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# Is attending lectures relevant anymore in engineering education?

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**Abstract**

A case-study was conducted on a group of undergraduate chemical engineering students to assess the relevance of attending lectures from a student perspective and to understand why these students attend and do not attend lectures with a view to developing approaches to teaching which are of greater interest and benefit to student learning. The students were surveyed by means of a questionnaire-type survey which collected both quantitative and qualitative data from them. The majority of students stated that lectures are still very beneficial to their learning and are not an out-of-date mode of education, with less than 9% of students stating that lectures are out of date. Consequently, attending lectures is still very relevant today to student learning. The major reasons for lecture non-attendance were time conflict issues with other scholarly activities, such as continuous assessments, and poor quality teaching. The students provided a number of suggestions to improve lectures and lecture attendance, including the incorporation of active learning in lectures, linking lectures to assessment, adding extra value to what is already in the notes and the lecturer should be enthusiastic and be able to capture the interest of the students.

**Keywords:** lecture relevance; student attendance.

## 1. Introduction

Most lecturers would state that students should attend lectures in order to successfully progress and gain the most out of a course. However, some students frequently miss lectures or rarely attend them at all. Students in a class usually possess a variety of different learning styles, which has a major influence on what they gain out of a lecture. Several dozen learning style models have been developed (Myers, 1962; Kolb, 1976, 1984; Schmeck et al., 1977; Gregorc and Ward, 1977; Gregorc, 1985; Honey and Mumford, 1986; Dunn and Dunn, 1993; Grasha, 1994, 1996;) with some being the subject of studies in the engineering education literature (Felder and Brent, 2005), such as the Felder and Silverman model (Felder and Silverman, 1988). The traditional teaching style of lecturers is typically verbally orientated where the lecturer is active but the students are passive except for note-taking. This is often a mismatch with the learning styles of many students who for example, may be active, visual or global learners. Consequently, these students become bored, inattentive and discouraged, leading to the realisation that they are not gaining much from lectures,

out of which they loose interest in attending lectures or consciously decide not to attend them.

Many experimental studies have been carried out to try and quantify what students retain during a typical 50-minute traditional lecture in which the lecturer is active lecturing while the students are for the most part passive other than note-taking (Hartley & Davis, 1978; Penner, 1984; Stuart & Rutherford, 1978). Immediately after the lecture, the students were tested on course content. The typical percentage of correct answers as a function of time during the lecture is presented in Figure 1. Typically after 10 minutes this percentage maximises at around 70% and then progressively decreases to typically about 20% at the end of the lecture. These studies show that much of the material presented during lectures are not actually being retained by many students during the lecture. This could act as a reason for non-attendance by some students.

Active learning is an approach to teaching that periodically gets all the students doing something course-related in class other than watching and listening to the instructor and taking notes. There is extensive evidence that shows that active learning promotes both short-term and long-term learning (Prince, 2004). Each active learning activity engages the students with what is being taught through their own activity. This greatly increases their attention to what is being taught and thus should result in greater retention of material taught in comparison to traditional lecturing. This enhanced student engagement can result in greater student satisfaction because they are gaining more from the lectures and this can lead to greater attendance at lectures.
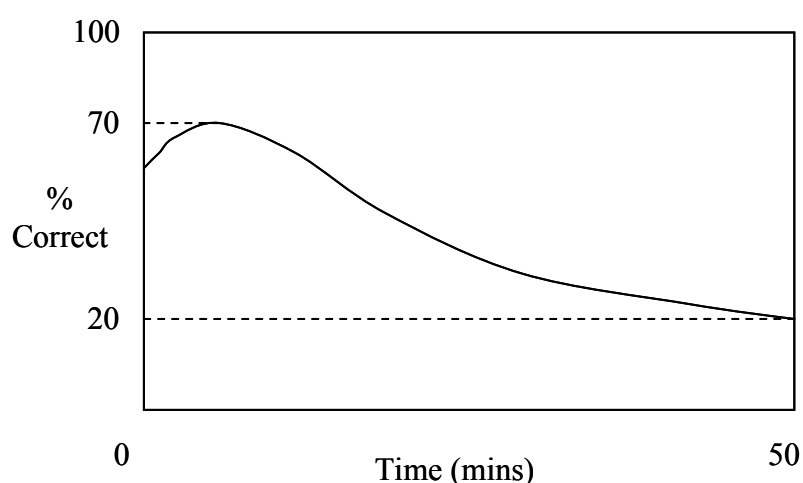


