was not deemed necessary.

Procedures

A structured questionnaire was developed to explore student opinion on ABL as an innovative pedagogical teaching tool. These responses were measured on a 5-point Likert-type scale as follows: 1= strongly agree, 2= agree, 3= no opinion/confused, 4= disagree and 5= strongly disagree. In addition to this, they were asked to comment on their beliefs and attitudes towards ABL.

Students were asked to fill in the evaluation questionnaire and hand it in as they left the lecture theatre. The questionnaires were all anonymous and completion was not compulsory.

Analysis

The number of students who preferred each mode of learning was divided by the total number of responses to determine the percentage in each category.

RESULTS

Of the total 105 students, 85 responded. Seven of the questionnaires were incomplete and therefore rejected. Therefore, Seventy six (72.3%) of the total 105 students enrolled actually participated in the study.

Comparison among teaching methodologies:

Following themes emerged from our results:

ABL- Student's preferred choice

Figure-1 shows the overall comparison of most preferred teaching methodology. ABL was maximally accepted by students and as shown in Table-1, majority of the students agreed that ABL helped to sustain interest, visualize concepts better, remembering facts, applying knowledge and understanding better different aspects of Physiology. Typical student comments in favour of ABL are shown in Table-2.

Only a few participants had negative attitude towards this innovative method:

"ABL also contains those slides which are almost impossible to draw or reproduce in exams"

Another had different concern:

"The interaction between teacher and student in video clip type of animation is less and worse when there is voice-over in the animation that means someone else is teaching in the class not the teacher".

PowerPoint and Transparencies-least preferred among student's

Students disliked both Transparencies and PowerPoint slides for the monotony of the classes and lack of interest it generates among both the teacher and student. In both these methods tendency to go too fast is common simply because of the ease of delivery of the material.

Further concerns over the excessive preference of PP were illuminated by respondents. For example, two of the respondent described their concern as: *"I hate slides where teachers stand besides the PP and run the slide show to relax and behave like a spectator. Its not active learning at all."* and

"PP should not have much written matter else they are like transparencies"

The students felt as someone else is teaching them not the teacher who is standing.

"Slide presentation is too fast. It makes concept retention tough. There should be time to make notes Reading of the slides is done instead of explanation of the topic."

Board Teaching- Still not forgotten: Old is Gold

Despite growing tendency towards excessive use of slides, student's perception leads us to argue whether the old concept of "chalk and talk" is outdated or not. We deliberately kept PowerPoint slide and ABL as two different teaching methodologies in the questionnaire and the former does not impressed students much. In fact it was rated inferior to board teaching as shown in Figure-1.

Participants stressed the importance of board teaching. This simply illustrates that single use of PowerPoint do not provide a suitable learning environment rather it fosters Passive learning.

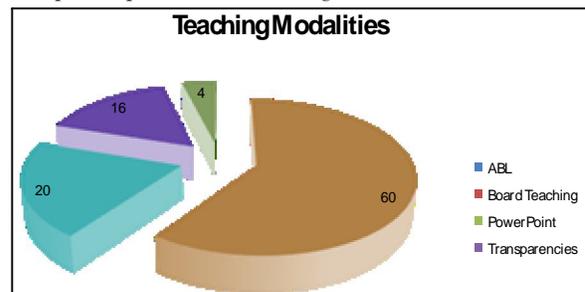
"Board teaching is a must if one has to make students understand"

Ideal Scenario

Many participants reflected that the joint use of both ABL and Board teaching is the ideal way to teach.

"Though teaching should be done on board, at least some animations are shown through PP."

"Nothing to be disliked about ABL except that complex topics should be taught on board."



"Some slides are too complex and few things require necessary explanation on the board."

Figure-1: Medical Students preference of teaching modalities

Table-1: Perceptions of Medical Students about Animation-Based Lectures

ABL as an effective teaching tool in:	Strongly	Agree	No Opinion	Disagree	Strongly
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	Agree (%)	(%)	(%)	(%)	Disagree (%)
Visualizing Concepts	84.2	15.5			
Sustaining Interest	97.3	2.6	0	0	0
Remembering facts	50	26.3	19.7	3.9	0
Understanding Better	76.3	18.4	5.2	0	0
Applying knowledge	63.1	15.7	18.4	2.6	0

Table-2: Typical Student’s response towards Animation-based Lectures

<p>“Helps to visualize what is happening especially while dealing with mechanism of action. Very exciting. Generates interest in boring yet important topics like pH regulation. Helps in developing “picturesque” memory. Colorful.”</p>	<i>Visualizing Concepts</i>
<p>“Animated PowerPoint should be encouraged as they give an insight (audio visual) to the concepts. Visualizing things makes it easier to retain things”</p> <p>“It really helps to have a visual look on endocrine physiology, helps to understand better, maintains the crisp in the lectures and helps to retain concepts for longer duration”</p> <p>“ABL is faster, efficient and with better graphical visualization. Role of pendrin in Pendred syndrome is forever etched in my memory”</p>	
<p>“It helps generate interest and animations are sort of an incentive for attending the lecture”</p> <p>“Prevents sleeping from the overnight awakening”</p> <p>“Like more of diagrammatic and interesting lecture”</p> <p>“I liked the animation based lectures. They made the lectures interesting”</p> <p>“Helps to analyze concepts better”</p> <p>“I liked the interesting stuff, nice images, different facts, everything apart from the traditional lecture”</p> <p>“Very interactive, prevents boredom during the lecture, sustains interest”</p>	<i>Sustaining Interest</i>
<p>“Dull topics like Urine Acidification should only be taught with the help of animations as moving ions in and out of cell catches more attention”.</p>	<i>Remembering facts</i>
<p>“It’s very interactive and makes the concept clear which cannot be taught through books”.</p> <p>“Complete clarification of difficult concepts like metabolic and respiratory alkalosis.”</p> <p>“Complex Taste and Olfactory pathways were made to understand quickly”</p>	<i>Understanding Better</i>
<p>The decreased effort as compared to writing on the board</p>	<i>Applying knowledge</i>

DISCUSSION

The current crop of medical students is techno-savvy whose major part of the day is broadly influenced by visual and auditory communication. These undergraduates prefer animations over and above textbooks⁷ and however anathema it may seem to educators, this preference should be respected and incorporated in lectures to get the desired results.

