

STRATEGIES INVOLVED IN TEACHING LARGE GROUPS OF UNDERGRADUATE STUDENTS

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Abstract

The study is set at a large, research-intensive university in South Africa. The teaching model in mathematics for entry level students is that of large group teaching, with up to five hundred students per group. The principles required for the success of large group teaching in mathematics, as identified by the teachers involved, are classified hierarchically into two broad categories. The first category concerns organisational principles and the second involves social principles based on the human element. The study shows that organisational fluency such as suitable and well-equipped venues, and the skilful use of technology is essential. What also emerges is the importance of 'soft' skills such as knowledge of large group thinking, and the ability to deploy strategies to build a group identity and group coherence, as well as for making the individual feel recognised. The recommendation is for these skills to be developed to cultivate an environment within which large group learning is optimised.

Keywords: Large groups, university students, group dynamics, lectures, class size.

Introduction

Large group teaching is a reality in higher education, and lecturing as a teaching mode will be around for the foreseeable future. Although these bold statements are open for speculation and discussion, they are nevertheless the point of departure for this study. We support Jawitz (2011), who claim that, The view that large class lectures in higher education are 'bad' and should be avoided if possible, is a dominant one that needs to be challenged. Not enough attention has been paid to the advantages and special opportunities that exist in working with large classes, and the lecture as a particular mode of teaching can play an important role (p. 140). We therefore need to delve into lecturing as a method of teaching in order to fully understand it and maximise the benefits of using this mode. The premise of this paper is to embrace the phenomenon of large classes rather than lament it, and show that there is much to embrace. Jungic, Kent and Menz (2006) state that little has been done towards expanding the body of knowledge with regard to the large group teaching of mathematics. Teachers tasked with teaching large groups are likely to seek guidance in this respect as it may be quite formidable to be faced with such a group. The sheer size of the group leaves little margin for error, and could pose a threat to an inexperienced teacher. The question here is what skills will enable an educator to successfully handle a large group, and allow for optimal learning to take place.

This paper reports on the experiences of twelve mathematics lecturers, who were practitioners skilled in teaching large groups. The first-hand accounts of what skills are required when teaching large groups are hierarchically organised into the two broad categories of organisational and social skills, each with three sub skills categories.

Literature Review

For the purpose of this study, we reviewed the available literature on large groups; the impact of class size on the success of lectures; and the impact of the roles of group dynamics, technology and interaction on successful teaching.

Large Groups

Large groups of people getting together for a purpose, such as attending a sporting event, a concert, or a conference are part and parcel of human activity. Collins (2004) uses the term “interaction ritual” to describe such events, of which the lecture is an example. Collins (2004) claims that without face-to-face interaction rituals, writings and ideas would never be charged with emotional energy. Allais (2011) states that interaction rituals foster and sustain a sense of group identity in large groups. She further states that in its best form, a lecture provides an introduction to a field or an overview of an argument, while at the same time stimulating students’ interest in learning more. This is perhaps what is meant by making the subject ‘come alive’.

Jawitz (2011) maintains that of the benefits provided by teaching large classes, those associated with the social and economies of scale aspects are substantial. Large classes allow the educator to promote the importance, and thus the requirement for high attendance, of the lecture as an event. Such classes further allow the educator to use crowd mentality and mood to achieve learning goals, which facilitates learning. The ideal is to “turn this crowd atmosphere to pedagogical use” (Wolfman, 2002, p. 258).

The question immediately arises: what is a large class? Large classes have a different meaning in different parts of the world. We get the impression that anything higher than 30 students is considered to be a large class in some parts of the world, but in countries such as South Africa and Australia, groups often consist of 300 to 400 students. For the purpose of this study, large classes are considered to be groups of more than 200. Lecturers are often thrown into the deep end when it comes to teaching a large group. A lecture hall filled with 300 to 400 students or more can be intimidating for both students and the lecturer, and lecturing such groups is more often a task given to lecturers who do not have years of experience (Jawitz, 2011). So, the lecturer is faced with a problematic situation as s/he is not trained in dealing with large groups of people, is not familiar with the intricacies of group dynamics, and does not know how to exploit the energy emanating from a large group. Thus, when moving from teaching a small group to teaching a large group there is a similar danger to when moving to new technology – the danger of replicating the old way of doing

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things in the new setting instead of rethinking the teaching strategy. In this case, teaching techniques that have worked for small groups are tried on the large group.