Figure 1. Typical percentage of correct answers as a function of time during a traditional lecture. [Immediately after the lecture, the students were tested on lecture content. **[Cite ref here**]]

Before the advent of the personal computer (PC), most lecturers would write material on the blackboard or on an overhead projector and the students would write these down into their copybooks as notes. Consequently, attending lectures was important just to obtain a good set of notes for future study for exams. Students could decide to not attend and photocopy the notes of other students but this was very cumbersome and oftentimes it was difficult to understand another student's note-taking or their hand writing.

After the advent of the PC, more and more lecturers began to prepare notes themselves using the PC that could be handed out to the students. This greatly reduced the amount of material that had to be written down by both the lecturer and students during class. Today, many lecturers provide the students with a complete set of notes that are either given out at the beginning of the course as a "tailor-made book" or are given out to the students as handouts throughout the course. Furthermore, many lecturers use PowerPoint to complement the notes that they have given out. Many lecturers place all these materials on a virtual learning system, such as Blackboard or Moodle, which are easily assessable by the students. Comparing the current situation with the pre-PC era, it is now a lot easier for a student to obtain a very good set of notes without ever attending lectures. Some students may even argue that it is more useful for them to spend the lecture time studying the notes and other material on Blackboard or Moodle than attending lectures.

The authors are lecturers in Process & Chemical Engineering at University College Cork (UCC) and over the years they have noticed a wide variation in student attendance, ranging from as low as 15% to a maximum of 100% attendance. The fourth year students would usually be the worst attendees. The authors lecture on a four-year Bachelor of Engineering in Process & Chemical Engineering and they have been lecturing on this degree for around 12 – 15 years each. Each of the authors teaches around 4-5 modules on the degree programme each year. The annual student intake onto this programme is typically around 25 students. In fourth year, the students have a lot of continuous assessment work as they have research and design projects which account for twenty of their sixty credits, and this is in addition to other continuous assessment work associated with other modules.

Each of the authors has prepared an extensive set of notes for each of their modules. Two of the authors give this out to the students as a "tailor-made" book at the beginning of the module. One of the authors gives the notes out throughout the module at the beginning of each class. All three lecturers place these notes and other materials, such as PowerPoint presentations, worked problem sets and animations on the Blackboard virtual learning system used in UCC. The three authors would consider themselves to be reasonably good teachers who are committed to trying to achieve good student learning. Two of the authors have received awards for excellence in teaching and learning within UCC. The initial motivation for this study originated from the large variation in student attendance. This lead to postulating reasons why students attend and don't attend, one of these being the extensive handing out of notes and the use of Blackboard. As a consequence of this, the lead author surveyed the undergraduate students so as to gain real insights from the students themselves. This paper presents the results from this survey or case-study. The specific objectives of this case-study were:

- to assess the relevance of attending lectures from a student perspective and
- to understand why these students attend and do not attend lectures with a view to developing approaches to teaching which are of greater interest and benefit to student learning.


## 2. Methodology

A questionnaire-type survey was used to ascertain both quantitative and qualitative data from the students pertaining to the objectives of the case-study. The use of this survey is a suitable method for achieving the objectives because they involve the

gathering of relevant data from the students. The survey was carefully constructed and reviewed by the authors and another colleague in the Education Department in UCC. This survey approach was an easy method to quickly survey students in the undergraduate programme. The survey was e-mailed to each of the students in the second, third and fourth year classes. They were asked to complete it and either e-mail it back to the lead author or if they wished to remain anonymous then print it out and leave in the lead author's mail box. The numbers of students involved in survey and percentage response rates are provided in Table 1.

Table 1.  Numbers of students in the survey and percentage response rates.

| Students | Number in class | Number responded | Percentage response |
|---|---|---|---|
| Second years | 23 | 10 | 44 |
| Third years | 22 | 16 | 73 |
| Fourth years | 22 | 13 | 59 |
| TOTAL | 67 | 39 | 58 |

There were 8 statements or questions on the survey the first simply asking the students to state what year they were in. Statements 2, 3 and 4 of the survey are presented in Figure 2 and they focus on the relevance of lectures to the students.

