

Pedagogical approaches in aviation education: large versus small classes

Sofia Michaelides-Mateou & Steven J. Thatcher

Abu Dhabi University
Abu Dhabi, United Arab Emirates

ABSTRACT: Abu Dhabi University (ADU) offers a Bachelor of Science in Aviation (BScA) degree programme designed to give students a broad-based education in aviation. Currently, there are approximately 550 students enrolled in the programme. Aviation classes are usually delivered to relatively large class sizes (in the order of 40-50 students) in the semester teaching periods and small class sizes (in the order of 25 students) in the term teaching periods. The difference in pedagogical outcomes between small and large class-group teaching sessions to students enrolled in the Bachelor of Science in Aviation is presented in this article. Various strategies of planning and structuring small and large group teaching are presented and discussed before suggesting facilitation techniques, so as to ensure that the teaching environment is one that is conducive to learning, and provides students with the optimum learning experience.

INTRODUCTION

It is generally accepted that teaching and learning methods influence learning outcomes and objectives, assessment and evaluation and quality assurance. When selecting which teaching method or methods to adopt, it is crucial that academics, as teachers, consider the various teaching and learning methods most appropriate to the specific discipline, ensure that each session forms part of the overall curriculum and create a stimulating environment for students to achieve the specified learning outcomes and pass the course.

More specifically, the following factors should be considered:

- The discipline - is the nature and content of the lesson practical or theoretical?
- The expected learning outcomes.
- The number of students and their level of study.
- How each specific lesson contributes to the course syllabus? What the students know about the topic and what they will be undertaking next?
- Alternative teaching methods and length of time available.
- Informal methods of testing understanding and learning, such as impromptu quizzes, asking questioning at the end of the lesson and other informal methods of assessments.
- Flexibility to account for any unforeseen learning needs.

SMALL GROUP TEACHING

Typically, a small group comprises eight to ten learners. Some researchers suggest that between five to eight students depicts the ideal small group size in order to cultivate effective interactive teaching and learning [1]. However, it should be noted that often, in higher education, programmes may have small groups which comprise 25-30 students.

It is important to note that one should not disregard the subjective perspective of what constitutes a small group. A lecturer who is accustomed to teaching 400 students might consider that a group of 50 would be a small group, whereas a lecturer who teaches 50 students may classify 10-20 in a class as a small group [2]. Therefore, an exact definition of small group teaching is difficult to attain. However, instead of attempting to determine a specific definition of what constitutes small group teaching, emphasis should be on the number at which it becomes too difficult to achieve the benefits of small group teaching and focus should be on the purpose and strengths of small group teaching and how size can enhance or impede those strengths [3].

Small group teaching provides a classroom environment that enables the learner to practice their communication skills, whilst also building their sense of confidence. The more reserved, shy student who may be intimidated by larger student numbers in the classroom will have the opportunity to actively engage in the learning process. A good facilitator who finds effective ways to encourage such students to participate and overcome their shyness will assist them in obtaining the confidence to become actively involved and contribute to the interactive environment. From the primary author's 25 plus years of experience in teaching law at universities in Cyprus, there were many examples of students who, in their first year, were afraid of answering questions and of standing up in front of the class to do presentations or participate in debates and case study discussions. Over time, and by employing various teaching methods, there was a marked improvement and students started to become actively engaged in the lesson and increasingly participated in discussions and presentations.

This was also evident in the Aviation Department in the College of Engineering at Abu Dhabi University, where classes are comprised of both male and female students. Teaching modules in which classes were capped at 30 students provided the opportunity to engage all the students in the learning process, and overall the teaching and learning experience was greatly improved from that of previous semesters where classes were taught with approximately 50 or more students in a class.

According to McCrorie *...the purist view of small group teaching is that it must be learner-centred, with all students joining in free discussion of a particular topic* [4]. Thatcher has also argued that flight training should be mediated using a student-centred approach [5][6]. Small group teaching can be beneficial and enjoyable to both students and teacher. However, it should be noted that there are different skills and abilities required to teach in a small group setting as opposed to teaching in large group settings. Teachers who are more comfortable or familiar with standing in front of a large audience delivering a lecture may not be adept at facilitating learning in small groups, asking questions, prompting discussions and drawing out and engaging the quieter students. With small group teaching, the focus is not so much on transferring information in a knowledgeable and interesting manner (as it is in teaching larger groups), but on facilitating learning and fostering interactivity and participation.