Although the virtues of a student-centred approach to teaching is highly regarded, high student numbers force universities to consider moving to a teacher-centred approach in which the teacher has the control and responsibility (Surgenor, 2010). The question then arises: how can a lecturer create the best learning environment in a large class? In the student-centred approach to teaching, the focus is on developing student understanding and conceptual change. The focus is also on student activities and the learning outcomes following from these activities (Cannon & Newble, 2002). The challenge with large groups is then to create possibilities for engaging students in active learning, and encouraging a deeper approach to learning (Surgenor, 2010).

Much has been written on teaching large groups of students (Jungic, Kent & Menz, 2006), but in most studies, the focus is on logistical and technical issues or on clearly apparent issues such as discipline, organisation, and preparation. To a large extent, more emotional issues, such as large group dynamics, have been neglected (Hogan & Kwiatkowski, 1998). Hogan and Kwiatkowski (1998) explain that,

Students may experience powerful feelings of alienation, anger, and envy in large groups and compensate in various ways, some of which will be antithetical to achieving effective learning and a stimulating educational experience. Similarly, lecturers can also seek to cope with their own feelings of fear and uncertainty by behaving equally maladaptively (p. 1).

Christopher (2011) mentions some of the arguments against and in favour of large group teaching. Those in opposition to large groups argue that it is unfair to be expected to teach these large groups and maintain the standards established for smaller groups. They further maintain that large groups are not only unfair to staff members in terms of teaching loads, but unfair in terms of offering students quality education. It is implied that no meaningful dialogue or interaction with students is possible in large groups and that students do not attend large group lectures.

Alternatively, proponents of large groups argue that the same amount of lecture material is covered regardless of class size, and that these classes generate many full-time equivalent (FTE) units. These units provide a department the opportunity to teach special undergraduate and graduate courses that might otherwise not be offered due to resource constraints. Large groups allow a department to optimise its limited resources while serving the needs of the department and the university, and are often referred to as the *bread-and-butter* of a department. Another advantage is that this approach makes the expertise of a good teacher available to many students while keeping teaching loads at a low enough level to permit time for staff members to develop their expertise through research and publication (Christopher, 2011).

Class Size

The issue of class size is not new. The philosopher Comenius is claimed to have said that it is better to teach large groups as this promotes and intensifies the educator's investment and interest in their work (Glass, 1985). Over the last few decades, research has mostly reported that class size does not have a major impact on student learning. In Follman's (1994) review of what research had been conducted on class size up to the year 1994, he concludes that most findings imply that unless class size is very low (below 15), class size does not impact student performance, especially adversely, which is a common opinion. Laughlin (1976) refers to class size as a "sacred cow" and concludes from research that "class size has not been shown to be a major factor in student learning," and that "at this time research data does not substantiate that differing class sizes make a difference in student cognitive growth." Christopher (2011) contends that teaching smaller classes has been found to be more effective only when higher-level cognitive skills are being taught. This means that when transferring factual information, large classes are no better or worse than teaching small classes.

To determine the relationship between class size and achievement, Williams, Cook, Quinn and Jensen (1985) used final exams given to different sized classes to perform a multiple regression analysis and concluded that, "Class size may be less important an influence on student achievement than some educators have thought," (p. 307) and that large classes (even up to several hundreds) may not seriously affect achievement.

Group Dynamics

Humans behave differently when functioning in groups. Support mechanisms are present in groups that can improve the overall performance of the group members. Unfortunately, there are also possible negative issues that have to be addressed, such as competition, conflict, and de-individualisation (Sniezek, 2007).

When teaching a large group, it is often difficult to get the students to become a cohesive group with common learning goals and a group identity instead of just a room full of individuals who are strangers to one another (Jungic, Kent & Menz, 2006). A common identity in a group empowers the group to create group norms that all members of the group can attempt to fulfill through their attitudes, beliefs and behaviour (McCauley, 1989).

