Handling Large Classrooms:Challenges and Strategies

Latha N.R., Pallavi G.B., Nandhini Vineeth
latha.cse@bmsce.ac.in, pallavi.cse@bmsce.ac.in, nandhiniv.cse@bmsce.ac.in
VTU, Computer Science and Engineering
BMS College of Engineering,
Bangalore, India

***Abstract*— Large classes are considered to contribute some complex challenges to professors and are often perceived as one of the major obstacles to ensure quality education. Correspondingly engineering institutions world-wide are also fronting with the same challenges. Whether the class is big or small, professors are expected to teach and assess students effectively. Hence it becomes essential for the educators to come up with coping skills and activities to handle the challenges and use them to make their job easier. Here, we present strategies to help professors deal with some of the challenges associated with teaching large classes.**

Keywords—Large class; Problem based learning;Activity based learning

I. INTRODUCTION

Engineering colleges these days comprise classrooms with students, almost filling a room! Nevertheless, there are no norms governing the maximum size of a class, as people's perception of this varies from context to context. The reasons for such large classes may be budget, space or lack of professors. Although the definition of a large class is always been a matter of debate, it is generally measured in terms of number of students per professor (student professor ratio) [1]. In this paper, class with students above fifty is considered as large.

Large class size presents many obstacles that hinder optimal learning for engineering students. In such environments students are especially vulnerable to the problems such as poor-quality instruction, disciplinary distractions and lower test scores.

A professor with too many students in a class may find it difficult to get to know each student on a personal basis. Learning disabilities or special needs are less likely to be identified as they do not have the time to focus on the individual needs of each student. Students who are struggling with reading or learning technical skills are unable to receive the remedial one-on-one help that could help them catch up to their peers. Students who could benefit from additional challenges may also suffer, as their exceptional learning abilities may go unnoticed.

Professors overwhelmed with paperwork, disciplinary problems and daily classroom management may not have time to dedicate to adequate coverage of important elementary skills needed in studying technical concepts. Creative exploratory assignments or interactive student-led activities are much more difficult to plan for in a large classroom where overcrowding prohibits much movement.

Large class size lends itself to discipline problems because professors are not able to establish the consistency needed to promote good classroom management. As professors struggle to handle individual student needs, it becomes very difficult to control the class. Discipline becomes ineffective, more sporadic and inconsistent. As a result professors may suffer from feelings of ineffectiveness in dealing with disciplinary problems [2].

In this paper we discuss about challenges faced in handling large class rooms, strategies used to deal with them and methodologies that can be applied for effective conduction of classes.

II. CHALLENGES FACED AND STRATEGIES APPLIED IN HANDLING LARGE CLASS ROOMS

Challenge

Intimacy: Professors greetings is been shown to be effective in improving intimacy with students, as the students feel individually recognized and his/her presence is noted. In an outnumbered class, it is likely that the professors have few opportunities to make connections with individual students and remembering student's name can take a while. Professors may feel that they do not get to know their students as well as they would like to.

Henceforth, it becomes essential that such personal, individual greetings are practiced to motivate, facilitate increased attention in the class room, and improvise student's academic progress [3].

Strategy

Learning and using students' names could be given a higher priority. Some strategies like usage of "equity cards" by professors, which are generated from students' pictures (from the class roll) assists in handling the above challenge.

Professors call on people at random from the card pile. This ensures that they use students' names, so that there is a broad base of participation of them and also makes students less likely to disengage during class. On the other hand, student ID cards can be gathered at the beginning of the class and they can be chosen at random to answer questions.

Alternate strategy could be usage of notecards. Students are made to list their interests in these cards before the commencement of the semester. This helps the professors in remembering their names and having conversations with them as they enter the classroom. Such efforts often result in a better rapport between professor and student, and as a consequence, a more engaged classroom.

Challenge

Lack of academic engagement: Large classes make it difficult to effectively engage all students in the learning process. Students may attend class, but still fail to engage in any real thinking about the topic being presented.