Statements 5 and 6 focus on the reasons for non-attendance and for attendance by the students, as presented in Figure 3. Under each statement there are between 12 and 15 reasons given which are presented and evaluated in section 3 below (See Tables 2 and 3). The students were asked to tick if these are definitely reasons or sometimes reason for non attending or attending of lectures.

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**2.** I think lectures are very beneficial to my learning.


Strongly Agree          Agree          Not sure          Disagree          Strongly Disagree

**3.** If the lecturer provides a good module handbook, then there is no real need to attend lectures.


Strongly Agree          Agree          Not sure          Disagree          Strongly Disagree

**4.** Lectures are now an out-dated mode of education in the modern world of information technology, distance learning and self-directed learning.


Strongly Agree          Agree          Not sure          Disagree          Strongly Disagree

<u>Please comment</u>:

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Figure 2.  Statements 2, 3 and 4 of the survey.

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**5.** If you **DO NOT attend lectures** of **certain modules regularly** (i.e. every week), tick any of the following reasons below if they are **in-part** the **reasons** for your **non-attendance**

**6.** If you **DO attend lectures** of **certain modules regularly** (i.e. every week), tick any of the following reasons below if they are **in-part** the **reasons** for your **attendance**

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Figure 3.  Statements 5 and 6 of the survey.

Questions 7 and 8 of the survey are presented in Figure 4. These try to ascertain from the students what really makes a good lecture in their opinion and what can the lecturers do to try and make lectures more worthwhile attending.

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**7.** What in your opinion does a really good lecture consist of (format, delivery and/or style)? Please comment:

**8.**  In your opinion, how can lectures be made more worthwhile for you to attend more regularly? Please comment:

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Figure 4.  Questions 7 and 8 of the survey.

## 3. Results and discussion

### 3.1. *The relevance of lectures*

A summary of the student responses to statement 2 ("I think lectures are very beneficial to my learning") is presented in Figure 5. These data clearly show that:

- Overall, for the three years surveyed, 15% strongly agree, 64% agree, 15% are unsure and only 6% either disagree or strongly disagree.
- The students by and large believe that lectures are very beneficial to their learning.
- There is significant variation between the three years surveyed with over 40% of the the fourth year students indicating that they are either unsure or (to a lesser degree) do not think lectures are beneficial to their learning). This compares with an overall figure of just 20%.
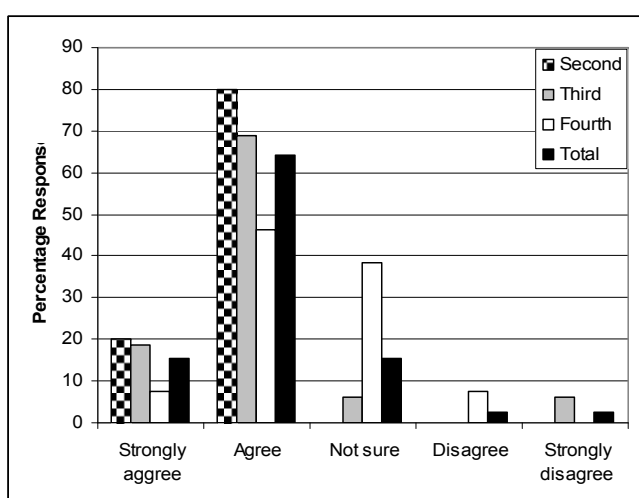


Figure 5.  Summary of student responses to statement 2 in the survey.

Preparing a good set of notes in form of a handbook and distributing to the students is very beneficial to students preparing for an exam; however this may result in some students deciding not to attend lectures. Statement 3 of the survey ("If the lecturer provides a good handbook then there is no need to attend lectures") was inserted in the survey to assess this proposition. A summary of the student responses to statement 3 is presented in Figure 6. These data clearly show that:

- Overall, for the three years surveyed, 23% agree, 36% are unsure 31% disagree and only 5% each strongly agree or strongly disagree.
- The responses are quite mixed but it does show that 28% of the students surveyed either agree or strongly agree, thus it appears that providing a good handbook may lead to significant percentage of students not attending lectures.

