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Using student presentations for learning and assessment: some experiences

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Abstract: This contribution reports on, reflects on and evaluates the author's experiences, over a number of academic years, of using formal student presentations as a means of learning and assessment in a taught postgraduate programme in engineering at Dublin Institute of Technology. Students were asked to prepare PowerPoint presentations on individual engineering topics; relevant references in books and technical papers were provided as assistance. Peer assessment of the presentations was employed, following a structured guideline agreed with the students. The contribution discusses the peer assessment experience in detail, including formal student feedback on the process. Some analysis work suggests that there is no significant difference in the peer-assessed grades recorded, compared to the grades recorded for the same assignment by the author.

1. Background to taught postgraduate programme

The Faculty of Engineering of the Dublin Institute of Technology introduced, in September 2002, a one-year full-time programme leading to a Masters degree (M.E.) in Advanced Engineering. The programme can also be taken in a part time mode, over two or more years. The programme was structured in modular form, allowing learners to advance from a Postgraduate Certificate (on completion of three modules) to a Postgraduate Diploma (on completion of five modules) to a Masters degree (on the completion of five modules and a dissertation). Single module certification was also available. Each module had three hours class contact per week, and six hours associated self-learning, totalling 12 ECTS credits per module.

For the academic year beginning in September 2004, the requirements of the programme were changed to each module having 2.5 hours class contact per week, and six hours associated self-learning, totalling 10 ECTS credits per module. This brought the programme in line with other such programmes in the DIT. Learners could now advance from a Postgraduate Certificate (on completion of three modules) to a Postgraduate Diploma (on completion of six modules) to a Masters degree (on the completion of six modules and a dissertation).

Finally, for the academic year beginning in September 2007, the programme was modularised and semesterised. Each module now has 5 ECTS credits associated with it. Learners could now advance from a Postgraduate Certificate (on completion of six modules) to a Postgraduate Diploma (on completion of twelve modules) to a Masters degree (on the completion of twelve modules and a dissertation).

The entry requirements for the programme are a minimum of a Second Class Honours degree (2.2 grade or higher) in engineering or a related science programme, or equivalent.

2. Teaching and learning on the Control Engineering electives (2004-6, 2007-8)

Students who chose Control Engineering elective modules in the periods mentioned had a variety of educational backgrounds, with first degrees in Electrical Engineering, Electronic Engineering, and Mechanical Engineering predominating. The variety of student educational background meant that the (first) module was taught assuming little prior knowledge of the subject matter; material was covered, however, in a rapid and academically rigorous manner, consistent with the programme award. In the 2004-6 period, the year-long module was assessed by coursework and examination. The coursework has a weighting of 30% and the terminal examination has a weighting of 70%. Coursework assessment was done by means of individual student assignments. Three assignments were set, the last of which was a peer-assessed individual student PowerPoint presentations, following a structured guideline. The weighting of this assignment was 10% of the module mark.

In the 2007-8 period, the programme was semesterised. In the first semester, the *Process Control Engineering* elective module was offered; the module was assessed by examination (with a weighting of 50%) and continuous assessment (with a weighting of 50%). It was decided to devote half of the 50% weighting for continuous assessment to the peer-assessed individual student PowerPoint presentation. Thus, the weighting of the assignment was 25% of the module; this is equivalent to a weighting of 12.5% of the module taken in the 2004-6 period. In the second semester, the *Advanced Control Engineering* elective module was offered; the module was assessed by examination (with a weighting of 70%) and continuous assessment (with a weighting of 30%). Continuous assessment was wholly by means of peer-assessed individual student PowerPoint presentation, following a more detailed guideline than that used in the Process Control Engineering elective. Thus, the weighting of the assignment was 30% of the module; this is equivalent to a weighting of 15% of the module taken in the 2004-6 period.