Strategy

The class may be divided into two groups say study and work group which comprise of small unit of individuals. These groups communicate and work together throughout the semester with the topics assigned to them every day in the class. This strategy has been shown to be effective to improve student involvement in the class.

Challenge

Taking attendance without sacrificing class time: Student attendance is important regardless of class size. Student's absence may lead to disconnection from the transfer of knowledge and miss out on interaction with the professor and their peers. In order to discourage the same, it becomes essential that an attendance policy is developed to ensure that the classroom experience is rewarding to students [3]. Nonetheless, marking attendance in a large class can be time consuming that takes up valuable class time.

Strategy

Several suggestions to avoid using class time while still fulfilling the duty of taking attendance are proposed in [3]. Some of these include:

- Use of a seating chart or sign-in sheets
- In-class assignments
- Have students sign in at the door.
- Take attendance at the end of class to discourage students from signing in and then leaving.
- Taking attendance at irregular intervals may suffice, especially if there is a clear policy for lowering grades when absences are excessive.
- Collect homework one week and return it another; students must be present both times to get credit.
- Post alphabetical lists of names on the walls of the classroom at various locations and have students sign in.
- Use personal response devices (clickers) to take attendance.

Challenge

Distractions and noise level: There can be more distractions in large classes such as late comers entering the class, students chatting while the lecture is going on etc. This poses problems to professors as the class becomes uncontrollable.

Strategy

The authors of [3] have proposed few techniques to avoid disruptions from late students. This includes specifying a special seating area in class room that is left empty so that students who are tardy to class can sit in this designated area. This area should likely be placed near one of the doors to the class room and may include about ten seats. This minimizes the disruption to the entire class room, as it keeps students from moving throughout the room and distracting others. Additionally, this will give the professor personal contact with students who are late to class, and the one-on-one time may help prevent future problems or tardiness. This helps observe the patterns of tardiness, address individual student accordingly and make sure that the tardy students are held accountable.

Challenge

Availability of Information from external resources: Advances in information technology has affected the craft of teaching as students get more insight of the concepts given in the class through sources like internet. These could be reasons for the less attentive attitude of the students in the class room. On the other hand today's students have grown up with technology and are comfortable multitasking in multimedia thereby bringing very different expectations to the class room [4].

Strategy

Students can be given some interesting assignments which can be solved by using the advanced technologies. The assignment given should be such that the students can solve them easily if they have attentively listened to the lectures in the class. This helps the students apply the concepts learnt instead of reading the same concepts again.

Challenge

Different IQ levels of students: Not all students in a class really think the same [5]. According to Howard Gardner's - Multiple intelligences theory, there are at least seven different kinds of intelligence viz., verbal, musical, logical-mathematical, spatial, body movement intelligence, intelligence to understand one self and intelligence to understand others.

The same assignment if given by the professor to different grade of students in the same class, quite a number of students may find it difficult to do the assignments as their IQ level may differ. Students may become unmotivated and lose interest in doing the work or try to get away with very little work.

Strategy

Generally, professors can address only some set of intelligence that is required for the course being taught. The assignments to be given need to be framed taking the

intelligence types into consideration. It becomes essential for the professors to set assignments with different degree of complexity so that students of all levels in that domain of intelligence can solve them.

Another strategy is to identify the student with different IQ levels and group them to work on given assignments. This helps students to share their knowledge with their peers. Consequently, students come to class prepared so that they can answer questions, about readings, to participate in class activities thereby enhancing their performance [6].

The above mentioned challenges and strategies are applicable to classes where traditional teaching is inevitable. Nevertheless, there may be certain concepts in every course where such lectures turn out to be passive listening for the students. Scenario becomes more complex in a large class room as the students will be outnumbered and noise levels will be predominantly high. Henceforth, creates a need for professors to come up with alternative teaching methodologies so that the entire class gets involved and learning happens.

