Active learning in large groups: A case study from new students' orientation

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Abstract

Learning to think critically is an important part of students' first year of tertiary study. The learning advisors at Massey University's Wellington campus expanded their input into orientation week to address this skill area. To make optimal use of the time allocated, we wanted to present key critical thinking concepts in a manner that would engage students in active learning. This decision was informed by literature which indicated that active learning approaches facilitate greater retention of ideas, engagement and motivation. We also viewed critical thinking as a skill that is best learned by doing. Challenges we faced included: adapting active learning approaches for use in the designated venues which were traditional tiered lecture theatres; and delivering these workshops to large groups of students with few staff facilitating. In order to implement active approaches in a large group setting we minimised the lecture type style of delivery to briefly address the content of the session, presented concepts briefly, and then asked students to practise these skills in small groups using a range of activities. Feedback from students on the workshop style was very positive and a brief review of the written material that students completed showed that most groups had been able to complete the activities in the time allocated, indicating that the tasks were pitched at a suitable level. Overall, this session indicated that using activity-based learning was a viable means of teaching in a lecture setting.

Re-orienting orientation

The methods used by learning advisors to present academic skills during orientation week at Massey University's Wellington campus underwent considerable change in the period 2011-2012. Prior to 2011, the Student Learning Centre offered Study Smart, which was an optional one-day course for which students were required to pre-register and pay a nominal fee to cover printed resources (J. Wutzler, personal communication, August 3, 2012). This course covered topics such as expectations regarding studying at university, skills such as reading, note-taking, library use and writing for assignments. The structure and facilitation style format of the workshop encouraged active student participation through self-evaluation, quizzes, small group discussions and workbook activities. Attendance was typically 60-80 students out of a new student intake of 1,000-1,200 students (J. Wutzler, personal communication, August 3 & 6, 2012).

In 2011, these optional workshops were removed from orientation in favour of presenting a condensed version of the same programme to all new students. The new sessions were framed as part of the main orientation programme rather than as an optional extra. In order to deliver our programme to a larger number of students, it was determined that we would use the format of 2.5 hour sessions, broken up with short breaks which would be presented in lecture theatres to groups of up to 200 students at a time. After reflecting on this approach, it was decided that aiming to present key academic skills to all first year students during orientation was a worthwhile move because students were keen to develop their study skills at this point in the semester. However, many students found the condensed format overwhelming; students attending consultations with learning advisors early in the semester reported that they found academic orientation too full and were concerned that they may have missed important information. With this in mind, we moved towards a new way of presenting.

The approach adopted in 2012 was presenting less content in a much more active format. Rather than attempting to give students an overview of all the major academic skills they would need in the semester ahead, we put greater emphasis on making sure students were aware of services on campus and that they knew where to ask for help in future. We also offered students a taster of two skill areas: critical thinking and group work skills. Although these sessions would be presented under similar conditions to the previous year's orientation, we decided that on the basis of strong theoretical support for active learning, it was worth adopting this approach to enhance students' understanding, engagement and motivation in learning about critical thinking and group work.

Rationale for active learning: Reviewing the literature

Active learning covers a wide range of approaches. The common thread connecting these varied approaches is that they require students to put into practice the material they are learning often through working with other students. This means students consolidate their learning and gain immediate feedback on whether they have understood the concepts. The literature explored below suggests that active learning approaches improve students' retention of information (as evidenced in assessment results), enhance student concentration, and promote student engagement and enjoyment.

In the context of the large group lecture, typical active learning approaches included small group discussions around questions the lecturer posed (Huerta, 2007), role plays and debates (Revell & Wainwright, 2009), and solving problems in groups (Gardner & Belland, 2012; Revell & Wainwright, 2009). Other approaches that required students to work individually included handouts where students are required to fill in missing information (Jakee, 2011), posing questions for reflection throughout the lecture (Fata-Hartley, 2011; Huerta, 2007) or using brief quizzes (Gier & Kreiner, 2009). Some studies also include active learning tasks that were designed to be completed

by students between lectures (Fata-Hartley, 2011; Smith & Cardaciotto, 2011). Others also included the use of multimedia elements such as short videos (Cavanagh, 2011) or animations (Gardner & Belland, 2012) in their discussion of active learning strategies.

