JET
The Journal of Effective Teaching
an online journal devoted to teaching excellence

A Handy Interactive Class For Teaching Introductory Cell Biology

Shyamala Hande[1]
Melaka Manipal Medical College, Manipal-576104, Karnataka , INDIA
Manjunatha Hande
Kasturba Medical College, Manipal-576104, Karnataka , INDIA

Abstract

In this paper we share the experience of an interactive method of teaching that involves every student in the learning process in the classroom. We describe an interactive class conducted over a two year period for premedical students. The process involved three stages namely a study session, a test-yourself session and a review session. Through student feedback we have found that 96% of the students approved the method and found it highly useful. The method has been found to have advantages like uniform reach of content, opportunities for group learning, and involvement of visual aids as teaching-learning method and enhances interest among teachers and learners. By creating a lively learning environment in the classroom, student involvement in the educational process is increased. By increasing students' involvement, academic performance is improved. In addition, by actively involving the students in the educational process, students may recognize and accept their responsibility for lifelong learning and continued professional development (Cross 1987)

Keywords: Premedical, interactive, cell biology, teaching and learning.

Making classes interactive involves giving all students something to do during the session such as answering a question, interpreting a graph, or solving a problem. This is most effective when such activities are done regularly throughout the term. Making classes interactive is a major challenge for educators today. Lecturing, on the other hand, is a time-honored teaching technique that is an efficient method for presenting information but may result in students who listen passively. Including short activities during a lecture can foster active engagement and enhance the value of the lecture segments. Students today want to move past passive learning and listening to proactive learning; they are now open to new learning methods such as cooperative learning and group testing (Hicks, 2007) and educators need to find better ways of engaging students in the learning process. Teaching to different learning styles and multiple senses can help revitalize classroom presentations that have become routine through repetitions (Nilson, 1998).

Proactive learning refers to models of instruction that focus the responsibility of learning on learners. This is another challenge for teachers. Teachers look for ways of vicariously

[1] Corresponding author's email: shyamalahande@yahoo.com

engaging students in the learning process. But many teachers feel a need for help in employing interactive sessions in classrooms that would constitute a meaningful set of active learning sessions. Active involvement in the learning process has been suggested to enhance creative thinking, judgment, interpretation, and problem-solving skills (Rao & Di Carlo, 2001). Didactic lectures on certain topics cannot involve every student. Therefore, educators are encouraged to incorporate various learning strategies in each class.

Faculty are also reluctant to introduce new strategies in place of a didactic lecture for various reasons such as student numbers, lack of facilities, lack of time and student responses. To deal with this reluctance, a learning session such as the present one, was undertaken and student opinions were solicited afterwards.

Background

There were three major reasons that interactive sessions were introduced:

1. In the present paradigm, teachers continue to use the traditional lecture as their primary method of instruction. The average information retention rate for this method is only 5% for a 24-hour period, compared with alternative approaches such as demonstration (30%), discussion groups (50%), practice activities (75%), and peer teaching (90%) (Sousa, 1995).

2. In-depth interviews with students made it clear that they enjoy interactive sessions, collaborative learning and self-directed learning, but they do not like didactic lectures. There is evidence that interactive tutorials have been found to be an effective means of improving student performance according to Tonkin, Taverner, Latte & Doecke, 2006. Several studies (Mannison, Patton, & Lemon, 1994; Ali et al., 1999, Wilke, 2003; Arwood, 2004) suggest that interactive teaching strategies significantly improve outcomes as compared with traditional methods.

3. Several healthcare institutions have made Self Directed Learning a part of the curriculum. In self-directed learning learners take the initiative to make use of resources rather than simply react to transmission of knowledge (usually in the limited sense of knowledge as information) . Using self-directed learning helps learners to learn more and learn better. The main purpose of education should be to develop the skills of inquiry and, more importantly, to equip students with the tools for acquiring new knowledge easily and skilfully for the rest of their lives. (Ramnarayan & Shyamala, 2005) To meet the challenges in today's healthcare environment, self-directed learning is most essential. So, it is appropriate that such skills are instilled in premedical/ foundation courses.

Method

The interactive class was conducted for groups of different sizes, ranging from a total of six students (smallest) to fifty five (largest) students. The sessions were each 120 minutes long. The students were asked to bring the text book to the classroom. The class was

assigned a topic which was relatively easy and students were somewhat familiar with the topic. For example, one topic was on biological macromolecules which the students had studied briefly in previous years. They were given an hour to make notes on the topic.