When teaching a large group, the group dynamics can be exploited to improve overall performance of the individual members of the groups. However, educators should not be ignorant about the disadvantages and difficulties when a large group is cohesive and behaves as a collective (Sniezek, 2007).

Interaction

In the large group teaching format, the importance of human interaction is often ignored (Jungic, Kent & Menz, 2006). An example of the difficulties that may be experienced include the safety in anonymity that some students enjoy, making a noise during lectures. Moreover, lecturers may find it difficult to see a raised hand or to hear a question. In a large group it becomes even more important to recognise individual students rather than a mass of people.

The University of Washington (2009) suggests some strategies to reduce students' anonymity so that they can make a connection with the lecturer or fellow students. This would help students be more willing to participate in a large class. Such strategies include introducing yourself in detail, showing interest in the students as individuals before and after class (including learning some of their names), and using known names during the lecture as this shows the students that the educator is interested and invested in helping them. Morton (2007) makes a case for providing for the diversity of the student population. A lecturer should find out as much as possible about the student cohort who will attend the lectures and use different examples reflecting the subject disciplines of the different students.

Technology

Teaching technology such as a microphone, laptop or Tablet PC has alleviated the difficulties of teaching large groups in a lecture hall. The availability of contemporary technology such as Learning Management Systems (LMS) assists in managing a large group (Jungic, Kent & Menz, 2006). Using the discussion board feature, a lecturer can get feedback from students on their particular needs, which can then be addressed in the lecture. Morton (2007) mentions that a lecturer should import technology into the lecture, such as audio and video, to generate interest and provide rich and varied information to enliven a lecture. He lists a few dos and don'ts about using technology. Two-way communication can be established in class when using clickers or some device enabling students to respond to the questions posed by the lecturer. Research on the use of technology for large group learning, supplemental to face-to-face teaching, shows that the student learning experience is usually enhanced by using teaching technology appropriately (Saunders & Gale, 2012; Vigentini, 2009).

Theoretical Framework

Based on the literature consulted, as reported in the previous section, the authors embarked on developing a phenomenographic framework. The process is described subsequently. Phenomenography identifies how people process particular situations or phenomena (Marton & Booth, 1997). The method elicits the range of experiences, and the research "outcome space" is a set of related experience categories that are sometimes structured in a certain way according to factors of importance.

From the literature, and from many years of our own experience as undergraduate mathematics teachers, the different principles that are important in teaching large groups well were grouped into *organisational principles* and *social principles*.

Organisational principles included *discipline*, including authority, order, punctuality and respect; *presentation clarity*, including audible and legible lectures, presentation technology and support technology; and the *preparation and pacing* of lectures.

Social principles included *individualisation*, including getting to know your students, involvement and creating a work culture, and after class interaction; *motivation*, including the lecturer as performer, motivating students, using humour and enthusiasm and interest; and *group coherence*, including addressing large group dynamics, identity, and winning students over.

Research Problem

Since the phenomenon of large groups of students is a reality, rather than repeating the often heard lamentations about the problems that are experienced when teaching large groups of students, the aim of this study, as inferred, is to positively investigate what factors and practices bear on the success of the large group teaching of undergraduate mathematics. Although this study was conducted in a mathematics department, the results are valid in any discipline – there is little that distinguishes these groups of students from students in any other subject.

Research Design

At the university where this study is conducted, teaching groups of between 200 and 500 undergraduate mathematics students are common. Twelve lecturers (around 25% of the staff members) in the mathematics department are involved in teaching large groups and most of them have been doing so for many years.

A questionnaire was developed with open-ended questions, with the aim of investigating what advice an experienced large group lecturer would present to someone starting out on teaching large groups. The questionnaire was jointly compiled by the researchers and verified for an appropriate scope of questions. Respondents were firstly probed for general advice about large group teaching. It gave respondents an opportunity to offer guiding principles based on their experience of large group teaching and then about activities particular to their own teaching.

The questionnaire also asked about the things that each lecturer did that was special to teaching a large group. The lecturers were requested to indicate how they gave recognition to individuals by making the individual feel part of the group. They were asked about how they engaged students in the lecture when teaching a large group, creating a coherence in the large group and a feeling of belonging in the group. The lecturers had to indicate how they got to know more about the students that they taught. They were also asked how they used humour in their teaching, how they

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motivated students to put effort into the course, and how they succeeded in demonstrating passion and enthusiasm for the subject in their lectures. Then, the lecturers had to indicate how they used technology (the LMS, Facebook, amongst others) for teaching purposes (other than in class).

