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Learning IT:
Where Do Lecturers Fit?

Tanya McGill, Murdoch University, Australia

Samantha Bax, Murdoch University, Australia

ABSTRACT

Lectures are the traditional method of content delivery in undergraduate information technology degrees, yet concerns have been raised about their effectiveness. This paper addresses the role of lectures within information technology degree programs from a student perspective; it examines the factors that influence lecture attendance and student perceptions of the usefulness of a variety of possible lecture activities. Overall, the results suggest that students see the lecturer as contributing significant value to their learning experience through the lecture setting. Students appear to value the expertise of the lecturer and find activities that can best make use of the lecturer's expertise the most useful. The results also suggest that students recognize the importance of active learning within the constraints of traditional learning settings.

Keywords: active learning; student-centered learning; traditional learning

INTRODUCTION

The traditional lecture is one of the most common forms of teaching and has long been the primary method of formally introducing subject material to the student population (Kumar, Kumar & Basu, 2002) as well as providing opportunities for lecturers to guide students on how to study the course's content (Khan, 1996). Yet, the lecture is also considered to be one of the least effective forms of instruction for students (Bligh, 1972; Felder, 1992; Johnston, Moffat, Sondergaard & Stuckey, 1996). Some of the problems reported with the lecturing approach are that lectures can promote passivity, feelings of isolation (Isaacs, 1994; Rosenthal, 1995) and boredom (Mukherjee, 2000). This could make them ineffectual as an approach to learning.

Despite these concerns and the increasing availability and popularity of online education (McCormick, 2000; Peffers & Bloom, 1999), the lecture is the traditional method of learning in undergraduate information technology (IT) degrees and is still the standard for IT courses (Griffiths & Oates, 2003; Lynch & Markham, 2003). This raises the question of what the role of

lectures can and should be within an IT degree program. The study described in this paper meets Khan's (1996) call for more research on students' perceptions of the importance and benefits of attending lectures and explores the opinions of a group of IT students; examining the factors that influenced their lecture attendance and their perceptions of the usefulness of a variety of possible lecture activities.

BACKGROUND

The majority of on-campus IT students today are assumed to attend lectures, which provide the main method of introducing IT content to students. However, lecture attendance is rarely mandatory and varies from course to course, with anecdotal evidence suggesting that there is a trend toward lower attendance. This lower attendance may reflect students' dissatisfaction with lectures as a tool for learning but may also reflect the changing nature of student life with students facing many competing demands on their time and requiring flexibility in learning.

Many lecture sessions take the format of traditional talking head lectures. One concern associated with the passivity that a lecture can encourage is that students who are not actively participating (whether physically or mentally) have a reduced level of concentration after the first 10 to 15 minutes of a lecture (Stuart & Rutherford, 1978), after which the amount of information retained by the student declines (Bligh, 1972). McKeachie (1986) reports that after a lecture, a student recalls 70% of the information presented in the first 10 minutes, but only 20% of the information presented within the last 10 minutes of lecture time.

Schank (1998) asserts that it is a difficult task to listen while someone else (i.e., the lecturer) talks, with the best case scenario being that a student will think about what has just been said and then miss the points that follow in the lecture. What is required for learning to take place is for students to stop listening and process what they have just heard before continuing with further points in the instruction (Rodger, 1995; Schank, 1998). Schank (1998), goes so far as to state that "lecturing is antithetical to learning" (p. 23).

In addition to problems with concentration and information retention, traditional lectures do not easily accommodate discussion, yet dialogue and discussion are considered to be important elements in the promotion of higher-level cognitive processing (Mannison, Patton & Lemon, 1994). Levels of effectiveness in learning are believed to be directly related to the participation of the student, with students tending to retain much more of the material when their engagement with it is high; that is, when they are active learners rather than passive members of an audience (Dale, 1969).

Not all lecture sessions are alike. Lecture sessions may be utilized in a number of ways. In addition to the traditional talking head session, today's IT lecture can involve multimedia demonstrations (Fagin, 1994; Makkonen, 1998; Robling & Freiseben, 2000), interactive case-study analysis (Mukherjee, 2000), role-playing exercises (Lynch & Markham, 2003; McConnell, 1996), in-class problem solving (Rodger, 1995), as well as more unorthodox lecturing approaches such as class singing, as suggested by Siegel (1999). What these approaches have in common is an attempt to introduce active learning to the lecture situation.