III. Introduction to Active Learning Methodologies

The famous saying of Confucius goes like "Tell me, and I will forget, Show me, and I may remember, Involve me, and I will understand". Teaching emphasis has moved away from memorizing facts towards finding, evaluating and using information. Professors are realizing what they teach isn't the same as what students learn and re-scoping the curriculum accordingly. The current trends in teaching involve techniques like active learning, social learning, moocs, blended learning etc. In this paper, we emphasize on active learning techniques.

Active learning is anything course related that all students in a class are called upon to do other than simply watching, listening and taking notes [7]. If a lecture includes even a few minutes of relevant activity, the student will be active for the remaining time in a way that never happens in a traditional lecture. Figure 1 shows how active learning could be a better tool where learning happens to an extent of 90 percent compared to passive learning where learning is only for about 50 percent

Fig 1. Active learning – Passive Teaching [8]

There are various techniques that can be used as part of Active learning, a few of which are as discussed below:

A. Problem Based Learning

Problem Based Learning (PBL) is an instructional method of hands-on and active learning, centered on the investigation and resolution of real world problems. PBL is a pedagogical approach and curriculum design methodology often used in higher education [9]. Some of the defining characteristics of a PBL are

1. Learning is driven by challenging, open ended Problems with no, one specific answer.
2. Problems/cases are context-specific.
3. Students work as self- directed, active investigators and problem solvers in small collaborative groups.
4. A key problem is identified and a solution is agreed upon and implemented.
5. Professors adopt the role as facilitators of learning, guiding the learning process and promoting an environment of inquiry.

Proponents of PBL believe that, as a strategy it

- Develops critical thinking and creative skills.
- Improves problem solving skills
- Increases motivation
- Helps students learn to transfer knowledge to new situations.

Figure 2 shows a scenario of problem based learning where a professor is helping out students involved in solving a problem.

Fig 2. A Scenario of Problem based learning

B. Project based learning

Project based learning is a comprehensive perspective focused on teaching by engaging students in investigation [10].

Project Based Learning framework involves:

- Students pursue solutions to non-trivial problems by asking and refining questions.
- Debating ideas.
- Making predictions
- Designing plans and experiments
- Collecting and analyzing data.
- Drawing conclusions, communicating their ideas and findings to others.
- Asking new questions and creating artifacts.

Figure 3 shows project review meeting between professor and students.

Fig 3. A Scenario of Project based learning

Proponents of Project Based Learning are:
- Students investigate and seek resolutions to problems.
- They acquire an understanding of key principles and concepts
- Students are placed in realistic, contextualized problem solving environments.

Projects can serve as a bridge between the class room and real life experiences. Project Based Learning also promotes links among subject matter disciplines and presents an expanded rather that narrow, view of subject matter. Subsequently, projects are adaptable to different types of learners and learning situations.

C. Activity Based Learning

Activity Based Learning (ABL) describes a range of pedagogical approaches to teaching. Its core premises include the requirement that learning should be based on doing some hands-on experiments and activities on a given topic. The idea of activity based learning is rooted in the common notion that students are active learners rather than passive recipients of the information. If students are provided the opportunity to explore solutions of activities by their own and provided an ideal learning environment then the learning becomes joyful and long lasting [11].

Activity Based Learning is an approach to education focusing on the idea that students should be engaged through actions. This is in contrast to some traditional forms of teaching in which a professor lectures or otherwise relays information to students who are expected to absorb what they are told. In activity based teaching, a professor serves the function of facilitator, assisting students through the learning process and providing them with guidance.

The purpose of activity-based teaching is for a professor to engage students directly, drawing them into a lesson so that they become a participant in their own learning [12].

There are various Activity Based Learning methodologies that can be adopted in a day to day class which could engage outnumbered students. Some of them are discussed here:

1) The Think-Pair-Share (TPS)

Think-pair-share (TPS) is a collaborative learning strategy in which students work in pairs to solve a problem or answer a question about an assigned reading. A problem is posed to students where they have to think about it individually and then they work in pairs to solve them and share their ideas with the class. Consequently, this promotes class room participation by encouraging a high degree of pupil response, rather than using a basic recitation method in which a professor poses a question and one student offers response.