One student wrote that *"A good module handbook is invaluable when studying for the exam, and it also allows the student to understand the scope and structure of the module. It probably does harm attendance at lectures because students do not feel they always need to attend, but I would not like to see them being abandoned."*
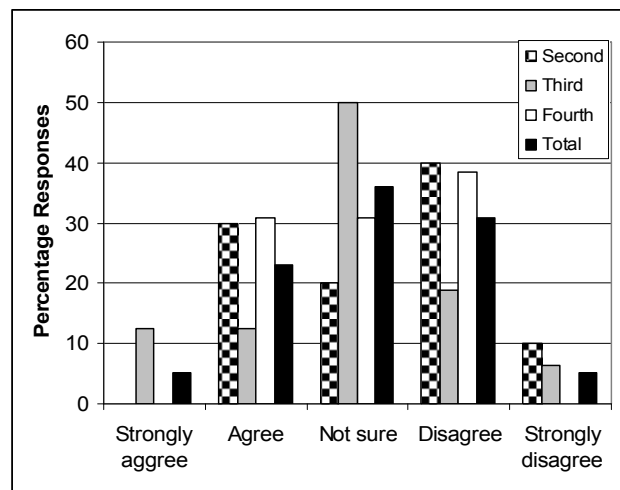
Figure 6. Summary of student responses to statement 3 in the survey.

In the modern era of IT and distance learning, some may consider that lecturing is now an out-of-date mode of education. Statement 4 was inserted in the survey to assess if the students considered this to be true. A summary of the student responses to statement 4 are presented in Figure 7. These data clearly show that:

- Overall, for the three years surveyed, 8% strongly disagree, 64% disagree, 20% are unsure and only 8% agree or strongly agree.
- 72% either agree or strongly agree, thus it is clear from this case-study that the majority of students do not believe that lecturing is an out-of-date mode of education.
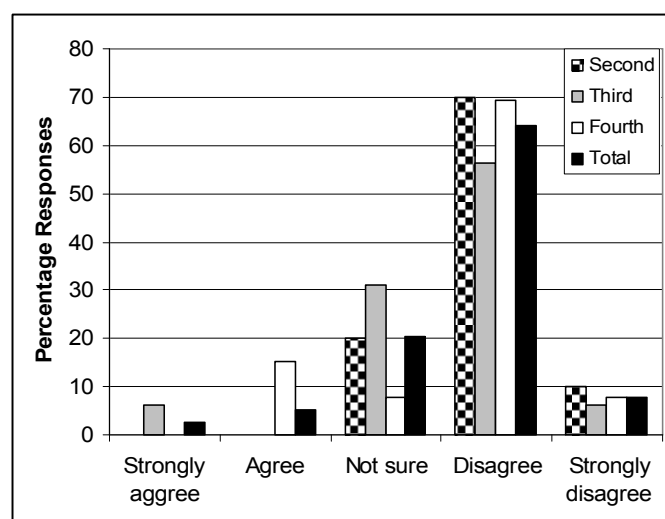


Figure 7. Summary of student responses to statement 4 in the survey.

The qualitative responses of the students to statement 4 could be broadly summarised by stating that lectures and tutorials are other vehicles through which a variety of teaching techniques can be applied to engage students and enhance student learning. For example, the responses of three students were as follows:

*"I'm a very visual learner and find it much more beneficial to attend lectures and actively learn the material rather than to sit down at a computer and read it all. I find myself remembering pictures, actions and explanations that I actually saw."* [2nd year]

*"Only so much can be learned online or through podcasts. Lectures allow for clearer explanations of material. Before the exams, its helps to be able to picture the lecturer talking about the topic in question."* [4th year]

*"I believe that tutorials are more beneficial, I didn't really learn much in class but after the tutorials I got a better understanding of the subject (plus it helped greatly when it came to studying the material for exams)!"* [3rd year]

### 3.2. *Factors influencing the non-attendance at lectures*

Fifteen reasons for not attending lectures regularly were provided in statement 5 of the survey and the students were asked to tick those that they considered to be definite reasons or sometimes reasons why they did not attend lectures regularly. A summary of the analysis for the definite reasons only is presented in Table 2, where the reasons are ordered in decreasing percentage response order from all three years.