One of the most common modifications to the traditional lecture format has been online availability of lecture notes. In

order to reduce the amount of time students spend taking notes and, hence, make time available for more active learning, many academics have advocated making lecture slides available online prior to the lecture (Wirth, 2003). However, concerns have been expressed that online availability of lecture notes promotes lower attendance to the detriment of the students concerned (Hunter & Tetley, 1999; Khan, 1996; Roosenburg, 2002).

While ideas for teaching innovations abound, there is very little empirical evidence available to support them. This paper addresses the role of lectures within IT degree programs from a student perceptive. It explores the opinions of a group of IT students and examines the factors that influence their lecture attendance and their perceptions of the usefulness of a variety of possible lecture activities.

THE STUDY

This study was conducted by survey. Participants in the study were students enrolled in a second-year IT course at an Australian university. They had thus experienced at least one year of IT lectures already, and these lectures would have been in classes of various sizes with a wide variety of lecturers. Participants were recruited during the first lecture of the semester and completed a questionnaire on the spot. It was stressed that the completion of the questionnaire was voluntary and that it formed no part of their assessment in the course.

The first part of the questionnaire collected background information about the participants and information about their lecture attendance. The participants in the study were 113 students (78.8% male, 21.2% female), with an average age of 24 (with a minimum age of 18 and a maximum age of 49). The students were from two campuses of the university; 73.5% attended the larger main campus, and 26.5% attended a smaller regional campus.

Students believed that they had attended around 80% of lectures during the previous semester with a range from 5% to 100% attendance. Given anecdotal reports from academic staff who had previously taught this cohort of students, this average attendance figure might be an overestimate; however it is consistent with figures reported by Hunter and Tetley (1999).

The second part of the questionnaire included questions that sought to determine the factors that influence whether students attend lectures. A list of factors that have been proposed to influence lecture attendance was provided, and participants were asked to indicate if each factor influenced whether they attended lectures. The list of factors that have been proposed to influence lecture attendance was drawn from the literature (Hunter & Tetley, 1999; Isaacs, 1994; Khan, 1996; Roosenburg, 2002). Table 1 includes the list of factors.

The questionnaire also asked about student perceptions of the role of lecturers. The final questions asked students to rate the usefulness, in terms of their learning, of each of a list of possible lecture activities. This list was also drawn from the literature (Mannison et al., 1994; Mukherjee, 2000; Rodrigues & Atchison, 1996; Rosenthal, 1995; Wirth, 2003). The lecture activities were rated on a five-point scale where 1 was *not useful* and 5 corresponded to the activity being *extremely useful*. The Appendix contains a copy of the questions asked.

RESULTS AND DISCUSSION

Factors Influencing Lecture Attendance

Various factors have been proposed to influence lecture attendance. Conflicts with other classes are an obvious one, because if a student has more than one class scheduled for a particular timeslot, they can clearly only be present at one of them. The time of day in which a lecture is scheduled has been cited by Khan (1996) as a factor affecting lecture attendance; Khan states that lectures that are timetabled for early morning or late afternoon appear to have a lower level of attendance. As discussed earlier, online availability of lecture notes is another factor that appears to affect lecture attendance, leading to a decrease in attendance, as students have an alternative means of accessing at least some of the information provided in lectures (Hunter & Tetley, 1999; Khan, 1996; Roosenburg, 2002). The lecturer's style of teaching also has been suggested as a factor influencing lecture attendance, with approximately 50% of students citing poor quality lecturing as a reason for nonattendance, according to Khan's (1996) survey. The quality and accessibility of textbooks are other factors that have been suggested as factors that influence attendance. It is considered that students will attend lectures in order to gain additional explanation and illustration of the concepts presented within the text; especially if the textbook is difficult to understand or presents new or complex material.

Table 1 shows each of these factors ranked from most influential to least influential. Surprisingly, the style of the lecturer's teaching was the most commonly cited determinant of lecture attendance (57.4%). This result is consistent with Khan's (1996) comment that students will be attracted to well-prepared and delivered lectures that are engaging, easy to follow, and relevant to their studies. However, this result also implies that while the student may consider that a lecture adds value to their learning experience, if the style of the lecturer is not one that suits the student, attendance will fall.

The time of day at which the lecture is scheduled was ranked second among the five factors (40.7%) influencing lecture attendance. This appears to be consistent with Khan (1996), who noted that students prefer classes that are not scheduled during late afternoon or early morning.