ABL provide a valuable way to communicate dynamic, complex sequences of physiological events more effectively than text or a static graphic.⁸ Previous work has established that students understood a complex signal transduction pathway better after

viewing a narrated animation compared with a graphic with an equivalent legend.⁷

Liao’s meta-analysis suggest that, as a whole, student learning is greater when a multimedia learning tool is included during instruction relative to a control group without such tools.⁹

Not only this, recent research indicate their significant role in long-term memory retention than simple graphics¹⁰ as well as their potential usefulness as a pedagogical tool in students with dyslexia.¹¹

Our evaluation questionnaire established that a large majority (60%) of student respondents thought that the use of the ABL is the ideal teaching methodology and this was one of the most encouraging findings of this study. These responses were in line

with previous expressed views^{7,10} and a strong endorsement for the positive role of ABL in promoting student engagement.

The other unexpected and interesting theme which emerged from our study is that contrary to popular belief students favoured Board teaching above PP for inductive teaching. PP without animation was not an effective presentation tool and it was just like transparencies which fared worst among student preferences. Recent research has clearly shown that students benefit maximally from animations than from static images of PP.¹²

In accordance with Sir William Osler who wrote in his book- *The Student Life*- "The successful teacher is no longer on a height, pumping knowledge at high pressure into passive receptacles...He is a senior student anxious to help his juniors", we firmly believe that teaching Physiology is not only a science but it's an art.

It is crucially important to let students feel the subtle play of rhythms, the totality of psycho- and physiological responses of the educator's body to the task of standing at a Board, waving hands and explaining to students something beyond their comprehension. In view of student preferences this can be maximized by lecture plans that include ABL in combination with "chalk and talk" Board teaching. In view of student preference by careful mixing of media, a presentation can appeal to a number of different learning styles and be made more stimulating than the monotony of static slides and transparencies.

Further sanctity of classroom teaching is preserved by the fact that students who access animations online do not have the benefit of the instructor's narration and fare badly. An educator is most effective when text is adjacent to important structures and is spoken simultaneously to reinforce the learning process (spatial contiguity effect).¹³

CONCLUSION

Learning preferences of medical students indicate ABL as a promising teaching methodology in sustaining interest, visualizing concepts and remembering facts.

More research is needed to further elaborate this method's strengths and how best to use it. This

study, however is a starting point for further investigations where the exciting and innovative ABL and old and forgotten but tried and tested Board teaching can be used together to bring about maximum pedagogical benefits to the students.

The author(s) declare that they have no competing interests.

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REFERENCES

1. Dunn R, Dunn K. Teaching students through their individual learning styles: A practical approach. What is the role for videos in medical education? Reston, VA: Reston Publishing Company.1978.
2. Sathishkumar et al; Attitude of medical students towards Early Clinical Exposure in learning endocrine physiology. *BMC Med Educ* 2007;7:30.
3. Fleming ND. I'm different; not dumb. Modes of presentation (VARK) in the tertiary classroom. In: *Research and Development in Higher Education*, edited by Zelmer A. Proceedings of the 1995 Annual Conference of the Higher Education and Research Development Society of Australasia 1995;18:308-313.
4. Beakes, G. A Picture is Worth a Thousand Words. A Personal View of Using Images in the Teaching of the Biological Sciences. *BEE-j*, 1 (1), 15pp at <http://bio.ltsn.ac.uk/journal/vol1/beej-1-3.htm>
5. Paivio A. Dual coding theory: retrospect and current status. *Can J Psychol* 1991;45:255-87.
6. McClean P, Johnson C, Rogers R, Daniels L, Reber J, Slator BM, *et al.* Molecular and cellular biology animations: development and impact on student learning. *Cell Biol. Educ* 2005;4:169-79.
7. O'Day DH. Animated cell biology: a quick and easy method for making effective high-quality teaching animations. *CBE Life Sci Educ* 2006;5:255-63.
8. Stith BJ. Use of animation in teaching cell biology. *Cell Biol Educ* 2004;3:181-8.
9. Liao YKC. Effects of hypermedia on students' achievement: a meta-analysis. *J Ed Multimedia Hypermedia* 1999;8:255-77.
10. O'Day DH. The Value of Animations in Biology Teaching: A Study of Long-Term Memory Retention. *CBE Life Sci Educ* 2007;6(3):217-23.
11. Taylor M, Duffy S, Hughes G. The use of animation in higher education teaching to support students with dyslexia. *Education & Training* 2007;49(1):25-35.
12. Rieber LP. Using animation in science instruction with young children. *J Ed Psychol* 1990;82:135-40.
13. Mayer RE. The promise of multimedia learning: using the same instructional design methods across different media. *Learn Instr* 2003;13:125-39.

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