3. Outline of some literature on peer assessment

A significant literature exists on peer assessment issues, both as applied to student group work (for example, McDermott *et al*. (2000)) and individual student work, which is the focus of this paper. For example, Falchikov (1995) and Morris (2001) provide an interesting and comprehensive literature review on peer assessment issues; some other authors (e.g. Magin and Helmore (2001)) focus on the validity of peer and teacher assessment of the oral presentations skills of (engineering) students.

Some authors give more specific advice on how to structure the peer assessment process (e.g. Falchikov (1986)), suggesting that the provision of explicit assessment criteria to the peer assessors is important. Other authors (e.g. Kwan and Leung (1996)) focus on the agreement (or otherwise) between tutor and peer group assessments, using statistical techniques (including calculation of means and standard deviations). Peer assessment of oral presentations, taking into account factors such as gender, university affiliation, time of day at which the assessment was carried out and participation in the development of the assessment criteria are considered by Langan *et al*. (2005), for example. Other contributions are also of interest (e.g. the peer assessment of poster presentations, as discussed by Orsmond *et al*. (1996)).

The contribution closest to the approach adopted in this paper (both from an assessment methodology and presentation procedure) is that of MacAlpine (1999), who considers peer assessments of undergraduate engineering students in a final year option subject. The peer assessment is 15% of the continuous assessment mark in this case.

4. Peer assessment approach used

In 2004-5, 2005-6 and 2007-8 (Semester 1), students were asked to prepare an individual 15-minute PowerPoint presentation on a control-engineering topic; relevant references, principally technical papers, were provided as assistance. In addition, students were strongly encouraged to source and use other relevant material from electronic journals, databases or from any other source (such as relevant websites), with the proviso that all source material must be referenced. In 2004-6, presentation topics were assigned through individual dialogue, sometimes based on a students prior work experience or on an issue relevant to their dissertation; in 2007-8, presentation topics were assigned at random. All topics had a process control systems applications emphasis. In 2007-8 (Semester 2), students were asked to prepare an individual 30-minute PowerPoint presentation based on modelling and controller design case studies, drawn at random from Messner and Tilbury (1999). A full list of presentation topics is given in Appendix 1.

Peer and lecturer assessment of the presentations was employed, following a structured guideline. The structured guideline (for 2007-8, Semester 1) is given in Appendix 2; in the 2004-6 period, student marks for the assignment were based on the presentation only (following a similar guideline). This guideline was agreed with the students. For 2007-8, Semester 2, a more detailed guideline was agreed with the students (given in Appendix 3). A guideline to producing good PowerPoint presentations was also distributed to the students [available at www.iasted.org/conferences/formatting/Presentations-Tips.ppt].