Online availability of lecture notes was ranked third among the factors (32.4%) influencing lecture attendance. While not the most influential factor, online availability of lecture notes played a major role in influencing whether or not approximately a third of the students attended lectures. This is consistent with the results of Hunter and Tetley's (1999) study of the reasons for nonattendance of lectures. Nevertheless, a substantial proportion of students (67.6%) was not influenced by

Table 1. Ranked list of factors influencing lecture attendance

Rank	Factor	No. responses citing factor	Percentage of responses
1	Lecturer's style of teaching	62	57.4
2	Time of day lecture scheduled	44	40.7
3	Online availability of lecture notes	35	32.4
4	Clashes with other classes	33	30.6
5	Quality and accessibility of the textbook	22	20.4

availability of online lecture notes and presumably believed that attending lectures can add further value to their learning experience.

Conflicts with other classes was ranked fourth among the five factors (30.6%). This relatively low ranking may result from careful lecture scheduling in the past, ensuring that there have been a minimal number of classes timetabled for the same timeslot for this cohort of students. However, a lecture at which some of these data were gathered was inadvertently scheduled to conflict with two other classes during the semester, and this fact was noted by a number of students within the comments section of the survey.

The quality and accessibility of the textbook were the least cited determinant of lecture attendance (20.4%). This may indicate that many students believe that the lecturer adds substantial value to the material that is available to them, regardless of the quality of the textbook. It also may be that attendance is influenced by a number of these factors in combination. For example, the quality of the textbook might not be such an influential factor if the related lecture notes are available online.

The results were further examined to determine whether gender, age, or the campus a student attended had an influence on the factors determining lecture attendance. Possible differences due to gender, age, or campus were explored using chi-square tests, as the variables were all measured on nominal scales. Significantly more male students than female students identified teaching style as an influence on their attendance ($\chi^2(1) = 5.004$, p = 0.025). One explanation for this is that female students are more likely to view lectures as adding value to their learning, regardless of teaching style. However, an alternative explanation might be that lecture attendance meets other needs of female students, such as face-to-face interaction before and after the lecture presentation. No other gender differences were found.

Age appeared to have a significant effect on whether the time of day the lecture was scheduled influenced lecture attendance. Approximately 31% of the sample was at least 24 years old and these students were less influenced by the time of day at which the lecture took place ($\chi^2(1) = 10.137$, p = 0.001). It may be that older students, having made the decision to return to study, are more dedicated to completing the course than younger students, and so they will attend lectures regardless of the time at which they are scheduled. Further research is required to confirm this possibility. No other age differences were observed, nor were any differences noted between the two campuses regarding factors that influenced the students' attendance.

Students also identified other factors that might influence lecture attendance. These included the length of the lecture (the lecture for the course in which the survey was administered was at that time scheduled for a three-hour block, and the majority of students were noted as being opposed to this); and the student's work commitments. However, several students noted that they would always attend lectures, both as a preparation for the tutorial work and as an aid in staying up-to-date within the class, while others claimed laziness and lack of motivation as other factors influencing their attendance at lectures.

Role of the Lecturer

Students next were asked to indicate whether they considered the role of lecturers to be to teach you or to help you learn. Despite being asked to select the statement

that most accurately reflected their perceptions, a number of students selected both statements. Thus 19.4% considered the role of lecturers to be to teach students, 51.9% considered it to be to help students learn, and 28.7% considered the role of the lecturer to be that of both teaching and helping the student to learn. The results indicate that lecturers are increasingly considered to be guidance or learning support personnel, indicating that students at universities have a heightened sense of responsibility for their own scholarship. Thus, student-centered learning appears to be a goal that is being accepted by university staff and students alike (Griffiths & Oates, 2003; Lynch & Markham, 2003; McConnell, 1996; Mukherjee, 2000; Rodger, 1995).

Possible differences in perceptions of the role of the lecturer due to gender, age, and the campus attended were examined using the chi-squared test. While the majority of students saw the role of lecturers to be primarily to help students learn, significantly more male students than female students ($\chi^2(2) = 7.507$, p = 0.023) still believed the role of lecturers is to teach students (25% of male students compared to 0% of female students). Thus, female students appear to have accepted the responsibility for their learning more readily than have male students. This is consistent with the gender difference in response to teaching style discussed above. That is, the lecture attendance of female students is less likely to be affected by their perception of the lecturer's teaching style.