Studies that compare active learning methods with traditional approaches to lecturing show that incorporating active learning methods in teaching enhances students' retention of lecture content, as evidenced through students' assessment results and self-assessment. For example, Huerta (2007) compared student performance in a first year governmental studies course at a Texan university that used traditional lecture methods with the same course in three subsequent semesters, where each used a different combination of active learning techniques. These active learning approaches used across the three semesters were question-based outlines in the first active learning semester, question-based outlines with small group discussion in the second, and these two approaches with the addition of student-created study outlines in the third active learning semester. The mean results of the five assessments students undertook throughout the semester were compared and it was found that there was a significant increase in students' mean test scores in seven out of fifteen of the active learning assessments compared to the non-active condition. In no assessment was there a significant decrease in students' mean scores in the active learning conditions compared to the non-active conditions. Likewise, in a study of undergraduate psychology students at two Midwestern American universities, Gier and Kreiner (2009) found significantly improved scores in tests and the final exam from students in a class which incorporated content-based questions followed by brief discussion compared to the students from a similar class where the authors used only PowerPoint and handouts to support their teaching.

These findings showing improved exam results are consistent with studies which show students self-report higher levels of learning in courses using active learning techniques. Smith and Cardaciotto (2011) compared the perceptions of students enrolled in a first year psychology course at an American university who completed content-based reviews of material taught in class with students taking the same course who completed activity-based revision tasks. Students answered questions on whether they perceived the activities to be a useful way of learning about the topics and whether they personally had found the activities useful. Significant increases in the active learning group were found for seven out of the nine course modules. Cavanagh's (2011) study of second year students in a mathematics education course also showed that students found activity-based learning to be helpful. Students participated in 'lectorials', which combined segments of lecturing with cooperative activities of 10-15 minutes in duration. The success of this format was evidenced both by student questionnaires showing that students viewed the cooperative activities as valuable for their learning, and by the high rate of attendance in class despite the voluntary nature of the lectorials and the fact that students were able to view the lectorials online without attending class.

It is possible that using a variety of teaching methods is more important than using active learning strategies. The studies reviewed in this paper generally used short segments of traditional lecturing broken up with brief activities. This approach is supported by Cavanagh (2011), and Revell and Wainwright (2009), who note that frequent changes in activity types enabled students to maintain focus for longer periods of time. Young, Robinson and Alberts (2009) note that this "vigilance decrement" (p. 53) sets in 10-30 minutes into a lecture and argue that "any variation in presentation or media can only help to maintain attention and facilitate deeper learning approaches in all lectures" (p. 53). Interestingly, Huerta (2007) found that there was not a great difference in student results between the three courses he taught which each used a different combination of active learning methods, suggesting that perhaps frequent changes in activity type are more important than the choice of particular activities. More evidence that the particular choice of activity may be less important comes from Breckler and Yu (2011), who examined the relationship between teaching styles, learning preferences and students' performance in an advanced physiology paper. They compared the performance of students with a preference for kinaesthetic learning against students who did not select kinaesthetic learning as one of their preferred styles, and found that both groups of students showed a comparable improvement in understanding when a hands-on activity was incorporated into the instruction, compared to when the traditional lecture method was used. This indicates that active learning approaches can be beneficial to students even when they are not aligned with students' preferred learning approaches. Overall, it appears that active learning methods, or indeed any changes in activity, such as using audiovisual extracts, facilitate increased recall and comprehension because breaking the lecture into smaller segments with frequent activity changes facilitates greater concentration. Because it appeared that using an active and segmented format for the workshop was more important than the choice of particular activities, the learning advisors decided that it was appropriate to prioritise ease of implementation in selecting activities for use in the workshop.

Active learning engages students of all abilities. Biggs (2012) argues that students who are considered academically able and highly motivated typically utilise a wide range of learning strategies regardless of the style of teaching used. These strategies will in turn benefit these students throughout their studies. On the other hand, students who are considered less able or motivated typically engage in the material only at the level required to complete the task at hand. This means that when a low level of engagement is required, such as in the typical lecture, these students will use surface approaches to learning. However, Biggs (2012) posits that when these students engage in tasks which call for higher-order skills such as problem-based learning, they use approaches associated with deep learning. Because critical thinking requires students to use

what Biggs (2012) identifies as higher-order skills such as comparing and contrasting, making connections between ideas and reflecting on their experiences, using active learning approaches is a logical way of teaching critical thinking.

Literature examining students' experience of lectures suggests that students generally find courses which use active learning approaches more enjoyable. For example, Revell and Wainwright (2009) found that in a series of focus group and individual interviews with students and staff in the geography department of Brunel University, both groups consistently identified "a high degree of student participation and interaction" (p. 214) as a key component of effective lectures. This finding is consistent with Huerta's (2007) review of end-of-semester evaluations in which 79% of students in the classes which used active learning rated the learning opportunities in the class favourably, compared to 57% of students in the class that did not use active learning. Likewise, the percentage of students who would recommend the lecturer was 85% in the active learning classes, compared to 59% in the non-active classes. On the other hand, Smith and Cardaciotto (2011) surveyed tertiary student responses to two different sets of activities to be completed outside of class and found that although students indicated they experienced a greater degree of challenge and felt they attained a greater depth of understanding when they participated in active learning tasks, they did not report that they enjoyed these tasks more than students who took part in exercises that did not use active learning principles. Overall though, it appears there is reasonable support for the notion that students enjoy learning through activity, suggesting that using this approach would allow the learning advisors to create a positive and enjoyable learning experience for students in orientation.

