AFFECTS OF STUDENT ATTENDANCE ON PERFORMANCE IN UNDERGRADUATE MATERIALS AND MANUFACTURING MODULES

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ABSTRACT

This paper investigates the class attendance of second year, third year and fourth year students and their overall performance at the school of Mechanical and Manufacturing Engineering in Dublin City University (DCU). An investigation was recently conducted into the delivery of different module which was presented to a group of second year, third year and fourth year engineering students at DCU. Attendance in the class was recorded and the continuous assessment results and the final overall performances were investigated with their attendance. Student performance on Strength of materials – part 1 (SM1), Strength of materials part - 2 (SM2), Mechanics of Materials and Machine (MMM) and Advanced Materials and Manufacturing Processes (AMMP) modules are presented in this paper. This paper presents an examination of some of the factors affecting the overall results of these students. Factors evaluated include attendance of the student, as well as individual performance in continuous assessment and examination. Overall attendance at the lecture, the organised seminar series, and practical work were recorded. Results indicate a direct link between attendance and marks awarded. Students with higher attendance achieved better grades.

INTRODUCTION

Undergraduate engineering education has 'changed very little over the last half of this century' [1]. Regular reviews have taken place in many countries, but these have tended to focus on the subject content of degree courses, and its relevance to the needs of engineering employers [2]. However in 1990s, pressure for more radical changes began to build, for instance, in United Kingdom [3], Australia [4], the United States [5] and New Zealand [6, 7]. The motivation was a perceived need to improve the level of understanding by student, analyse their different learning styles and to examine ways in which student could get a deeper understanding of the required concepts in engineering. The ability to produce engineering graduates with educational standards comparable to the best in the world is critical to sustained economic growth with regard the formation, retention and attraction of high value added companies. Not only changing the learning environment, modern engineering education is so far enrich with full of resources, like e-learning facilities, web-based resources, distance learning and virtual learning. Most of these are for mature students who have self learning capacity.

Researcher found that the first year in college is a time for adjustment and turmoil for many late adolescents [8]. Some experience difficulties sufficient to cause them to drop out [9]. Academic performance and retention of college students has been studied extensively and theoretical models developed to describe various factors affecting college students' adjustment and academic performance [10-14]. So, it is obvious that to have a proper learning environment it is necessary to investigate properly what are the point which effects student learning. In Ireland researcher from

all engineering discipline is now widely focusing on the student learning style, motivation, factors effecting and how to improve it from the present situation. These studies discusses current knowledge about effective teaching and learning in higher education and the implications for undergraduate engineering education.

METHODOLOGY

Strength of Materials

Strength of Materials is relatively traditional second year module for mechanical engineering students. Strength of material studied for the Computer Aided Mechanical and Manufacturing Engineering (CAM) degree and the Business and Manufacturing Engineering (BME) degree and also the Medical Mechanical Engineering (MEDM) students in their second year. In their first semester they do the first part of strength of materials (SM1) and in the second semester they do the second part of strength of materials (SM2). Each of SM1 and SM2 is a five full five credit course in each semester. The final exam accounted for 80% of the overall marks and 20% of the marks were awarded on the basis of the continuous assessments. Students' regular attendances were taken. In 2008 there were 50 students in the first semester class and 56 students were in the second semester class.

Mechanics of Materials and Machine

Mechanics of Materials and Machine studied for the Mechatronic Engineering (ME) degree third year. Mechanics of Materials and Machine is a full five credit course half of which is focused on mechanics of materials like fracture, fatigue, creep and the other half of the module is focused on mechanics of machine. The final exam accounted for 80% of the overall marks and 20% of the marks were awarded on the basis of the continuous assessments. Students' regular attendances were taken. In 2007 there were 13 students in the class and in 2008 there were 14 students were in the class.

Advanced Materials and Manufacturing Processes

Advanced Materials and Manufacturing Processes studied for the Computer Aided Mechanical and Manufacturing Engineering (CAM) degree and the Business and Manufacturing Engineering (BME) degree in fourth year. The advanced materials and manufacturing processes module is a full five credit course half of which is focused on materials and half on advanced manufacturing processes. The advanced materials part covers glass and ceramics, bio materials, materials characterisation, crystallography, and composites. The advanced manufacturing part of the course covers welding, design of experiments, laser processing, electron beam processing, and rapid manufacturing. Both parts of the courses include elements of research currently being undertaken within the Materials Processing Research Centre at DCU. As an example of this the students had to submit a continuous assessment reports on materials characterisation techniques for glasses and ceramics and on a high temperature and shear rate capillary viscometry laboratory experiment which they conducted. Some seminars complementing the course content were given by final year PhD students and postdoctoral researchers within the School. The final examination and continuous assessment were split equally between the materials and processes sections. The final exam accounted for 60% of the overall marks and 40% of the marks were awarded on the basis of the continuous assessments. Students' regular attendances were taken. In 2007 there were 25 students in the class and in 2008 there were 22 students were in the class.

RESULTS

Table 1 shows Percentage of students which attended at the specified percentage levels for the three modules during 2006/07 and 2007/08.

Table 1 Percentage of students which attended at the specified percentage levels for the three modules during 2007 and 2008.