The students' knowledge would be tested in the next hour. Students were permitted to keep their books open during the "test yourself" session. After the first hour, the teacher presented about 20 questions of single best response and projected the questions one by one on an LCD screen. The PowerPoint presentation was self-timed for 2 minutes per question.

After the "test yourself" session, the teacher highlighted and reviewed each of the correct answers as the students checked their answers. The students were given a feedback form (Table 1) so that they could evaluate the class.

Table 1. Student Evaluation

Scale Value

Definitely agree	Agree	Uncertain	Disagree	Definitely disagree
5	4	3	2	1

Questions on the session	Definitely agree	Agree	Uncertain	Disagree	Definitely disagree
1) It covered the entire chapter effectively					
2) Time allotted for study was enough					
3) Time allotted for test was enough					
4) Develops the ability to think					
5) I could understand the content thoroughly					
6) It guided me on how to study a chapter effectively					
7) I prefer lecture to this learning activity					
8) It is a good learning experience					

Comments if any: _____
_____

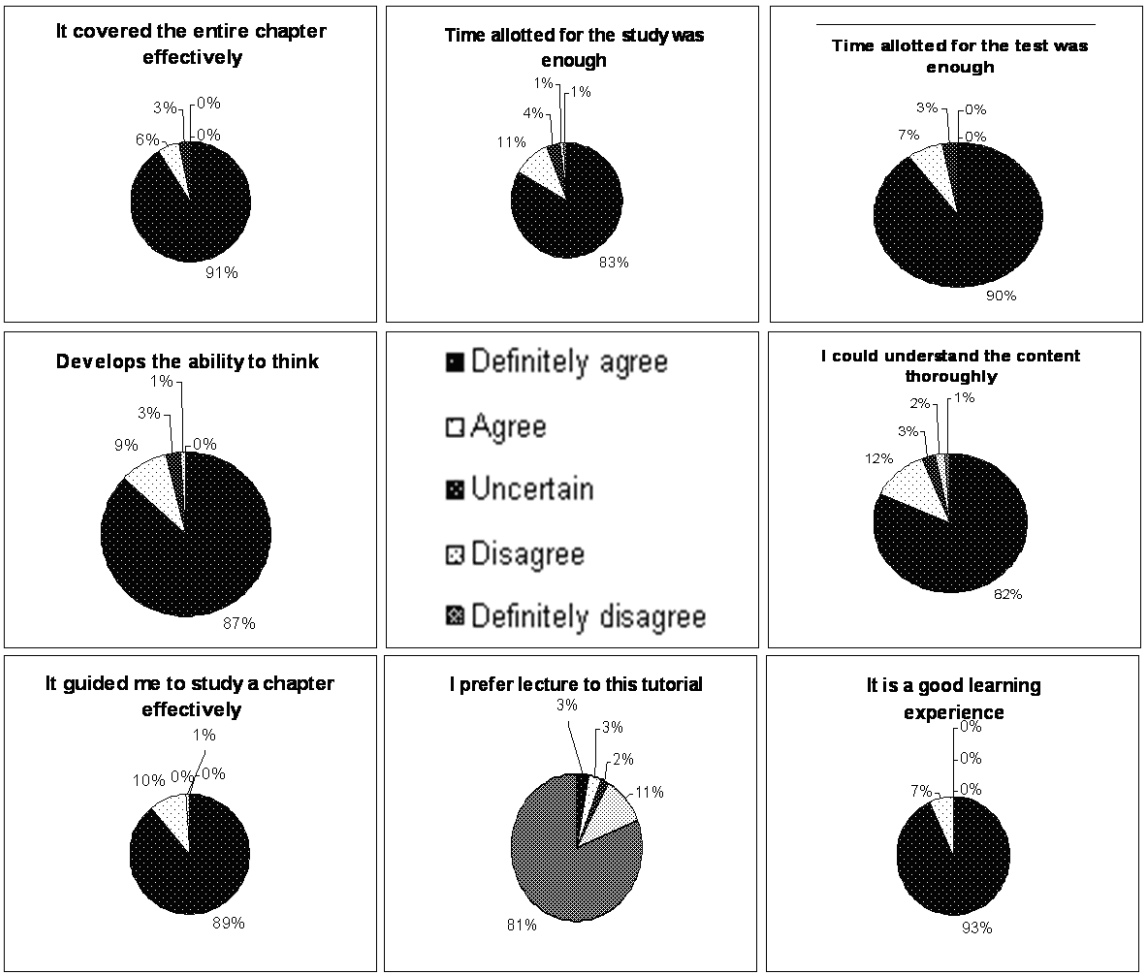

Figure 1. Student evaluation of the interactive class. Each pie chart corresponds to the response in percentage to the questions in the student feedback form.