The first four major reasons for non-attendance at lectures can be summarised as follows:

- **Continuous assessment deadlines and in-class exams in other modules:** Overall 41% stated this as a definite reason and a further 26% stated it as sometimes. However, there is a lot of variation amongst the years. It is a really big issue amongst the fourth year students with 77% definite and a further 15% sometimes, while it is smaller issue for the third years and really not much of an issue for the second years.
- **Projects and assignments:** Overall 38% stated this as a definite reason and a further 21% stated it as sometimes. But once again, this is a particular issue of concern amongst fourth year students and appears not to be an issue at all amongst the second years.
- **Not gaining much benefit from lectures:** Overall 23% stated this as a definite reason and a further 26% stated it as sometimes.
- **Too many lectures and labs:** Overall 23% stated this as a definite reason and a further 21% stated it as sometimes.

There were many reasons that appear not to be significant reasons to the students, that is, having a percentage response equalled to or less than 10%. These were:
- Lectures are boring (except for 1st years).
- I dislike the material.
- I dislike the lecturer.
- Lunch-time lectures.
- Part-time job makes it difficult to attend lectures.
- Social life makes me too tired to attend lectures.

Other reasons worth noting for not attending regularly by the second years were 9:00 lectures did not suit them [50%], poor standard of teaching [40%] and boring lectures [30%].

Table 2. Percentage of those who responded who ticked the reasons below as being definite reasons why they did NOT attend lectures regularly. [ALL represents percentage response from all three years]

| **Reasons for NOT attending lectures regularly** | Year 2 | Year 3 | Year 4 | ALL |
|---|---|---|---|---|
| Continuous assessment deadlines and in-class exams from other lecturers means I concentrate on these rather than the lectures | 10 | 31 | 77 | **41** |
| Projects and assignments take up a lot of time and there is not enough time to attend lectures | 0 | 31 | 77 | **38** |
| Do not gain much benefit from lectures | 30 | 6 | 38 | **23** |
| We have too many lectures and lab sessions and I cannot possibly attend most of them. | 20 | 19 | 31 | **23** |
| 9:00 lectures do not suit me | 50 | 6 | 15 | **21** |
| More useful to use the lecture time to study module notes | 0 | 13 | 38 | **18** |
| Poor standard of teaching by the lecturer | 40 | 6 | 15 | **18** |
| Good lecture notes are more than sufficient | 0 | 19 | 23 | **15** |
| Lectures are boring and do not engage my attention | 30 | 0 | 8 | **10** |
| I dislike the material covered in the module | 10 | 13 | 0 | **8** |
| I dislike the lecturer | 10 | 0 | 8 | **5** |
| 13:00 – 14:00 lectures do not suit me | 10 | 0 | 0 | **3** |
| Lectures after 14:00 do not suit me | 10 | 0 | 0 | **3** |
| Part-time job makes it difficult to attend lectures | 0 | 0 | 0 | **0** |
| Social life makes me too tired to attend lectures | 0 | 0 | 0 | **0** |

In summary, the major reasons for non-attendance could be broadly catorgorised as:
- **Time conflict issues** due to continuous assessment deadlines, in-class exams, projects, assignments and laboratories. This was a particularly big issue for the 4th year students.
- **Lecture quality** in terms of not gaining much from the lecture, boring lectures and the quality of teaching being perceived as poor.

There was limited qualitative data provided by the students and most of this came from the fourth year students which elaborated mainly on the time conflict issues mentioned above. For example, two fourth year students stated:
*"In 4th year and also in 3rd year the main reasons for my absence is workload with assignments and projects. In order to do this work and attend all lectures I would be spending ALL of my time in college."*
*"I try to attend as many lectures as I can but more often than not when I don't attend it is down to the fact that there is a lot of project work, assignments and in-class tests involved in this course that need to be focused on in order to make deadlines and maintain a high standard of continuous assessment marks."*

### 3.3. *Factors influencing the attendance at lectures*

Twelve reasons for attending lectures regularly were provided in statement 6 of the survey and the students were asked to tick those that they considered to be definite reasons or sometimes reasons why they attended lectures regularly. A summary of the

analysis for the definite reasons only is presented in Table 3, where the reasons are ordered in decreasing percentage response order from all three years.