Strategies and approaches to our orientation workshop

While there is strong pedagogical support for active learning methods, Huerta (2007) observes that many instructors believe that scaling these approaches up from small groups to use in large lectures is not feasible. Although the practicalities of taking an active learning approach initially seemed somewhat daunting, past presentations by colleagues using this approach with smaller groups had been very successful. One of the inspirations for the project was Burns' (2011) report on presenting key aspects of a literature review in the form of short activities. Students moved between stations completing activities such as comparing different designs of literature reviews, discussing how these designs could be used in their own work and comparing approaches to introducing literature. The success of this workshop showed that small-group, discussion-based learning was a viable way for learning advisors to present study skills to students. On this basis, the learning advisors decided to scale up this type of activity-based approach for use in orientation. In adapting the critical thinking workshop, one of the challenges that we faced was that the layout of lecture theatres was fixed, which put limits on students moving around. A second limitation was that as there would be a number of presentations running simultaneously across the campus, there were few staff members available for each session. This meant that we

would need to be reasonably certain that students could complete the activities with minimal staff support. Choosing group work activities was one way of increasing the likelihood that most students would be able to complete the tasks successfully without further assistance from learning advisors due to the diversity of skill levels in each group.

Planning for orientation took into account the need for frequent changes between activities and the advantages of asking students to work in small groups. The format for the session was a 5-10 minute explanation of an idea followed by a 5-10 minute active learning task relating to that concept. Resources for these activities were distributed to students at the beginning of the session. This approach made giving directions about which resources to use much easier. The first three activities focussed on elements of critical reading, as taken from Massey's online model (Massey University, 2011). In these tasks students were asked to read three short texts that related to water quality in New Zealand. They were then asked to find information on the background of the text (such as the kind of source, who published the text and who the intended audience was), the likely purpose of the text and the evidence that was included in the text. The final three activities looked at critical writing. The aim was that in participating in this session, students would begin to:

- Consider what makes a reliable source,
- Identify claims in a text,
- Identify types of supporting evidence,
- Distinguish descriptive and critical writing, and
- Use appropriate language to introduce the literature.

Prior to presenting these sessions, I delivered a practice presentation to my colleagues. They suggested that I include definitions of key academic terms such as argument, reduce the amount of reading in the activity packs, shorten some of the activities and provide greater scaffolding for the activities. On reflection, I realised that I had over-estimated the reading skills that some of the new intake of students would have and that it was important to make sure that the activities did not rely too heavily on students being able to read texts quickly. Reducing the content of the activity packs would not compromise active learning; in fact, reducing the amount of time students needed to spend reading would allow for more time discussing the ideas in the texts. The process of having the material reviewed by my colleagues was beneficial and it enabled me to adhere to the aim of reducing the material covered in favour of ensuring that students experienced mastery of the content we did cover.

Observations and implications

Handouts
The activities in the session were supplemented with paper-based resources. Three of these required students to fill in the blanks with information they found in short

extracts of texts. The remaining three activities required students to categorise statements/words or to place them on a continuum. Rather than having students move to different activities, they were given packs of activities to work through in small groups. Resources were colour-coded so that the presenter could refer to the required activity as, for example, the green grid or the set of yellow cards. In each grid, some of the answers were completed in order to provide appropriate scaffolding. These decisions meant that groups required minimal individual input with the organisational aspects of the task. Handouts collected at the end of the session were largely completed or near-completed, indicating that level of activities and the time allotted were appropriate for most students.

As well as using paper-based resources for group activities, students were given a short summary of the key points to take away at the end of the session. This resource was included at the suggestion of a colleague, who advised that many students appreciate tangible resources (rather than just online resources) to refer back to. Initially, I was hesitant about whether this kind of static resource would aid active learning. However, studies suggest that students regard handouts as a valuable supplement to lectures (Sakraida & Draus, 2005), and respond positively to handouts which have a worksheet component such as requiring students to fill in missing information (Jakee, 2011; Revel & Wainwright, 2009). Such resources provide a clear and engaging structure to the lecture (Jakee, 2011; Revel & Wainwright, 2009). For future presentations, it would be worth including individual worksheets which provide students with a record of what they have covered in the presentation.