Finally, the respondents were requested to indicate to what extent they agreed with the following statement:

A large class enhances your teaching because of the greater response and the energy in the class.

The questionnaire was distributed amongst the twelve staff members of the mathematics department involved in large group teaching, giving individual assurance of anonymity on reporting. It was completed by all twelve lecturers, showing a 100% response rate. This is not representative of the entire teaching staff but represents all lecturers that have been involved in teaching large groups of students.

Using a phenomenographic approach, as stated in the previous section, the researchers manually coded sections from the lecturers' questionnaire, which were then iteratively allotted categories. The researchers first identified relevant themes individually, with the flexibility to adapt themes as, and when, needed. The researchers then jointly went through the lecturers' responses, confirming, rejecting or modifying each category and/or theme through a group discussion at the end of each stage. This allowed us to gain a clear, agreed upon "outcome space" with a defined set of categories.

A limitation of the study is that it was based on 12 responses only. It is thus a small and context-specific data set. Moreover, the study may suffer from institutional bias, however, the study could be extended to other institutions for future research. It should be noted, however, that for a single department to have 12 lecturers with experience in large group teaching is exceptional and provides a valuable research source.

Findings

The principles that emerged were grouped into two broad categories of organisational and social principles, each subdivided into three sub-categories. A hierarchical order was established, moving from practical, organisational principles to human principles, such as personal, emotional and sociopsychological issues. These included issues related to group dynamics and identity, thus constructing the theoretical framework. Each category is described in more detail and illustrated by quotes. This description is then followed by a short exposition of the practice of implementing these principles in the class. The number of responses that were received relating to the topic is provided in brackets.

The findings emanating from the analysis of the questionnaire responses are discussed within the structure of the theoretical framework.

Organisational Principles

Discipline

What emerges on the first level, and as most prominent, is the notion that a large group should be controlled through authority, and that disciplinary measures should be laid down at the onset. A large group should be handled through displaying confidence. Furthermore, punctuality is expected from both the lecturer and the students.

Authority (5): Be authoritative, confident and in control of the class.

Be big, bold, definitely not apologetic (R1).

Be in control of the students, your lecture and the technology (R2).

Show authority, confidence (R3).

Discipline, order and punctuality (10): Formulate rules for maintaining discipline and order, and apply these from the onset. Punctuality is important.

Set the rules about arriving late, texting, earphones. Implement the rule (R4).

Be strict about latecomers (R1).

Be punctual to lecture contact venues – lectures, class test venues and any other appointment. If late, by a minute, say it explicitly and apologise (R3).

Respect (6): Demand manners and respect, and give respect.

Show them respect and they will respect you back (R5).

Mutual respect is important (R2).

Show students that you respect them or even say it (R3).

Practices cited to enforce authority are, for example, looking students in the eyes and spelling out the rules. Large classes pose the threat of noisiness, so the practices to counteract this are picking out one culprit as an example and, for instance, requesting him/her to keep quiet and then asking permission to continue and thanking the student once he/she agrees that you may do so. One respondent (R6) disagreed with this and confessed to tolerating some noise as he would tell himself that they were discussing mathematics.

The practices for preventing late coming include rewarding those that are early by quick revision of what was done the previous day, but not starting something new before a few minutes have elapsed. The disruption was not perceived to be as significant as in small groups, although not all respondents agreed and some took drastic measures against latecomers such as asking them to leave. Another respondent (R7) disagreed with the concept of enforcing rules and claimed that it is

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possible to follow a different approach where there will be no discipline issues (discussed under VI).

Mutual respect and tact were advocated, with mention of the precaution not to humiliate a student by poking fun at them in front of the class. There was also a warning given by one respondent (R8) to guard against too much familiarity.

Presentation Clarity

On the second level, and also geared towards the practicalities of teaching a large lecture group, is the use of technology for audibility and legibility. Large group teaching in particular poses the danger of physical hindrances such as not being able to hear or see. For this purpose, using technology was strongly advocated amongst the respondents. The advantages, and often the necessity of using technology emerged strongly from the responses.