Results and Discussion

In total, 96 students participated in the study. Of these students 96% approved of the method and found it highly useful. There was no significant difference in the student grades or the responses between each of the batches. So, the results were pooled for the students at large. The feedback questionnaire given to students was analyzed and the results are presented graphically in Figure 1.

This teaching strategy also enables the student to practice effective use of the textbook because questions are asked from a particular chapter in the book. Students understand the content focus needed. For faculty, adding some visual components may take some time and effort to develop but can avert burn-out.

There were several responses to the open-ended "any other comments" sections. One of the most common comments was that "It was a very useful exercise". This was very encouraging. Based on the feedback from and performance of the students, this type of lesson was useful and reached out to each one of the students. Another prevalent positive comment was that the interactive class enhanced their study skills in a short duration of time. It also encouraged the less motivated students in a group.

As seen in Figure 1 student responses to all questions indicate that there was a strong positive feedback about the interactive tutorial. . About 96% of the students favored this learning activity. The students felt that the two hours were spent usefully, less stressfully and they enjoyed learning and reviewing this way. The advantages are that the students learn the material in the classroom, and are able to assess themselves with the immediate feedback. Every student is involved which instills a sense of satisfaction to the teacher.

The student is made responsible for his own learning. By actively involving students in the learning process, academic performance is enhanced. Students learn more when they are actively involved in learning than when they are passive recipients of instruction (Cross, 1987). Educators who find students uninterested in didactic lectures continue to strive to develop and evaluate innovative teaching strategies for improving students' interaction, understanding and comprehension of course concepts and materials.

Conclusions

This class created an active learning environment. By encouraging such a lively learning classroom environment, student involvement in the educational process was significantly increased. By increasing students' involvement, academic performance is improved. In addition, by actively engaging the students in the educational process, students may recognize and accept their responsibility for lifelong learning and continued professional development (Cross 1987). Faculty could learn that no-matter what size group – focus on content will assist student development in foundation classes. Not all class time should be lecture time. Educating students from a technology-laden generation makes teaching more challenging than ever before. University administrators encourage educators to search for strategies that will enhance students' retention and application of information, leading to success in their respective programs of study.

References

Ali, J., Adam, R., Josa, D., Pierre, I., Bedaysie, H., & West, U. (1999). Comparison of performance of interns completing the old (1993) and new interactive (1997) Advanced Trauma Life Support courses. *Journal of Trauma 46:* 80-86.

Arwood, L. (2004). Teaching cell biology to nonscience majors through forensics, or how to design a killer course. *Cellular Biology Education, 3*, 131-138.

Cross, P. K. (1987). Students learn more when they are actively involved in learning than when they are passive recipients of instruction. *Am Assoc Higher Educ Bull 39*: 3–7.

Hicks, J. (2007). Students' Views of Cooperative Learning and Group Testing. *Radiologic Technology, 78*:275-283.

Mannison, M., Patton, W., & Lemon, G. (1994). Interactive teaching goes to uni: Keeping students awake and learning alive. *Higher Education Research and Development, 13*, 35-47.

Nilson, L. B. (1998). *Teaching at its best: A research-based resource for college instructors* (Ed.). Bolton, MA: Anker Publishing.

Ramnarayan, K. & Hande, S. (2005). Thoughts On Self-Directed Learning In Medical Schools: Making Students More Responsible. New Horizons for Learning Online Journal http://www.newhorizons.org/lifelong/higher_ed/ramnarayan%20hande.htm.

Rao, S. P., & DiCarlo, S.E. (2001). Active learning of respiratory physiology improves performance on respiratory physiology examinations *Advan. Physiol. Edu. 25*: 55-61.

Sousa, D. A. (1995). How the brain learns. Reston, VA: National Association of Secondary School Principals.

Tonkin, A.L., Taverner, D., Latte, J., & Doecke, C. (2006). The effect of an interactive tutorial on the prescribing performance of senior medical students. *Med Educ Online [serial online]* 2006;11:9.

Wilke, R.R. (2003). The effect of active learning on student characteristics in a human physiology course for nonmajors. Advances in Physiology Education, *27*, 207-223.