The advantages of well-designed small group teaching sessions include enhanced critical thinking, consolidation of learning from different parts of a programme and retention of information [4]. In addition, small group teaching enables students to: experience active participation, reflect on and clarify understanding, and explore ideas and concepts. Further, small group teaching also assists in the development of transferable skills, such as study and communication, teamwork, problem-solving and personal development. Mills and Alexander have highlighted the following four key strengths of small group teaching [7]:

- Flexibility as learning happens interactively and dynamically.
- Interaction as it fosters a great amount of interaction and immediate feedback for learning development.
- Reflexivity in that it develops teaching practices through the skills required to support individuals within an active learning environment.
- Engagement in that it enhances enthusiasm and creativity of thinking [7].

Small group teaching is often the preferred pedagogical method for certain disciplines at a tertiary education institution; for example, tutorials for law programmes, problem-based learning groups in nursing medicine and laboratory sessions in engineering. In addition, it is often that constraining factors, such as space and limited staff dictate the class size.

When teaching small groups, it is important to simultaneously manage the group effectively, the set activities and the desired learning, while ensuring that the teacher maintains the role of the facilitator of learning by guiding students, asking questions and enabling active participation. One of the common difficulties faced by faculty or academics when teaching in small group settings is one of student engagement, that is, some students may remain silent and disengaged, whilst more dominant students will do the majority of the work. Additionally, students may find it easier to sidetrack the lecturer/facilitator by engaging in non-relevant discussion.

The following tips and best practices are suggested techniques to enhance active involvement and interactive learning for teaching in small groups settings:

- Learn the names of the students. The first author, a new faculty member at Abu Dhabi University, found that teaching in the 2016 Winter Term with a group of aviation students with a class size not exceeding 30 made it easier to learn the names of the students. Student engagement and active participation in discussions, as well as student motivation was greatly enhanced. As a result of the interactive class, students took an active role in the learning process and this, ultimately, contributed to students performing better in the class and obtaining higher grades;
- Brief students about the content of the next session, and give them time to share and discuss what they have prepared;
- Provide students with activities to help them integrate the material with the rest of the course;
- Give students time to think;

- Make use of appropriate assessment methods, such as assessed presentations, class tasks, work sheets and poster displays;
- Involve the students in assessing themselves and their classmates, giving them an opportunity to become familiar with the assessment criteria;
- Make use of different methods and approaches to engage all the students;
- Take note of shy or reserved students and devise ways to engage them without pushing or embarrassing them;
- Be aware of gender and cultural issues;
- Allow students to participate in different ways by varying the activities, so that students can contribute by discussions and presentations individually or as a group [2].

Teaching small groups provides opportunities for interactive learning, in-depth discussion, reflection and consolidation of learning. Small group teaching fosters an atmosphere very different to that of a large lecture and is a pedagogical approach, which, when executed well, affords both the teacher and the learner with optimum teaching and learning opportunities.

Within the aviation discipline, small class teaching is taken to the extreme, because in flight instruction, there is just the instructor and the student in the cockpit. This presents both challenges and benefits. Challenges, because the student is alone with the instructor and is required to engage in active learning whether they feel comfortable in the environment or not. Benefits, because learning in this special type of environment is enhanced and immediately reinforced. This is a very powerful method of learning, because of the situated form of cognition [8]. It also allows the use of student-centred or crew-centred learning to reinforce team skills through facilitation methods rather than pure pedagogical methods [9][10].

LARGE GROUP TEACHIING

Teaching in large groups, (namely: the *lecture*) has been described as *...the awkward child born of administrative convenience and academic habit* [11].