Timing
Groups of students completed tasks at different rates, although most students were able to complete most of the tasks in the given time. Some of the activities were structured with tasks to complete first and extension questions for those who finished early. This structure of core and extension questions worked well and is something I would like to expand in future presentations. MacKay (2006) suggests that for groups of diverse learners it is important to consider ways to reduce "the fear of not being able to keep up" (p. 45). One strategy to do this is by dividing activities into what MacKay (2006) describes as "all must...most should...some could" (2006, p. 47) whereby all students complete the first activity, which covers the main concept, and learners who have done this are then able to attempt a variety of subsequent revision strategies. MacKay (2006) recommends that there is a variety of activity types involved at each level so that students who only complete the first level of core tasks still encounter a range of activities. These recommendations are worth considering for future presentations, for example, the first three activities used in the session required students to find and fill in information; for future presentations, it may be beneficial to use a greater range of approaches to cater for a diverse range of learning preferences.

Dominance of reading and writing

The workshop could have been improved by offering a greater range of hands-on or visual activities in addition to activities based on written language. The workshop utilised short segments of lecturing, interspersed with activities which relied on reading and writing skills. It also incorporated other modes of learning, such as kinaesthetic learning by physically rearranging cards into categories or on a continuum. To some degree, this reflects the reality of university study, which is often based around these written skills. However, it is also important to bear in mind that many students prefer to learn through means other than written channels. Breckler and Yu (2011), for example, indicate that although only half the students they surveyed indicated that they preferred a kinaesthetic learning style, hands-on activities were almost universally popular with students in an undergraduate biology class, and led to improved performance across the class. As another approach, Gill (2011) found that students both rated video segments as valuable elements of lectures and were highly engaged in learning from them. Similarly, Schrad (2010) found that "students overwhelmingly responded positively" (p. 763) to lecturing which incorporated short video clips of popular media. In light of these findings, it would be well worth using a mix of video and print sources for students to evaluate.

Student-student interaction

I facilitated two of the four sessions on critical thinking. Although the overall response from students in both groups was positive, I observed that there was a higher level of interaction between students in the second group. Whereas both groups participated willingly and completed the activities, the second group seemed more ready to engage in discussion, ask questions and volunteer opinions. One possible explanation for this is that the second group had just completed another session, Problem Solving 101, covering group work and problem solving skills for first year students. In this session, students completed an initial group-based problem-solving activity, engaged in a structured reflection on their approach to group work and then had the opportunity to try out new approaches to group work in a second scenario-based learning activity. Thus the students were primed for interactive group work when they commenced the critical thinking workshop. Higher levels of participation in the second group may indicate the value of allowing time for students to develop their group work skills before undertaking small group activity-based learning. In a study of second year tertiary students across a semester-long course, Scott-Ladd and Chan (2008) found that students need time and instruction to develop skills for working in groups. They also found that more developed group work skills correlated with students viewing group work more positively. While new students' orientation takes place in a much shorter time frame, there may still be benefits of considering cumulative learning across sessions with regards to preparing students for group work. As is often the case in organising large events, timetabling was driven by logistical concerns such as the availability of lecture theatres, time taken to move

across campus and coordinating with other fixed events in orientation week. However, the unintended benefits of the previous group work session show that, inasmuch as it is feasible to do so, it is worth considering how we can prepare students for positive activity-based and group-based learning experiences.

Additional staff support

I presented two sessions with an additional learning advisor in the room, who assisted with welcoming students, and distributing materials. During the activity slots, both advisors circulated the room and observed progress on the activities. Students were able to call on the advisors to ask for assistance. The ratio of staff members to students (two learning advisors, 150 students in the larger session, working in groups of 3-4) was sufficient to allow the advisors to check in briefly with each group on most activities. Having a second person available to welcome students and to support the logistics of the presentation was valuable, especially when we encountered difficulties with the sound system. Co-presenting the session would be another option to consider for future presentations.

Conclusion

Despite the constraints of the lecture theatre, using an active learning approach to teach critical thinking skills proved to be a viable approach during new students' orientation. Taking this approach offers benefits across a range of criteria, including increasing students' interest and engagement, and maximising the material that is understood and retained. Forward planning in regards to resources meant that it was possible to present these sessions smoothly with two staff members. The positive flow-on effects of students' participation in other sessions running during orientation suggests that it is worth considering orientation holistically rather than as a series of discreet activities. Future presentations could utilise a greater range of media such as using popular video clips for students to critique rather than just using text-based sources. Video material is consistently rated highly by students and its use would minimise the amount of reading that students need to complete in order to participate in the small group activities evaluating claims and evidence in the texts. This would ensure that participation was less contingent on reading speed and therefore may also facilitate smoother timing of the sessions. More formal evaluation of the sessions would also be useful in order to assess students' perceptions of the activities that they participated in. Ultimately though, the active model for teaching critical thinking skills in orientation has met with success both from a student response and a logistical standpoint.

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