%	students attended in the class					
Attend.	SM1-07/08	SM2-07/08	MMM-06/07	MMM-07/08	AMMP-06/07	AMMP-07/08
0-20	6	20	7	7	4	-
20-40	20	28	29	32	24	20
40-60	40	45	43	40	20	24
60-80	26	5	14	14	28	34
80-100	6	2	7	7	24	22

Students were attributed an overall attendance level of either 0-20, 20-40, 40-60, 60-80, or 80-100%. The first two column of this table is representing the percentage attendance of the student in second year module. 40-60% is the maximum level of attendance for second year students for 07/08 year. The similar trend is observed in third year students. From this table, it is clear that fourth year students have more tendencies to be in the class than any other years.

The percentage attendance of student and their marks on 2007/08 for strength of materials can be seen in Table 2. From this table it is clear that, in strength of materials – part 1, higher the attendance higher the marks obtained. The highest marks obtained in both continuous assessment and examinations are by students who fall in the group of 80-100% attendance. The similar results are evident for the strength of materials – part 2 students. Strength of materials part 1 results are better than part 2, it is may be because of the more mathematical content in part 1 and more theoretical in content in part 2.

Table 2 Percentage attendance of student and their marks on 2007/08 for SM

% Attendance	*Total Marks_MS1*	*Cont. Assmt_MS1*	*Exams Marks_MS1*	*Total Marks_MS2*	*Cont. Assmt_MS2*	*Exams Marks_MS2*
0-20	24	17	26	4	21	A
20-40	46	61	44	51	62	49
40-60	57	66	52	60	68	77
60-80	69	75	66	73	65	80
80-100	83	80	84	76	74	76

The percentage attendance of student and their marks on 2007/08 for mechanics of materials and machine can be seen in Table 3. From this table it is clear that, in 2007/08, higher the attendance higher the marks obtained. The highest marks obtained in both continuous assessment and examinations are by students who fall in the group of 80-100% attendance. The similar results are evident for the 2006/07. One important observation from this table can be noted that the tendency

of being absent in the examination and also in the lack of participation of the class work and report submission are observed among lower attendance group. In this table 'A' stands for absence.

Table 3 Percentage attendance of student and their marks on 2006/07 and 2007/08 for MMM

% Attedence	Total Marks-2007/08	Cont. Assmt -2007/08	Exams Marks -2007/08	Total Marks-2006/07	Cont. Assmt -2006/07	Exams Marks -2006/07
0-20	A	A	A	13	65	A
20-40	A	A	A	36	44	34
40-60	55	69	50	58	65	56
60-80	54	74	50	45	60	52
80-100	53	77	47	65	53	68

Finally, the percentage attendance of student and their marks on 2007/08 for advanced materials and manufacturing processes can be seen in Table 4. From this table it is clear that, in 2007/08, higher the attendance higher the marks obtained. The highest marks obtained in both continuous assessment and examinations are by students who fall in the group of 80-100% attendance. The similar results are evident for the 2006/07. One optimistic observation from table 4, is that there are no student in the 0-20% attendance level. All the students are over 20% attendance. There were only one student fail in year 06/07 among 25 student and there were no failing was recorded in 07/08 among 22 students. It is also noticeable that students overall performance is better in 07/08 than 06/07.

Table 4 Percentage attendance of student and their marks on 2006/07 and 2007/08 for AMMP

% Attedence	Total Marks-2007/08	Cont. Assmt -2007/08	Exams Marks -2007/08	Total Marks -2006/07	Cont. Assmt -2006/07	Exams Marks -2006/07
0-20	-	-	-	49	48	50
20-40	42	46	45	52.36	46	41.5
40-60	57	63	53	51.78	59	47.1
60-80	70	65	65	54.74	58	50.4
80-100	72	75	73	71.6	75	69.5

DISCUSSION & CONCLUSION

In most cases percentage marks obtained in continuous assessment are higher than the percentage marks obtained in the exam. Good continuous assessment performance did not automatically indicate good exam performance and vice versa. One student who secured 83% marks in strength of materials part 1, with a 80-100% in first semester, with 40-60% attendee this same student in the second semester was straggling to pass strength of materials part two. It would be interesting to investigate why he didn't attend the second semester class as much as he did in first semester. Despite all the notes available in the moodle, he was unable to reach the same level of understanding.

The author considers that aspects of the traditional model of engineering education, such as widespread use of lecturers, the overcrowded content and the assessments methods used, do not lead to high quality learning. In addition, there is evidence that the overloaded content of engineering courses leads to many engineering students taking an instrumental approach to their studies. This is marked by a motivation to pass exams in order to obtain a degree (and hence a job), rather than being driven by an interest in learning [17]. Get rid of some extra syllabus, give the module a more realistic content. These authors has researched this and made some amendment in all these three module discussed in this paper.

To achieve improved learning, the course content delivery structure needs to be reviewed on a regular basis and made as clear as possible. In reality if engineering educators are to meet the goals of increased student numbers and improved teaching methodologies, a readily implementable system of Continuous Improvement (CI) needs to be an integral part of engineering programme structures [18, 19]. Methods that have been shown to be effective in improving content delivery include blended learning and access to the latest technology for facilitator and students. These methods also encourage and in many cases require student attendance which has been found here to be strongly correlated to their level of learning.

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