5. Comparison of peer and lecturer marking

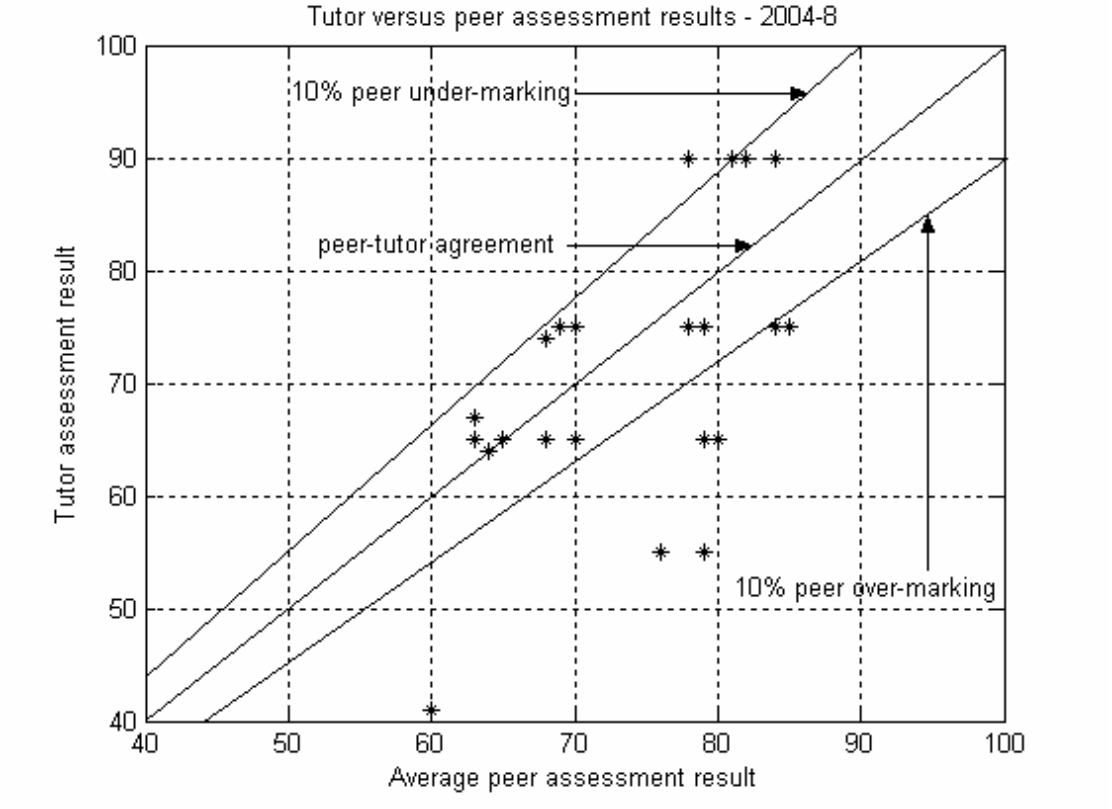
When the assessment data is analysed, it was found that in 68% of cases (19 out of 28), the difference between the lecturer grade and average peer grade was less than 10%; such a difference translates into a difference of less than 1% of the subject grade (and is considered acceptable). Falchikov (1986) also considered that a 10% difference between the lecturer grade and average peer grade was acceptable; in her work, 71% of cases show such a difference i.e. the results are broadly comparable. Of the remaining 9 cases, 8 of them involved an average peer grade of more than 10% above the lecturer grade. Considering the overall data, the comment of Falchikov (1986) applies i.e. there is a tendency for peer-group markers to over-grade in comparison with lecturer (tutor) markers, and the mean amount of over-marking is greater than the mean amount of under-marking. Mean peer marks, lecturer marks and the differences between these are shown in full in Table 1.

Table 1: A comparison of mean peer mark and lecturer mark

Student	Mean peer mark (P)	Lecturer mark (L)	Difference (P-L)	% equivalent (subject grade)
2004-5				
1	79	65	+14	+1.4
2	79	75	+4	+0.4
3	78	90	-12	-1.2
4	80	65	+15	+1.5
5	78	75	+3	+0.3
6	79	65	+14	+1.4
7	76	55	+21	+2.1
8	85	75	+10	+1.0
9	82	90	-8	-0.8
10	84	75	+9	+0.9
11	80	65	+15	+1.5
12	79	55	+24	+2.4
Average	**80**	**71**	**+9**	**+0.9**
2005-6				
1	79	75	+4	+0.4
2	79	65	+14	+1.4
3	69	75	-6	-0.6
4	63	65	-2	-0.2
5	81	90	-9	-0.9
6	84	90	-6	-0.6
Average	**76**	**77**	**-1**	**-0.1**
2007-8, S1				
1	70	65	+5	+0.8
2	70	75	-5	-0.8
3	79	75	+4	+0.6
4	65	65	0	0
5	65	65	0	0
Average	**70**	**69**	**+1**	**+0.2**
2007-8, S2				
1	64	64	0	0
2	63	67	-4	-1.2
3	68	74	-6	-2.0
4	60	41	+19	+5.7
5	68	65	+3	+0.9
Average	**65**	**62**	**+3**	**+0.9**

There is no evidence from this table that the more detailed guideline for presentation assessment used in 2007-8, Semester 2 reduces the extent of over-marking (though the

sample size is small, and the results are skewed by the data for one individual student). A scatter plot of tutor versus average peer assessment results confirms the patterns detected.