Think-pair-share technique can be used for a wide variety of daily class room activities such as concept reviews, discussion questions, partner reading, brain storming, quiz reviews, topic development etc. This in turn helps students develop: (i) Conceptual understanding of a topic (ii) Ability to filter information and draw conclusions and (iii) Ability to consider other points of view [13].

Figure 4 displays a situation where a professor is facilitating the activity.

Fig 4. Think-Pair-share

2) Thinking-aloud pair problem solving (TAPPS)

The TAPPS technique is a useful device for the teaching of problem solving techniques as it causes learners to pay attention to basic reasoning skills [14].

The TAPPS strategy enables students rehearse the concepts, relate them to existing knowledge and produce a deeper understanding. Here students work in groups of four to solve a problem. One pair is the problem solvers and the other pair is the listeners. The problem solvers verbalize everything, they are thinking as they work on a solution. The listeners encourage and offer suggestions if the problem solvers get stuck. The roles are reversed for the next problem. [15].

Figure 5 shows a situation where a professor is facilitating the activity.

Fig 5. Think-aloud pair problem solving

3) Brain Storming

Brainstorming is a group or individual creativity technique by which efforts are made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its member(s) [16].

Brainstorming combines a relaxed, informal approach to problem solving with lateral thinking. Brainstorming provides a free and open environment that encourages everyone to participate. Individual ideas are welcomed and built upon, and all participants are encouraged to contribute fully, helping them develop a rich array of creative solutions [17].

Figure 6 demonstrates a brainstorming session by a group of students.

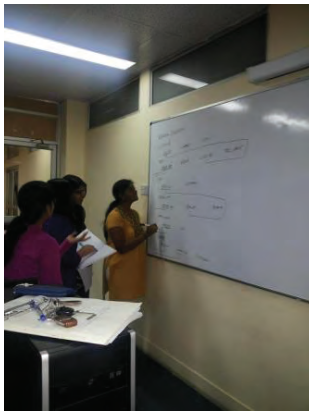

Fig 6. Brain Storming

The steps to be followed to run a group brainstorming session effectively are:
1: Prepare the Group
2: Present the Problem
3: Guide the Discussion

The above mentioned techniques can be effectively applied for a group of people. However there are also certain active learning strategies that suits **individual** students. A few to mention are:

4) One-Minute paper

A "one minute paper" has been defined as a very short in class writing activity (taking one minute or less to complete). Students respond anonymously to a professor's posed question that is designed to provide feedback about student learning [18].

A wide range of questions may be used as prompts for one-minute papers, which may be categorized as follows:

- Questions Designed to Assess Student Interests
- Perceived Relevance of Course Concepts
- Assess Student Attitudes/Opinions
- Checking Student Comprehension
- Assessing Conceptual Connections (Cross-Concept Integration)

Benefits of one-Minute paper process are [19]:

- Professor demonstrates respect for and interest in student opinion
- Inform the revision process at the start of the next class
- Students do not wait until the end of the semester to identify their problem learning areas
- Possibly have an impact on retention if students don't get lost in their learning
- Encourage the students active involvement in the learning process

5) Muddiest Point Activity

Muddiest Point exercises are active learning techniques typically conducted at the end of a topic, chapter or class period. In a "Muddiest Point" exercise students are anonymously asked to report what idea, topic, etc. about the previous lesson was confusing or unclear.

Professors collect all "Muddiest Point" responses and later read and analyze them to see what areas of the lesson or assignments students are unclear about. It is important to provide follow-up and feedback regarding student responses.

Some of the techniques that can be followed are:

- Start off the next lecture by clarifying confusing topics
- Re-teach larger sections of material as necessary
- Provide simple explanations, etc. on a course website

CONCLUSION

Teaching large classes is a global phenomenon, engineering stream is no exception. Teaching a large class requires hard work, effective planning both in terms of logistical arrangements and provision of learning activities, instead of relying on traditional lectures, which are not highly effective. The brief reviews of literature, accompanied by own experiences of teaching large classes some challenges were

emphasized. Subsequently the strategies that can be used to minimize these problems are also addressed. By applying these strategies in the day-to-day classes, issues related to handling large classes can be reduced and learning can be enhanced.

ACKNOWLEDGEMENT

The authors would like to thank BMS College of Engineering for sponsoring Mission 10X Wipro Technologies Pedagogy training. The training gave an exposure of adopting innovative teaching/learning techniques in a class room. The resource guides included pedagogy and instructional de-sign methodologies as their backbone, application of which enhanced student learning.

REFERENCES

[1] Embracing Diversity: Toolkit for Creating Inclusive, Learning-Friendly Environments. Specialized Booklet 2-Practical Tips for Teaching Large Classes.

[2] PROBLEMS WITH LARGE CLASS SIZES IN ELEMENTARY SCHOOLS BY AMY PEARSON, DEMAND MEDIA
http://everydaylife.globalpost.com/problems-large-class-sizes-elementary-schools-7594.html

[3] Managing the large(r) class room By Jennifer L. Schroeder, Rebecca Stephens, and Kashunda L. Williams
http://www.psychologicalscience.org/index.php/publications/observer/ 2013/march-13/managing-the-larger-classroom.html

[4] Frontiers of Education Symposium, Inauguration of Robert J Birgeneau as the Ninth Chancellor of UC Berkeley (April 2005)
http://technology.berkeley.edu/sites/default/files/TeachingLearningTrends.pdf

[5] Multiple Intelligences: Implications for Classroom Use Brooke Gupton ED 690 Supervision of Instruction May 17, 2011

[6] Institute for teaching, learning and academic leadership – University at Albany State University of New York
http://www.albany.edu/teachingandlearning/tlr/ta_specific/q7.shtml

[7] ACTIVE LEARNING: AN INTRODUCTION
Richard M. Felder, Rebecca Brent - ASQ Higher Education Brief,2(4), August 2009.
www4.ncsu.edu/unity/lockers/users/f/felder/public/papers/ALpaper(ASQ).pdf

[8] Active learning- Passive Teaching http://mathsimulationtechnology.wordpress.com/2012/02/16/active-learning-passive-teaching

[9] Learning-Theories .com –Knowledge base and webliography

[10] Motivating project based learning - Sustaining the doing supporting the learning by Phyllis C. Blumenfeld, Elliot Soloway, Ronald W. Marx, Joseph S. Krajcik, Mark Guzdial and Anniemarie Palincsar
http://mathforum.org/wikis/uploads/Blumenfeld.motivating.project.based.pdf

[11] Fallon, Eimear; Walsh, Stephen; and Prendergast, Terry (2013) "An Activity-based Approach to the Learning and Teaching of Research Methods: Measuring Student Engagement and Learning, "Irish Journal of Academic Practice: Vol. 2: Issue. 1, Article 2.
http://arrow.dit.ie/ijap/vol2/iss1/2Irish Journal of Academic Practise – Article 2

[12]http://www.wisegeek.com/what-is-activity-based-teaching.htm

[13]http://www.readwritethink.org/professional-development/strategy-guides/using-think-pair-share-30626.html

[14]http://www.readcube.com/articles/10.1002%2Ftl.37219873007?r3_referer=wol&show_checkout=1

[15]http://www.spiritsd.ca/curr_content/bestpractice/coop/examples7.html

[16] Brainstorming techniques-For Left Brains and Right Brains By Grace Fleming
http://homeworktips.about.com/od/homeworkhelp/a/brainstorming.htm

[17] http://www.mindtools.com/brainstm.html

[18] THE ONE-MINUTE PAPER: An Efficient & Effective Strategy for Promoting Students' Active Involvement and Personal Reflection by Joe Cuseo
http://www.lasc.edu/faculty_staff/staff_dev/documents/One-Minute-Paper-12.pdf

[19] „Using Harvard one-minute papers to improve the first year experience' by A Kay Plummer, Warwick Baines, Nick Davis, Kristy Fitzmaurice, Dinata Muntean, Nick Pawsey