Audible and legible (10): Pay special attention to ensuring that all students can hear you and can see whatever you produce for them to read.

Whether you use a tablet, the black board or both, remember that many students sit far away from you, take care that they can read whatever it is you are writing (R9).

Be sure that everyone can hear you – use a microphone (R1).

I use a microphone to get a psychological advantage over my students and also so that I don't have to strain my voice when teaching (R10).

Presentation technology (11): A Tablet PC as technology is ideally suited to teaching mathematics to large groups, accompanied by a microphone. Be there early to check the technology.

Chalkboard as the main form of teaching does not work. Use a Tablet PC and a microphone (R7).

Use a Tablet to look them in the eye (R1).

Use technology: tablet, microphone, camera, etc. (R2).

Know your Tablet PC and the connections, know the safe codes and how the microphone works (carry extra batteries) (R7).

Support technology (5): The Learning Management System (LMS) has a definite supporting role in large group teaching. The LMS that is used at this university is Blackboard but it is locally called ClickUP.

You are not always able to do all the necessary problems. Use ClickUP when time runs out (R2).

Turning my notes into a pdf file which I share with students on ClickUP has the added benefit that I can give problems as homework and provide them

with the answers as part of my notes or show them explicitly on how to finish solving a problem if time runs out in class (R10).

I put pre-lecture notes on ClickUP so students have a chance to prepare for the lecture, and read up on the topic of the lecture in advance (R9).

In the setting of this study, the facilities are of a high quality and therefore it is common practice to teach using a microphone for audibility. The mathematics department has also invested in technology for teaching, and for this purpose has provided all large group lecturers with Tablet PCs. The venues used for lecturing are technology enabled and projections are large and clear. Although the odd lecturer still uses the blackboard for teaching, group size permitting, the blackboard is not an option for truly large groups. Lecturers have taken positively to using Tablet PC technology, often preparing an outline of the lecture beforehand and fleshing it out in class, and also making use of video clips, graphs and other features available on such a device. Class notes are also converted to pdf format and posted on the ClickUP portal for students to access. Other practices include posting notes beforehand in preparation for the lecture, posting extra problems, or a complete solution for a problem that was outlined in class.

Preparation and Pacing

On the third level, the notion emerging from the responses was the importance of preparation and the pacing of the presentation. Thorough preparation was advised, more so than for smaller groups, as well as a decreased presentation pace.

Preparation (8): Particular care should be taken in preparing lectures when presenting to large groups.

Be prepared – really prepared. If you hesitate, you are lost and the students will start talking (R11).

Know your subject content very well. Prepare your lessons carefully with interesting and well-selected examples (R10).

Be extremely well-prepared – minimize mistakes (R2).

Pacing (3): Large group teaching necessitates a slower pace.

If you teach a “big” group, you cannot do all the work in a period that you can do in a period for a “small” group. Somehow, you have to work more slowly (R11).

Time management is important: Teaching big groups is time consuming (R2).

Preparation is one of the keystones to presenting to large groups. Under-preparedness and hesitation can impact the attention of the students and often results in them commenting and ridiculing the lecturer or content amongst themselves. It also undermines the lecturer’s confidence. According to one respondent (R7), you should not only know the work but should also carefully plan how you will approach the work, what background information you need to refresh

the content, and from what angle you will approach the topic. This adds to the educator's confidence and the success of the lecture. It should be noted that examples should be selected with care. Due to the decreased pace of large group lecturing, valuable time is wasted if mistakes made by the lecturer need to be rectified.

Social Principles

Individualisation

On the fourth level, and moving away from practicalities, the respondents were alert about treating individuals personally and encouraging the creation of increased student involvement through a common work culture.

Individualisation (2): Get to know a few names in the group and notice behaviour patterns

Show them you care by just knowing the few students names. Try to remember their sitting behaviour and show the students that you do notice where they sit most of the time (R5).

Try to involve them individually. Get to know some of their names. If a student asks a question, always ask his/her name (R6).

Involvement and work culture (8): Involve everyone and create a common work culture

Try to interact with the class. This will most likely involve only a small proportion of the students who are actually willing to answer a question (R10).