No significant differences were noted between age groups for the perceived role of the lecturer. It thus appears that a student's view of the role of the lecturer does not significantly change as they mature. This result is surprising, given that older students might be expected to take a more mature and self-motivated approach to learning (Piccoli, Ahmad & Ives, 2001).

A significant difference did exist, however, between the two campuses of the university (χ^2 (2) = 6.433, p = 0.040). A much larger percentage of students attending the smaller regional campus (35.7%) considered that the role of the lecturer was to teach them, compared to 13.8% of the students at the main university campus. This result was surprising, as we had anticipated that students attending the larger, more anonymous lectures at the main campus would be predisposed to seeing their own role as a more passive one. However, the difference may be due to the students at the regional campus having a more traditional working class background and, hence, being less familiar and comfortable with the technological innovations that tend to support student-centered learning.

Lecture Activity Usefulness

The final part of the questionnaire asked students to rate the usefulness, in terms of their learning, of each of a list of possible lecture activities. All suggested activities were ranked relatively high, indicating that students want more than just the traditional style of lectures. Table 2 shows each of the activities ranked by perceived usefulness.

The lecture activity identified as most useful to learning was practical demonstration. The fact that a number of students also specifically commented that they would like to see practical or real-life applications of the theory covered within lectures provides further evidence of this. The importance of the use of real-world illustrations of course material has also been highlighted by Orngreen and Bielli (2002), Mukherjee (2000), and Rodrigues and Atchison (1996).

Table 2. Perceived usefulness of lecture activities

Rank	Lecture Activity	Mean	SD	Min.	Max.
1	Practical demonstrations	4.47	0.74	1	5
2	Reviewing previous exam questions	4.29	0.90	1	5
3	Coverage of topic material	4.12	0.88	1	5
4	Questioning the lecturer	3.78	1.04	1	5
5	Class discussion	3.64	1.06	1	5
6	Videos/Multimedia	3.58	1.04	1	5
7	Small group activities/exercises	3.49	1.05	1	5

Reviewing of exam questions was ranked second in terms of usefulness as a lecture activity. This result may be related to the students' recognition that reviewing exam questions is a useful revision aid for the current lecture topic, particularly when having access to the knowledge of the lecturer while the revision activity is occurring. This result highlights how focused students currently are on passing courses. With increases in education costs, this is to be expected.

Coverage of the topic material was listed as the third most useful lecture activity. Despite the increased flexibility in approaches to study available to students, many appear to still consider the lecture and its related additional explanations and clarifications as valuable additions to their learning.

Questioning the lecturer was considered fourth in usefulness as a lecture activity. This is further evidence that students view the lecture as an opportunity to add value to their learning experience and that the expertise of the lecturer is considered to be a significant addition to both their lecture time and their education.

Class discussion was ranked fifth. This relatively low ranking of class discussion as a lecture activity can be explained by the fact that many IT classes are large (Johnston et al., 1996), and group discussion is impractical for large groups. Many students feel uncomfortable expressing themselves in a large public setting, and it is difficult to hear individual contributions within a large lecture theater. In addition, in Australian universities, class discussion is traditionally an activity performed during tutorial classes. Thus, undertaking an activity that is already being completed within other learning sessions may not be considered by students to be a useful activity during lecture time. Despite this, Rodger (1995) reported on the value of class discussion in IT lectures, stating that "Although less material is covered during class, students obtain a deeper understanding of this material and can expand on this understanding outside of class" (p. 278).

Use of videos and multimedia was ranked second lowest. Activities that are computer-based are perhaps perceived as activities that students can undertake within their own time. Thus, time during lectures could be better spent in activities that are less flexible timewise and that can take advantage of the expertise of the lecturer while he or she is present. The lowest ranked lecture activity was that of small group activities and exercises. This result might be explained by small group activities also being prevalent within tutorial classes, and, thus, the students may not consider this to be a useful addition to the lecture time slot.

Overall, it appears that activities that provide access to the knowledge and expertise of the lecturer are those that are most valued during the lecture time slot. However, it also appears that the students wish to have a greater control of these activities in order to ensure that the activities undertaken during lecture time suit their own perceived needs.