The first four major reasons for attendance at lectures can be summarised as follows:
- **Good standard of teaching:** Overall 59% stated this as a definite reason and a further 13% stated it as sometimes. This was important for all 3 years.
- **Lectures help the student understand the material a lot better:** Overall 51% stated this as a definite reason and a further 31% stated it as sometimes. Once again, this was important to all 3 years.
- **Might miss something important if not attending lectures:** Overall 44% stated this as a definite reason and a further 31% stated it as sometimes.
- **Lectures are an alternative vehicle to the notes:** Overall 38% stated this as a definite reason and a further 28% stated it as sometimes. It was of particular importance to the second years.

Unlike the reasons for non-attending, none of the reasons presented in Table 3 could be considered as insignificant. Considering the first, second and fourth reasons, it is clear that good quality lecturing adds value to the notes and is an alternative vehicle which can help student understanding of the course material and thus encourage them to attend. This is supported by the very limited qualitative data that was supplied by two fourth year students:
*"The material and discussions in lectures often give a better insight into the material. I can gain a better understanding of the course material by attending lectures.*
*"Attending lectures helps me understand. This is the main reason I attend lectures at all! Some lecturers are difficult to follow, so then the reason is lost."*

Table 3. Percentage of those who responded who ticked the reasons below as being definite reasons why they did attend lectures regularly. [ALL represents percentage response from all three years]

| **Reasons for attending lectures regularly** | **Year 2** | **Year 3** | **Year 4** | **ALL** |
|---|---|---|---|---|
| Good standard of teaching by the lecturer | 50 | 50 | 77 | **59** |
| Attending lectures helps me understand the course material a lot better than just reading through the module notes. | 70 | 44 | 46 | **51** |
| I feel that I could miss out on something important if I miss lectures | 30 | 50 | 46 | **44** |
| Lectures are an alternative vehicle to the notes to help me do well in the module exam(s) | 80 | 19 | 31 | **38** |
| To get the notes, as lecturer only hands out notes during each lecture | 50 | 25 | 31 | **33** |
| The lecturer keeps a record of attendance | 30 | 38 | 23 | **31** |
| Lecturer provides little or no module handout materials, thus I need to go to lectures to find out what is being covered | 50 | 13 | 31 | **28** |
| Lectures are very interesting and engage my attention | 40 | 13 | 31 | **26** |
| Lecturer provides a good set of ancillary materials (PowerPoint, overhead slides, etc) in class which complement the lecture notes | 30 | 25 | 23 | **26** |
| Lecturer gets the students to do things during the lectures, thus we are actively involved during the | 10 | 38 | 15 | **23** |

| | | | | |
|---|---|---|---|---|
| lecture | | | | |
| Lecture area coincides with my interests | 10 | 13 | 38 | **21** |
| I want to a maintain good impression with the lecturer | 20 | 25 | 8 | **18** |

### 3.4. *How to improve lectures?*

This is addressed by considering question 7 in the survey ("What in your opinion does a really good lecture consist of (format, delivery and/or style)?") The student' responses in all 3 years raised similar issues and these are summarised below using direct quotes from the students:

**Engagement/active learning environment**
*"Lecturer must engage the students. Students must be active, participating in the lecture. Not passively sitting there."* [2nd year]
*"Consistent engagement of the audience. Get them to take things down, get them to work things out. In general, I have found that a tutorial-type style of lecturing is more beneficial for a student and much more engaging."* [4th year]
*"The best lectures are where the students are actively involved in the class. The lecturer could ask the students questions, explain a situation. The lecturer should encourage the students to ask questions."* [2nd year]

**Good notes/presentation**
*"Good notes given out at start of class or available beforehand, in booklet or to print off blackboard. PowerPoint presentation containing salient points from notes but worded differently from notes, presented by lecturer with enthusiasm. Notes should have gaps for some figures/diagrams that need to be taken down in class."* [2nd year]
*"A good lecture consists of having a good set of course notes in front of you during the lecture."* [4th year]

**Address all types of learners**
*"A really good lecture is structured (so that the more global relevance is made clear before little details are handled), dynamic (not when the lecturer just stands and reads through the notes out loud) and interesting. Visual aids such as diagrams or PowerPoint slides are very useful."* [2nd year]

**Match material to assessment**
*"It really helps if lecturer does exam questions to give student more of an understanding of the material on the course."* [2nd year]
*"Keeps in sync with notes; does practical examples; constantly refers to exams and how material may be asked in exams."* [3rd year]

**Provide a safe/positive learning environment**
*"I find a friendly, casual style the most pleasant. Most certainly a student must not in any way be nervous about any asking or saying anything."* [3rd year]

**Active learning environment through problem solving**
*"Giving the class a question and then going around helping students who are trying to solve it I find works well."* [3rd year]

> *"When concepts are explained by the lecturer by referring to examples. Problem solving in class."* [3rd year]
> *"Engagement with class other than asking questions, e.g. attempt problems followed by correct method and explanation."* [4th year]

**Creating conditions for a deep learning experience**
*"I attend most of my lectures if I find I benefit from them. Lecture notes can always be photocopied from other people/books; it's the actual understanding of them that I find important. The reason I would skip a module regularly is because I find I'm wasting my time – I can easily pick up a book and teach myself the same material more clearly in the hour I've just wasted sitting down not learning anything."* [2nd year]

### 3.5. *How to improve student attendance?*

This is addressed by considering question 8 in the survey ("In your opinion, how can lectures be made more worthwhile for you to attend more regularly?") The student' responses in all 3 years can be categorised under 3 major headings and these are summarised below using direct quotes from the students:

**Lectures should incorporate the preparing of students for the exams**
*"Do specific past exam questions or have class assignments."* [2nd year]
*"Exam strategy, exam questions, exam solutions, exams exams exams."* [3rd year]
*"Make it clear that the material being covered will be relevant to the exam"* [4th year]

**Implementation of active learning during lectures**
*"The best lectures are where the students are actively involved in the class. The lecturer should encourage the students to ask questions."* [2nd year]
*"Periodic problems that we have to do ourselves."* [3rd year]
*"Class engagement – worked problems attempted by the class."* [4th year]

**Reward Attendance**
*"Actual marks going for attendance (10%-15% would be fair) as this would then lighten our other continuous assessment workload as we wouldn't have so many projects / assignments."* [4th year]

Other suggestions by the students were that *"an interesting subject"* and *"an enthusiastic lecturer"* makes lectures more worthwhile attending.

## 4. Conclusions

In this case-study, by far the majority of students stated that lectures are still beneficial to their learning and are not an out-of-date mode of education even in the modern era of information and communication technologies. Second year students place greater emphasis on the importance of attending lectures, while there is a pronounced fall off among fourth years, who give a mixed response as to the benefits of attending lectures. A good set of notes/course handbook is a requirement for a well

taught module, however the students generally are not convinced that this is sufficient alone (less than 30% would agree that this is enough), consequently lectures are required in addition. Providing a good quality course handbook may lead to a significant percentage of students missing lectures, thus it is very important that lectures add value in addition to the handbook, otherwise the link between lecture attendance and subsequent performance of a student may be weakened. Overall, less than 9% of students would agree that lectures are out of date, consequently their day is far from over!

The major reasons for non-attendance of lectures in this case-study could be broadly summarised as time conflict issues with other scholarly activities that they have to do and poor quality teaching with students not gaining much from attending lectures. The fourth year students in particular had a design project and a research project in addition to other continuous assessment deadlines which majorly curtailed their attendance at lectures. The major reasons for attendance can be broadly summarised as good quality teaching where the students are learning from lectures and also the fear of missing something important if they did not attend.

In this case-study, the students provided a number of suggestions to improve lectures and lecture attendance. Lectures should incorporate an active learning environment, with a focus on exam type questions or other types of assessment, where students have a participatory role. Other student suggestions include linking lectures to assessment, the lectures should add something extra to what is already in the notes and the lecturer should be enthusiastic and be able to capture the interest of the students.

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