Don't think you cannot implement active learning. Use technology as a tool to make active learning possible (R4).

Create a culture of learning – We work together in the lecture, I don't do the work while you watch. Everyone tries an example, even the back benchers (R7).

After class interaction (4): Use the short period after class for valuable interaction

Be available if a student quickly wants to ask something before/after the lecture (R2).

Stay behind after the lecture – there is always somebody who wants to speak to you (R6).

If someone asks a question, I sometimes tell them to see me after the class.

To answer a question and the rest of the class do not know what the question is and are not interested it could cause chaos. Best to avoid (R8).

Other practices for individualisation include reading out the names of the top performers in tests, even asking them to stand to be congratulated. Randomly picking a student from the class and asking a question is a practice in groups of say 200, but becomes difficult to execute in truly large groups (say 500) because it is often difficult

or even impossible to hear the answer. A similar practice is to start a public conversation with an individual with everybody listening, asking his/her name, where s/he comes from, and what s/he studies. Tutorial sessions and consultation sessions give the lecturer an opportunity to get to know the individuals in the class. Another practice is to instruct students to try an example during the lecture and walk through the lecture hall giving individuals the opportunity to answer, class size permitting. One respondent (R4) advocated walking up and down the aisles during class with the agreement that if students wanted to have their work checked, they could sit at the ends of the rows. The respondent claimed that students actually did this and liked it when she commented on their notations, or work in general. Students can be coached into thinking through asking rhetorical questions such as: "What plan shall we make?" Trying to remember faces and names is an admirable, if limited practice, and some lecturers confess to the frustration of only getting to know a handful of names. Another way of individualising is by coming to the lecture early and, while busy connecting the tablet, to keep smiling at those who are watching and once finished, to walk around chatting to the students. Using technology (clickers specifically) is ideal for engaging students as everyone has to give a response.

Motivation

On the fifth level, the role of the lecturer as a performer and motivator is emphasised, also bringing humour and excitement to the class. Value is added to the interaction through the deliberations of the teacher.

Lecturer as performer (3): The lecturer is a performer that inspires and educates.

Teaching a large class is a performance – you have to inspire students by entertaining them (R6).

For a large group the lecturer is more of a performer and you have to pay attention to captivating the audience – so give character to your classes, let there be something to talk about, something to remember you by – they do not remember what they learned, they remember how they felt (R7).

You can't present just the subject content - you have to put up a bit of a show (R9).

Motivation (3): Play a role in motivating students

In every moment your message must include elements of persuasion and positivity; why completing certain tasks and (timeously) will work in your favour in as far as passing the module is concerned (R3).

A large class needs more motivation, it is easy to fade away in the crowd (R7).

Humour (2): Humour has a place in large group teaching

Make little jokes – sometimes about yourself (R1).

I use as much humour as I can. A lot of it comes naturally, again because I know the student mentality (R8).

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Enthusiasm and interest (10): Show enthusiasm for mathematics and create excitement and interest in the topic at hand and the subject as a whole.

Be enthusiastic and passionate about the subject you teach (R10).

Mathematics is VERY clinical and non-emotional. Go beyond the mathematical content by telling them stories about mathematics, mathematicians and what else to give a personal, human flavour to mathematics. Show excitement about the mathematics (R6).

In a large group one has to be particularly interesting and lively. Holding the attention of a large group needs conscious effort (R7).

I have passion for mathematics and teaching and being honest about this shows (R4).

Motivation is important for large group teaching as it is easy for individuals with feelings of despondency to go unnoticed in the masses. Motivation practices include sketching the bigger picture, pointing out that the students are doing this for their future - they are making a difference for themselves. They do not pass a module, rather, they are advancing a future career. Although it may have gone badly at first, there is an opportunity for recovery. Failure is very difficult for students to deal with, so provide constant encouragement for them not to fall behind. A boost for the students is to tell them that it is not a mistake for them to be sitting where they are, it is because they deserve to be there.