6. Student feedback on the learning and assessment process

Formal student feedback was first gathered in 2007-8, using a student questionnaire, given in Appendix 4. The questionnaire uses a 5-point Likert scale, with 1 corresponding to '*strongly disagree*' and 5 corresponding to '*strongly agree*'. The questionnaire is constructed with alternating positive and negative questions to avoid directional bias. For example, in the first question students were asked to indicate whether they thought that the feedback from peer assessment would help their own learning (positive direction). Then, in the second question, they were asked to indicate whether they were *uncomfortable* assessing the work of their peers. The negative items are reversed for scoring. Though only four students provided such feedback in Semester 1, the results, ordered with respect to level of agreement with the statements (and given in Table 2), clearly show support for both the learning achieved and the assessment process, with some caveats. In unscripted comments, students suggested that what they liked best about the procedure was learning from others, learning about an interesting topic, their mark being determined from more than one person and the learning involved in giving confident technical presentations. On the other hand, students suggested that presentation skills and content should be assessed separately, and that questions and answers after the presentation would be desirable. This feedback influenced the design of the structured guidelines for peer assessment in Semester 2 (see Appendix 3).

Table 2: Student questionnaire results

	Mean
I think the feedback from peer assessment will help my own learning	4.5
I feel I was treated fairly by the lecturer in his marking of my feedback to each presenter	4.5
I feel that I was able to be completely objective in marking the presentations	4.25
The assessment breakdown (84% for presentation, 16% for feedback to other presenters) is about right	4.25
I feel that skills and practice in presentation are likely (not likely) to be useful in my working life	4.25
Devoting half of the continuous assessment marks in the subject to this activity is about right	4.25
I did (did not) enjoy the process of peer group assessment	4.0
My confidence has increased (decreased) as a result of peer group assessment based on PowerPoint presentation	4.0
I feel the process of peer group assessment has developed my own critical thinking skills	4.0
I feel I was treated fairly by my peers in their marking of my presentation	4.0
I learned from the positive (and less positive) features of the presentations of others	4.0
I was comfortable (uncomfortable) assessing the work of my peers	3.75
I feel that there was much (little) learning benefit to me in making my PowerPoint presentation	3.75
I feel that assessing the work of my peers will help me to better improve my own performance in the future	3.5
I was able to assess others work with confidence using the criteria provided	3.5
I think I learned more from the presentations that I would have learned if the time was devoted to lectures and labs	3.5
I felt that I was more confident in making my presentation knowing that my presentation mark was largely determined by my peers, rather than by the lecturer	2.75
I would have learned more from the lecturer assessing my presentation than I learned from the peer group assessment	2.5
I feel I should not have to assess the work of my peers	2.25
I feel that assessing my peers involved too much work for me	2.0

7. Discussion

The author's experiences are that the learning and assessment method is learner-centred, motivates independent learning, caters to a diverse student background, unlocks previous student work and learning experiences to the benefit of all learners and provides case-study material that may be used on other programmes. The author agrees with the conclusion of Kwan and Leung (1996) that "although only a moderate degree of agreement has been found between tutor and peer group assessments … we believe that peer assessments should be introduced to students because the educational benefits of the learning experience may greatly outweigh the risks on an unreliable assessment outcome, particularly if peer assessment contributes only a relatively small part of the formal assessment". Overall, the learning and assessment approach assists in the aim of providing students with the fundamental skills required for life-long self-learning. In subsequent work, the author will report on the application of peer assessment to a final year undergraduate student cohort.