There have been many developments and innovations in pedagogy and learning methods, but the traditional one hour lecture is still very widely used in educational institutions, particularly in certain disciplines, such as medicine. This is largely because it is a good method for the simple transfer of knowledge and information, and requires a smaller number of teaching staff. However, many researchers have questioned the amount of learning that takes place during a lecture and submit that while the lecture method is an effective way to transfer knowledge to students, it is not more effective than other methods [12]. Compared to other methods, lecturing is a less effective pedagogical method for teaching skills, applying information, developing critical thinking or changing attitudes [13].

The actual size of the group of learners may limit both the tasks the students are asked to perform, as well as the learning experience. Teaching students in the hundreds presents many challenges for the lecturer with regards to the instruction, interaction, management and administration of large classes. Some lecturers feel intimidated by large classes. Students may take advantage of the large numbers and impersonal setting and not attend class or ask any questions. They may become de-motivated or may see the lecture class setting as an opportunity to chat with their friends. Students in a large group may find it difficult to focus on the task and the size of the lecture class may often impede discussion. In addition, it will be more difficult to have a supporting environment and the sheer size of the group may make it easier for weaker or quieter students to hide and become *invisible* to the teacher.

Managing large groups of students requires planning the specific details of the lesson in advance and being well organised. Teaching large classes requires the lecturer to have a combination of skills and strategies that include, *inter alia*, the ability to:

- Communicate the lecture material;
- Develop strategies to engage students;
- Maintain some degree of interaction with the students;
- Organise and present effective lectures;
- Integrate the essentials of active learning in traditional lecture formats;
- Effectively combine face-to-face and technology-enhanced learning activities;
- Control large crowds;
- Handle difficult and disruptive behaviour in such a setting [14].

The following are some strategies and practical tips for good practice in large classes:

- Remember that students will not have the attention span to sit through a one hour lecture and that you will need to find ways to maintain their attention and interest; be motivated and enthusiastic.
- Engage with students by moving around, making eye contact and talking to them and refrain from just standing in one place reading notes.

- Encourage students to engage with their notes and act upon the information you provide, individually or in groups.
- Reduce student anonymity.
- Plan how your lecture content will develop into a complete picture of the topic and provide structure to your lectures by providing an introduction to the topic. Outline what you will cover and summarise the main points at the end of the lecture.
- Ensure that you connect previous lectures with the current topic and future learning.
- Provide lecture notes or outlines to students in advance.
- Provide students with set tasks or reading in advance.
- Try to provide examples by applying theory to practical example. Reinforce the nexus between theory and practice.
- Reflect on the way you communicate and on your presentation skills and make use of visual aids, handouts, outlines and problem-based activities to facilitate active learning.
- Include reflective and interactive activities. Encourage interaction by asking questions and expecting responses. Make use of a combination of activities, such as debates, role plays, problem-solving tasks, etc, to break up the lecture and engage with students. In a 50 minute lecture, one or two activities of no more than 10 minutes in total can be included for students to reflect upon. Such activities may include using focusing questions, such as *What are your thoughts on...? What do we know about...? Or consolidating questions, such as Please summarise*
- Evaluate student understanding regularly by use of mini quizzes or true/false responses, etc.
- Assess how clearly you are communicating by getting feedback from both the students, as well as from peers.

To successfully engage large numbers of students (sometimes hundreds of students) sitting in a large lecture room into active learning is both challenging and rewarding. When done effectively, teaching in the traditional lecture method can transmit new information in an effective manner, explain difficult concepts, challenge beliefs and foster enthusiasm and motivation for learning [15].

SUMMARY

Interactive learning entails active involvement and participation, and ensures that the student does not have a passive role in their learning experience. From past teaching experience, as well as from teaching in the Bachelor of Science in Aviation programme at Abu Dhabi University, both authors support the rationale, which indicates that small class teaching fosters an interactive learning environment. In cases where it is not possible to have small group teaching, it is necessary to find ways in which existing teaching methods can be made more interactive, in order to provide the learner with the advantages and positive qualities of small group teaching.

However, it can be said that, regardless of the teaching style and pedagogical approach used, a successful teacher is one who is able to adapt his/her teaching style to motivate the students and transfer that motivation into engagement and active learning in order to meet the learning outcomes and assessment criteria, whilst providing the students with an optimum learning experience.

REFERENCES

1. Booth, A., *Assessing Group Work* (1996). In: Booth, A. and Hyland, P. (Eds), *History in Higher Education*. Oxford: Blackwell. In: Exley, K. and Dennick, R., *Small Group Teaching Tutorials, Seminars and Beyond*. London and New York: Routledge Falmer (2004), 23 January 2016, <http://toniau.ac.ir/doc/books/Small%20Group%20Teaching.pdf>
2. Surgenor, P., *Large and Small Group Teaching. Teaching Toolkit*. Dublin: UCD Teaching and Learning Resources (2010), 1 February 2016, <http://www.ucd.ie/t4cms/UCDTLT0021.pdf>
3. Allen, R., *Approaches to Small Group Teaching: Making Space for the Gold Standard within Higher Education*. Teaching and Learning Directorate, The University of Nottingham (2015), 25 January 2016, <https://www.nottingham.ac.uk/tld/documents/discussionpapers/small-group-teaching-201503.pdf>
4. McCrorie, P., *Teaching and Leading Small Groups*. Edinburgh, UK: Association for the Study of Medical Education, 32 (Understanding Medical Education) (2006).
5. Thatcher, S.J., *Flight instruction or flight facilitation: pedagogy vs andragogy*. Paper presented at Australian Aviation Psychology Association Industry Conference, Melbourne (1996).
6. Thatcher, S.J., *Flight instruction or flight facilitation: a foundation for crew resource management*. In: Jensen, R.S. and Rakovan, L. (Eds), *Proc. Ninth Inter. Symp. on Aviation Psychology*, Columbus, OH, 609-614 (1998).
7. Mills, D. and Alexander, P., *Small Group Teaching: a Toolkit for Learning*. The Higher Education Academy (2013), 12 February 2016, <http://docplayer.net/255626-Small-group-teaching-a-toolkit-for-learning-david-mills-and-patrick-alexander-march-2013.html>
8. Lintern, G., *Flight instruction: the challenge from situated cognition*. *The Inter. J. of Aviation Psychology*, 5, 4, 327-350 (1995).
9. Thatcher, S.J., *The foundations of crew resource management should be laid during ab-initio flight training*. Paper presented at the Australian Aviation Psychology Symposium, Manly (1998).
10. Thatcher, S.J., *Crew-centred flight training: a methodology for improving technical flight training*. *Proc. 4th Asia-Pacific Forum on Engng. and Technol. Educ.*, Bangkok, Thailand, 169-172 (2005).

11. Foster, E., Teaching Large Groups, CADG Guide, Nottingham University (2013), 20 February 2016, ntu.ac.uk/cadq/Mar-13
12. Bligh, D.A., *What's the Use of Lectures?* New York: Jossey-Bass (2000). In: Jeffries W.B., Teaching Large Groups (2014), 23 February 2016, link.springer.com/chapter/10.1007%2F978-94-017-9066-6_2
13. Mc Keachie, W., *Teaching Tips* (Lexington, MA: D.C. Heath and Co) and Newble, D. and Cannon, R., A Handbook for Medical Teachers' (Boston: Kluwer Academic) (1994). Cited in: Steinert, Y and Linda, S.S., Interactive lecturing: strategies for increasing participation in large group presentations. *Medical Teacher*, 21, 1 (1999), 23 February 2016, <http://med.ubc.ca/files/2012/03/Interactive-Lecturing-Strategies.pdf>
14. Burnett, L. and Krause, K.L., Teaching Large Classes: Challenges and Strategies, GIHE Good Practice Guide on Teaching Large Classes, 26 February 2016, https://www.griffith.edu.au/__data/assets/pdf_file/0007/118924/GPG-tlc.pdf
15. Steinert, Y. and Linda, S.S., Interactive lecturing: strategies for increasing participation in large group presentations. *Medical Teacher*, 21, 1 (1999), 15 February 2016, <http://med.ubc.ca/files/2012/03/Interactive-Lecturing-Strategies.pdf>