The respondents testified to making a special effort to hold students' attention by varying the pace, interspersing the class with comments and anecdotes, and giving context to the topic at hand. One respondent (R6) had the habit of creating a fuss about a student, asking a question or making a remark. If a student (say Peter) made some conjecture from an example, he would call it "Peter's conjecture" or "Peter's theorem" and would jokingly ask the other students to try to test it with other examples or prove it. Another respondent (R3) illustrated the value of anecdotes by relating an incident of telling students of a newsworthy discovery and after the lecture, on a Friday when most students would rush out to enjoy their weekend, there was a crowd of students who wanted to understand more about the relevance of their math knowledge to the discovery.

Humour is often spontaneous and is invariably valuable in regaining the attention and interest of the students and for relaxing the mood. Humour is also used deliberately after a long sequence of mathematics when the class feels tired or bored. There are a number of mathematical jokes that can be used in what one respondent (R7) called "a commercial break", when the moment is right for something lighter. Humour is a binding factor and the respondents testified to its worth.

The respondents were witness to the importance of displaying enthusiasm and passion for the subject, which is something that cannot be faked. Practices include pointing out the beauty of mathematics, telling students about the history of a certain result and about unsuccessful attempts through history to prove a result, but also

telling them about recent developments in the mathematics world so as to avert the impression that mathematics is an ancient subject. This positive emotion will hopefully result in students liking the subject more and wanting to engage further with the subject material. Another practice (R7) given is that whenever it gets tough or when there is an impressive formula, the lecturer should stop the students so as to take note, and say that this is the type of thing they must take home to show the paying parents that they are not wasting their money.

Group Coherence

On the sixth and highest level is the awareness that a large group has a character in itself, that there is an energy that can be tapped into to the advantage of both students and lecturer. The key is to embrace the largeness of the group rather than trying to counteract it, tapping into the energy rather than controlling it, letting the individual feel recognised as part of a coherent group rather than attempting to individualise a few people in the class, and creating a whole bigger than the sum of its parts.

Large group dynamics and identity (3):

Big crowd as they are, know their collective psychology and feedback mechanisms to your interaction with them (R3).

Create or suss out the group identity and group feeling – I believe every large group has a character - certain peculiarities and characteristics. If you know that you can adjust your approach to it and really reach them (R7). Individually I don't really get to know them but I know the psyche of a first year engineering student and I have sympathy with their workload (R8).

Winning them over (3):

Remember, you want them close to your bosom – even if that is not physical closeness. The opposite might close them off from you (psychologically) (R3).

Make it clear that you are on their side. You will do whatever possible to help the pass the course.(R6).

Bond with the group from the beginning, win them over. Sometimes you bond better with one group than another (R7).

The practices of exploring the group identity and winning students over are on the highest level in this categorisation. A knowledge of group dynamics and group psychology is preferable, although not prevalent amongst mathematics lecturers. History has shown that there are people who can naturally influence and sway crowds, tapping into their emotions and gaining their goodwill. Amongst the respondents, this was the least focused on aspect of large group teaching. Yet, there are valiant efforts on an intuitive level to follow a psychological approach. One respondent (R3) claimed that he paid attention to winning students over. He said that it developed quickly and soon, class reps would be talking to you and his task was to cooperate with them and appreciate their input. He focused on the positive aspects

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that enhance mutual trust, cooperation and academic friendship, which are the stepping stones to positive engagement. In passing, this might even be commented upon in the next contact with those students. The class representative was mentioned by another respondent (R7) in terms of building the group identity and creating coherence. He or she is their peer and what they say is taken seriously. The class representative is coached into giving a short “message” once a week, often humorous, sometimes profound, wishing peers well, and commiserating with them after a test. Students find listening to someone their age believable and funny, which has been hugely successful for the purpose of coherence. Another lecturer (R6) believed in building a group spirit by ‘conspiring’ with students that the group was going to make history by every member of the group passing the course – and that this had never happened before.

Yet another respondent (R8) said that individually, she did not really get to know the students, but she knew the psyche of a first-year engineering student and this shows through. She had standard sayings that she knew they would like – “Very few of ‘us’ communicates in our first language, so we should all feel at home here.” She maintained that the class as a whole had a common goal of succeeding and that she was on their side. Another suggested practice is to set a reward for cooperation and the hard work of the group as a whole by using the last ten minutes of the last lecture of the week to tell a well-prepared mathematically related humorous or informative story. This provides a common treat to look forward to. Another respondent (R9) believed that by addressing the class as a collective, it creates the impression that the group is a unit. However, he disagreed that it is the lecturer’s task to create unity, he rather believed it is much more of an internal process, taking place among the students themselves.