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Appendix 1: Student presentation topics

Advanced Control Engineering, 2004-5
Control in semiconductor manufacturing – the etch process
Control in semiconductor manufacturing – CVD furnace temperature control
Measurement and control of hazardous materials
Control of glucose levels in the bloodstream
Control of electric power generating plants
Control of electric power transmission
Practical auditing of closed loop control systems
Automatically controlled invasive surgery tools
Position control in manufacturing industries
Control of the Hewlett-Packard HP-7090A X-Y plotter
Control of telerobotic systems
Feedback and phase locked loops
Advanced Control Engineering, 2005-6
Control of a laser system
Control of anaesthesia
Control systems in computer networking applications
Automatic control and limb movement
Feedback control and the human cardiovascular system
Cascade control of a manufacturing plant
Process Control Engineering, 2007-8
Control of batch processes in the chemical industry
Control of wind turbines
Process control in industrial crystallization
Process control in petroleum refining
Biochemical reactor modeling and control
Advanced Control Engineering, 2007-8
Inverted pendulum: Modeling, PID controller design
DC motor position: Modeling, root locus controller design
Car cruise control: Modeling, digital controller design
Bus suspension system: Modeling, state space controller design
DC motor speed: Modeling, frequency response controller design

Appendix 2: Structured guideline for peer assessment of presentations (2007-8, Semester 1)

The following information was agreed and given to each student in Week 7 of the module.

Marking scheme

The presentation of technical information is an important part of a professional engineers working life. Such presentations tend to be done by individuals. Contribution of each individual in a collective team environment is also important in working life. The assessment marking scheme attempts to balance these two issues.

1. Presentation [maximum 84% of assessment mark]

Your presentation will be assessed by your colleagues and myself on the day. For each presentation, I will distribute to each person the following guideline for assessing the presentation:

Grade	Meaning of grade	Result
Fail [30%]	Very poor presentation. Technical content not understood.	
Pass [45%]	Poor presentation. Technical content somewhat understood.	
2(2) [55%]	Adequate presentation. Technical content understood.	
2(1) [65%]	Good presentation. Technical content well understood.	
1 [75%]	Very good presentation. Technical content very understandable.	
1+ [90%]	Outstanding presentation. Flawless technical understanding.	

After each presentation, I will then ask each person to submit to me a result for the presentation. The mark that you give for each presentation will remain confidential. The assignment mark will be the average of this result. The marking scheme suggests that the presentation must be understandable to persons not specialist in the particular topic; diagrams will be particularly useful.

2. Contribution [maximum 16% of assessment mark]

The sheet that I will distribute for assessment will also include two other pieces of information:

a) A space where you can make brief helpful contributions and feedback about the presentation of each person. Each helpful contribution will receive 2 marks (but it must be an individual contribution). Very helpful contributions, in my opinion, will receive 4 marks. Since there are 4 people presenting (excluding yourself), you can score a maximum of 16% from this part of the assessment.
b) A space to write your name. Your contributions will be fed back anonymously by me to each presenter.

Appendix 3: Structured guideline for peer assessment of presentations (2007-8, Semester 2). The following information was agreed and given to each student in Week 1 of the module.

Your lecture will be assessed by your colleagues and myself on the day. Content, learning and presentation will be assessed, following the structured guideline below. You will be asked to 'tick' the appropriate box. A tick in the extreme left hand box means that the statement on the left is true and is of 1+ (90%) quality. The boxes from left to right are abbreviated by 1+ (90% - outstanding), 1 (75% - very good), 2(1) (65% - good), 2(2) (55% - adequate), P (for Pass – 45% - poor) and F (for Fail – 30% - very poor).