The responses were further examined to determine if differences occurred in perceptions of the usefulness of the suggested lecture activities based on gender, age, or the campus surveyed. This analysis was undertaken using independent samples t-tests. The results indicated that, on average, females ranked most of the activities as more useful than males (except for practical demonstrations). However, the only significant differences existed for small group activities/exercises ($t = 0.276$, $p = 0.007$) and questioning the lecturer ($t = 2.35$, $p = 0.021$). This may be an indication that females desire a more personalized approach to learning, relative to their male counterparts. However, more research is required to further explore this finding.

Videos and multimedia were seen as significantly more useful additions by students who were younger (under 24 years of age) ($t = 2.35$, $p = 0.021$). One explanation for this finding may be that younger students are more comfortable with the use of technology in education and, hence, perceive it to be more useful. However, future research is required to better clarify this finding.

The only significant difference in preference for lecture activities between campuses was that of class discussion ($t = -0.201$, $p = 0.047$), where the students attending the smaller regional campus indicated this as a more useful lecture activity. This difference can be explained by the fact that class discussion during lecture times is more feasible with the smaller class sizes of the regional campus.

CONCLUSION

The results of this research suggest that students can see the importance of attending lectures and that they see the lecturer as contributing significant value to their learning experience through the lecture setting. Students appear to value the expertise of the lecturer and wish to take advantage of this knowledge during lecture time. Thus, despite the influence of the lecturer's teaching style on attendance, the activities that can best make use of the lecturer's expertise are those that are most preferred to be undertaken during the lecture time slot.

It also appears that the role of the lecturer is perceived as more than just that of a teacher. Many students have adopted a student-centered view of education and perceive the role of the lecturer to be to facilitate their learning. The results of the study also suggest a recognition of the importance of active learning within the constraints of traditional learning settings. Active learning has received attention among both trainers and academics for its role in aiding learning (Mukherjee, 2000) and encouraging students to become self-directed learners throughout their lifetimes (Meyers & Jones, 1993). Therefore, it should be a goal of all lecturers to involve active learning in their lectures.

This paper attempted to explore the role of lectures within IT education. As discussed previously, many students do see the importance of attending lectures and see the lecturer as contributing significant value to their learning experience through the lecture setting. However, if lectures are to continue to play a role in IT education,

they must facilitate active learning in ways that are appropriate for the size and the nature of the course. Given the prevalence of online availability of lecture notes and the flexibility this provides to students, lecturers must ensure that lecture sessions provide added value. They must provide varied opportunities for students to take advantage of the lecturer's expertise and also to encourage students to become active and self-directed learners.

REFERENCES

Bligh, D.A. (1972). *What's the use of lectures?* Hammondsworth: Penguin.

Dale, E. (1969). *Audio visual methods in teaching*. New York: Holt, Rinehart, Winston.

Fagin, B. (1994). Two years of "the digital world": Portable courseware for technological literacy. *SIGCSE Bulletin, 26*(1), 97-101.

Felder, R. (1992). How about a quick one? *Chemical Engineering Education, 26*(1), 18-19.

Griffiths, G., & Oates, B.J. (2003). Lecture-free teaching for systems analysis: An action research study. *Proceedings of the 2003 Informing Science + Information Technology Education Joint Conference, .*

Hunter, S., & Tetley, J. (1999). Lectures. Why don't students attend? *Cornerstones: What We Value in Higher Education*, 1-8.

Isaacs, G. (1994). Lecturing practices and note-taking purposes. *Studies in Higher Education, 19*(2), 203-216.

Johnston, R., Moffat, A., Sondergaard, H., & Stuckey, P. (1996). Low-contact learning in a first year programming course. *Proceeding of the 1st Australasian Conference on Computer Science Education* (pp. 19-26).

Khan, S. (1996). *Why don't they come to the lecture?* Learning Through Teaching: Proceedings of the 6th Annual Teaching Learning Forum, Perth, Australia, 163-165.

Kumar, A., Kumar, P., & Basu, S.C. (2002). Student perceptions of virtual education: An exploratory study. In M. Khosrow-Pour (Ed.), *Web-based instructional learning* (pp. 132-141). London: IRM Press.

Lynch, K., & Markham, S. (2003). The winds of change: Students' comfort level in different learning environments. *SIGCSE Bulletin, 35*(3), 70-73.

Makkonen, P. (1998). WWW-based presentations as a complementary part of conventional lectures in the basics of informatics. *SIGCSE Bulletin, 30*(3), 162-165.

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

McConnell, J.J. (1996). Active learning and its use in computer science. *SIGCSE Bulletin, 28*, 52-54.

McCormick, J. (2000). The new school. *Newsweek, 135*(17), 60-62.

McKeachie, W.J. (1986). *Teaching tips*. Lexington, KY: D.C. Health & Co.

Meyers, C., & Jones, T.B. (1993). *Promoting active learning: Strategies for the college classroom*. San Francisco: Jossey-Bass.

Mukherjee, A. (2000). Effective use of in-class mini case analysis for discovery learning in an undergraduate MIS course. *Journal of Computer Information Systems, 40*(3), 15-23.

Orngreen, R., & Bielli, P. (2002). Learning with multimedia cases in the information systems area. In M. Khosrow-Pour

(Ed.), *Web-based instructional learning* (pp. 242-251). London: IRM Press.

Peffers, K., & Bloom, S. (1999). Internet-based innovations for teaching IS courses: The state of adoption, 1998-2000. *Journal of Information Technology Theory and Application, 1*(1), 1-6.

Piccoli, G., Ahmad, R., & Ives, B. (2001). Web-based virtual learning environments: A research framework and a preliminary assessment of effectiveness in basic IT skills training. *MIS Quarterly, 25*(4), 401-427.

Robling, G., & Freiseben, B. (2000). Experiences in using animations in introductory computer science lectures. *SIGCSE Bulletin, 32*(1), 134-138.

Rodger, S.H. (1995). An interactive lecture approach to teaching computer science. *SIGCSE Bulletin, 27*(1), 278-282.

Rodrigues, C., & Atchison, M. (1996). A case-study based approach to assessment of systems design and implementation. *Proceedings of the 1st Australasian Conference on Computer Science Education*, (pp. 95-102).

Roosenburg, A. (2002). Attention, attendance sliding away. Retrieved 1 July 2004, 2004, from *http://www.cavelierdaily.com/CVarticle.asp?ID=12944&pid=895*

Rosenthal, J. (1995). Active learning strategies in advanced mathematics classes. *Studies in Higher Education, 19*(2), 223-228.

Schank, R. C. (1998). Horses for courses. *Communications of the ACM, 41*(7), 23-25.

Siegel, E.V. (1999). Why do fools fall into infinite loops: Singing to your computer science class. *SIGCSE Bulletin, 31*(3), 167-170.

Stuart, J., & Rutherford, R. (1978). Medical student concentration during lectures. *The Lancet, 2*, 514-516.

Wirth, M.A. (2003). E-notes: Using electronic lecture notes to support active learning in computer science. *SIGCSE Bulletin, 35*(2), 57-60.

APPENDIX

1. How old are you?   ____ Years

2. What gender are you?
   __ Female   ___ Male

3. Do you normally attend lectures?
   Rarely   Always
   1   2   3   4   5

4. Approximately what percentage of your lectures did you attend last semester?
   __ %

5. What factors influenced whether you attended lectures? (check all that apply)
   ___ Conflicts with other classes
   ___ Time of day
   ___ Whether lecture notes could be downloaded
   ___ Lecturer's style of teaching
   ___ Quality and accessibility of the textbook
   ___ Other (add as many as you like)

6. Which of the following statements more accurately reflects your perception of the role of a lecturer
   __ To teach you
   __ To help you learn
   __ Other (add as many as you like)

7. Please rate the usefulness of each of the following lecture activities to help your learning?

Detailed coverage of topic material
Not Useful   Very Useful
1   2   3   4   5

Practical demonstrations
Not Useful   Very Useful
1   2   3   4   5

Videos/multimedia
Not Useful   Very Useful
1   2   3   4   5

Class discussion
Not Useful   Very Useful
1   2   3   4   5

Small group activities/exercises
Not Useful   Very Useful
1   2   3   4   5

Questioning the lecturer
Not Useful   Very Useful
1   2   3   4   5

Reviewing previous exam questions
Not Useful   Very Useful
1   2   3   4   5

Tanya McGill is a senior lecturer in the School of Information Technology at Murdoch University in Western Australia. She has a PhD from Murdoch University. Her major research interests include end user computing and information technology education. Her work has appeared in various journals including the Journal of Research on Computing in Education, European Journal of Psychology of Education, Journal of the American Society for Information Science, *and the* Journal of Organizational and End User Computing.

Samantha Bax is associate lecturer in the School of Information Technology at Murdoch University in Western Australia. Her research interests include end user development and information systems success as well as online learning environments.