It should be emphasised that the efforts mentioned above are not based on large group dynamics principles, but are merely intuitive efforts. Nonetheless, there is an awareness of large group dynamics and behaviour among certain respondents. Such principles should be explored and large group lecturers should be advised regarding best practices.

Finally, respondents were asked to agree or disagree (on a four point Likert scale) with the following statement:

“A large class enhances your teaching because of the greater response and the energy in the class.”

Of the 12 respondents, seven were in agreement with the statement (five strongly agreed and two agreed) and five of the respondents disagreed with the statement. It is noticeable that not one of the five respondents who disagreed with the statement gave responses falling in the sixth category related to large group psychology. It is also noticeable that all four respondents (six responses) who gave responses that fell in the sixth category agreed with the statement above. It could be surmised that for most lecturers, efficiency, order and enthusiasm are at the heart of large group

teaching. However, in many cases, small group teaching techniques are practiced only on a smaller scale in the large group – knowing a few names, checking a few students' work.

It is also noticeable that of the total of 94 points of advice raised by the 12 respondents, 56 fell into the first three categories (the practicalities), and 38 into the last three categories (the human elements).

Discussion and Conclusions

Large group teaching is the order of the day at universities. Thus an inventory of skills required for doing this should be valuable to teachers embarking on this activity. In doing so, the danger of trying to transfer teaching strategies used for small groups to large groups could be eliminated.

The findings of this study are in agreement with Jawitz (2011), who advises that we need to work on making lecturing (and learning) in large groups engaging and enjoyable for students. This can be done in a variety of ways, as mentioned above, specifically, dramatising the content where necessary, and using humour where applicable to ensure that class interaction in large groups is not only an unforgettable experience for the students, but one where they feel a sense of community and belonging.

Practicalities such as maintaining order in the group, having clarity of presentation, and doing thorough preparation and pacing the lecture correctly cannot be discounted. The importance of these issues is emphasised by most of the respondents in this study.

What does emerge, and corresponds to what Jawitz (2011) infers, is that organisational skills alone do not translate into successful large group teaching. Factors such as the enthusiasm of the teachers, individualization, and motivational aspects are paramount. Creating coherence in a large group is a valuable skill that could and should be cultivated through scholarly practices.

We support the claim that large group teaching does not compromise student performance or cognitive growth (Follman, 1994; Laughlin, 1976) and that the quality of the teacher is more important in determining the success of the learning outcomes than the size of the class. The fact that these opinions have withstood the test of time testifies to its validity.

Caution should be taken that the teacher is not lulled into thinking that by knowing a few individual's names that all individuals will feel recognised. Dividing the large group into small discussion groups is also not feasible as it leads to disorder and also makes it impossible to hear students give feedback from the back of the lecture hall. These are practices inherited from small group teaching that could perhaps work for

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groups of up to 200. Perhaps a distinction should be made between large groups and mammoth groups of over 400 in terms of specific teaching practices.

The premise of this paper is that it is possible to work with the group as a whole while making individuals feel important within the group. Concerts, rallies and sports matches are testimony to that. It is also suspected that if the elements in the last three categories were in place, there would be fewer issues with discipline and control. The recommendation is that teachers of large groups should take cognisance of the psychology and dynamics involved and put these into practice, and in so doing, add a new dimension to their teaching of large groups.

In conclusion we add our voice to that of Jungic, Kent and Menz (2006), who find that it is rewarding to teach large numbers of students as the advantages thereof include opportunities to get students passionate about the subject, and tapping into students' positive energy to help teach the content more effectively. There is nothing quite like the "aha" moment that a large group of students experiences together, and this acts as a reminder to lecturers of what learning should be about. Therefore, it can be concluded that teaching large classes can be enjoyable for both lecturers and students alike, despite the additional challenges that come with it.

Although this study was conducted in a mathematics department, the results are valid in any discipline – there is nothing that distinguishes these groups of students from students in other subjects.

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