	1+	**1**	**2(1)**	**2(2)**	**P**	**F**	
Content							**Content**
Topic covered in depth							Superficial treatment of topic
Modelling section logically developed							Modelling section rambling
Controller section logically developed							Controller section rambling
Learning							**Learning**
I understand modelling in the application							I do not understand modelling in the application
I understand controller design in the application							I do not understand controller design in the application
Handout is useful for learning							Handout is not useful for learning
I could apply the controller design technique							I could not apply the controller design technique
Presentation							**Presentation**
Fluent delivery							Pace of delivery too fast/too slow
Succinct delivery							Unnecessarily repetitive and unclear
Animated tone							Flat or stilted or nervous tone
Very interesting							Uninteresting and boring
Attention-grabbing introduction							Uninspiring introduction
Questions well handled							Unsatisfactory handling of questions
Supportive body language							Body language detracted from argument
Clear and effective use of PowerPoint							PowerPoint use unclear and ineffective
Reasonable length							Too long/short
Effective use of figures and/or tables							Figures and/or tables add little to the argument

Content [1]	%	x 30%	%
Learning [2]	%	x 40%	%
Presentation [3]	%	x 30%	%
Total			

The mark that you give for each lecture will remain confidential. The assignment mark will be the average of all of the marks.

[1] Each element is worth 10% of total mark.
[2] Each element is worth 10% of total mark.
[3] Each element is worth 3% of total mark.

Appendix 4: Student questionnaire, 2007-8, Semester 1

The purpose of this questionnaire is to obtain views on the PowerPoint based assessment that has just been completed. You are requested to assign a number between 1 and 5 in answer to a series of statements below, with 5 – strongly agree; 4 – agree; 3 – unsure; 2 – disagree; 1 – strongly disagree.

Thank you for your assistance.

Thinking of the assessment process (peer marking, lecturer marking of feedback to each presenter):				**Please tick appropriate box**	
	1 – strongly disagree	2 – disagree	3 – unsure	4 – agree	5 – strongly agree
I think the feedback from peer assessment will help my own learning	☐	☐	☐	☐	☐
I was uncomfortable assessing the work of my peers	☐	☐	☐	☐	☐
I feel that assessing the work of my peers will help me to better improve my own performance in the future	☐	☐	☐	☐	☐
I did not enjoy the process of peer group assessment	☐	☐	☐	☐	☐
I feel that I was able to be completely objective in marking the presentations	☐	☐	☐	☐	☐
My confidence has decreased as a result of peer group assessment based on PowerPoint presentation	☐	☐	☐	☐	☐
I feel the process of peer group assessment has developed my own critical thinking skills	☐	☐	☐	☐	☐
I would have learned more from the lecturer assessing my presentation than I learned from the peer group assessment	☐	☐	☐	☐	☐
I was able to assess others work with confidence using the criteria provided	☐	☐	☐	☐	☐
I feel I should not have to assess the work of my peers	☐	☐	☐	☐	☐
I felt that I was more confident in making my presentation knowing that my presentation mark was largely determined by my peers, rather than by the lecturer	☐	☐	☐	☐	☐
I feel that assessing my peers involved too much work for me	☐	☐	☐	☐	☐
The assessment breakdown (84% for presentation, 16% for feedback to other presenters) is about right	☐	☐	☐	☐	☐

[please turn over]

	1 – strongly disagree	2 – disagree	3 – unsure	4 – agree	5 – strongly agree
I feel I was treated fairly by my peers in their marking of my presentation	☐	☐	☐	☐	☐
I feel I was treated fairly by the lecturer in his marking of my feedback to each presenter	☐	☐	☐	☐	☐

Considering the requirement to make a PowerPoint presentation: Please tick appropriate box

	1 – strongly disagree	2 – disagree	3 – unsure	4 – agree	5 – strongly agree
I feel that there was little learning benefit to me in making my PowerPoint presentation	☐	☐	☐	☐	☐
I learned from the positive (and less positive) features of the presentations of others	☐	☐	☐	☐	☐
I feel that skills and practice in presentation are not likely to be useful in my working life	☐	☐	☐	☐	☐
I think I learned more from the presentations that I would have learned if the time was devoted to lectures and labs	☐	☐	☐	☐	☐
Devoting 25% of the total subject mark (half of the continuous assessment marks in the subject) to this activity is about right	☐	☐	☐	☐	☐

General comments

What did you like BEST about the assessment ? Why ?
What did you like LEAST about the assessment ? Why ?
Other comments: