

INVESTIGATION OF FACTORS AFFECTING THE LEARNING OF FINAL YEAR ADVANCED MATERIALS AND MANUFACTURING ENGINEERING STUDENTS

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Outline of presentation

- Introduction
- Aims of work
- Methodology
- Results
- Discussion

Introduction

Recommendations¹ for engineering academic best practice

- (i) Recognise difficulty in learning subject matter,
- (ii) Increase complexity progressively through the module and make connections,
- (iii) Contextualise the information,
- (iv) Provide multiple representations to reinforce concepts,
- (v) Make personal connections, and
- (vi) Encourage interaction

1. McKenna, A., and Yalvac, B., Characterizing engineering faculty's teaching approaches, Teaching in Higher Education, Vol. 12, No. 3, June 2007, pp. 405-418

Introduction (Cont.)

An effective learning environment should be

Learner centered, Knowledge centered, Assessment centered and Community centered

Labour market

5 % increase in Science & Engineering (SE)
1 % increase in rest

Graduates

5 % are in SE in Ireland and America
40% are in SE in China

Aims of work

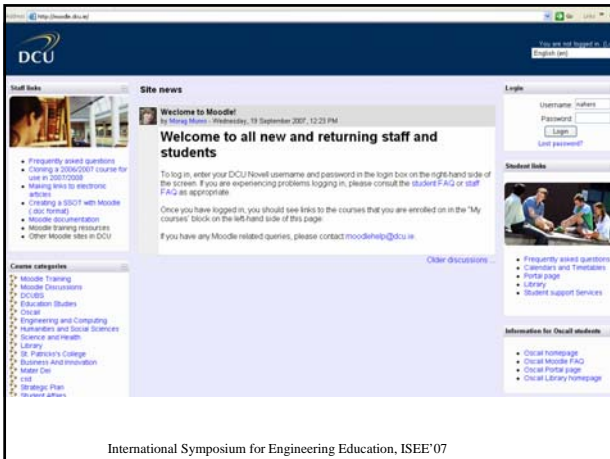
Identify the learning barriers for engineering students

&

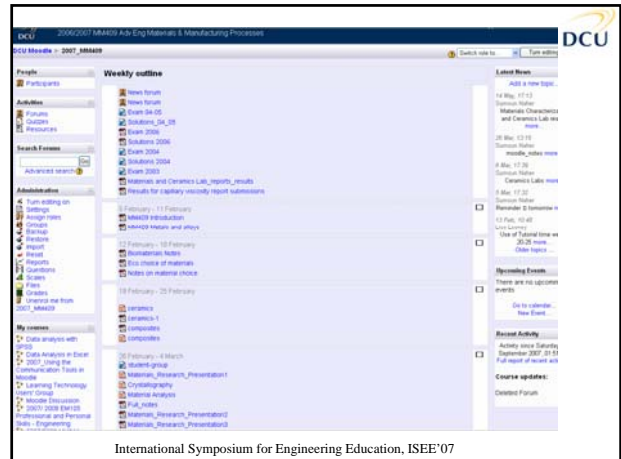
Establish possible ways to overcome these

Methodology

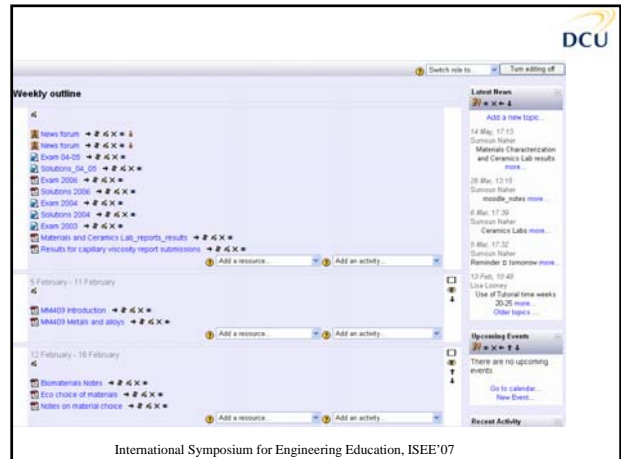
- MM409- 5 credit course
- Cohort consisted of 25 students
 - 13 from CAM degree and 12 from BME degree
- Final exam - 60% and CA - 40% of the overall marks
- Overall attendance at the lecture, the organised seminar series, and practical work were recorded
- Individual performance in CA and examination were evaluated
- Questionnaire survey



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Exam paper

Part A: Advanced materials

Question 1
Question 2
Question 3-related to CA

Part B: Manufacturing processes

Question 4
Question 5
Question 6-related to CA

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DCU

Survey of student opinion on teaching

1 Do you feel strongly motivated to learn the module material?
Marks: -/1

Choose one answer a. Yes
 b. No

2 Do you think that the lecturer(s) were enthusiastic about teaching?
Marks: -/1

Choose one answer a. Yes
 b. No

3 Do you think the lecturer(s) make difficult topics understandable?
Marks: -/1

Choose one answer a. Yes
 b. No

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4 Do you think the lecturer(s) were well organised?
Marks: -/1

Choose one answer: a. Yes
 b. No

5 Do you think the objectives of the module were clearly stated?
Marks: -/1

Choose one answer: a. Yes
 b. No

6 Indicate to what extent you agree with the following statement. The laboratory assignment was useful as a learning aid.
Marks: -/1

Choose one answer: a. Very Strongly
 b. Strongly
 c. Moderately
 d. Weakly
 e. Very Weakly

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7 Indicate to what extent you agree with the following statement. The lecture material was presented clearly.
Marks: -/1

Choose one answer: a. Very Strongly
 b. Strongly
 c. Moderately
 d. Weakly
 e. Very weakly

8 Indicate to what extent you agree with the following statement. Communication with the lecturer was easy via directly speaking, e-mail or other means.
Marks: -/1

Choose one answer: a. Very Strongly
 b. Strongly
 c. Moderately
 d. Weakly
 e. Very Weakly

9 Indicate any other comments you may have on the delivery of this module. Answers to questions such as was the pace of the module delivery right, was too much material covered, and was the module enjoyable for example would be useful?
Marks: -/0

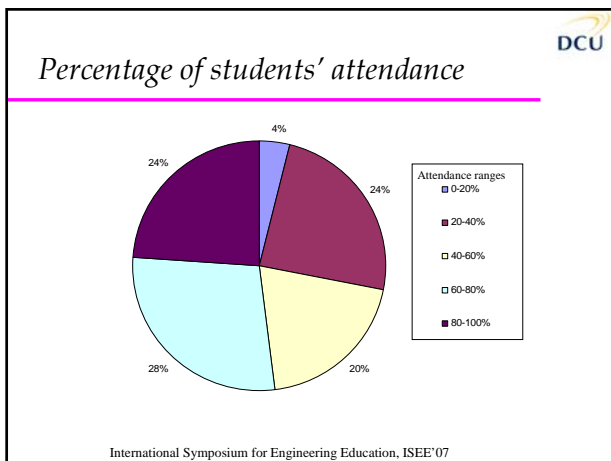
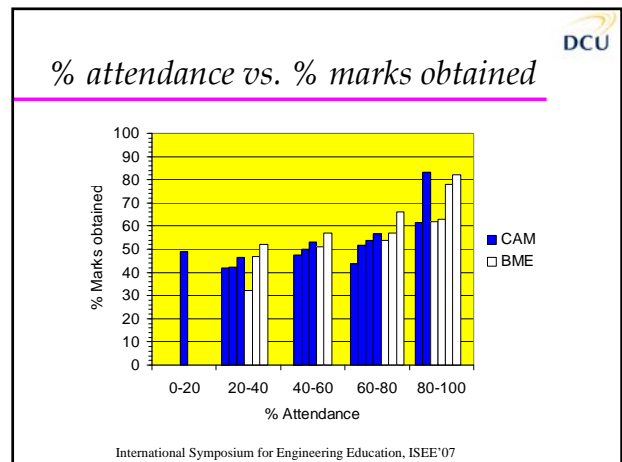
Answer:

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Students' total marks, exam marks, continuous assessment marks, and attendance

Student No	Total Marks %	Cont. Assmt. %	Final Exam %	Materials Assign	Manuf. Assign	Attendance %
S1	47.6	59	40	58	60	40-60
S2	54	67.5	45	65	70	60-80
S3	61.5	60	62.5	60	60	80-100
S4	46.6	55	41	60	50	20-40
S5	42.2	59	31	68	50	20-40
S6	83.2	77.5	87	75	80	80-100
S14	66	70	64	70	70	60-80
S15	82	80	82.5	70	90	80-100
S16	54	56.5	51.5	53	60	60-80
S17	52	57.5	48	55	60	20-40
S18	78	84	74.5	78	90	80-100
S19	63	71.5	57.5	73	70	80-100
S25	57.1	62.5	53.5	65	60	60-80

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Exam results for questions one to six

Student No.	Question 1 (Out of 25)	Question 2	Question 3	Question 4	Question 5	Question 6
S1	-	11	7	7	15	-
S2	8	11	-	21	-	5
S3	-	16	19.5	12	15	-
S4	11	-	7	17	6	-
S5	5	4	-	10	12	-
S6	20.5	-	16.5	25	25	-
S14	10	19	-	23	-	12
S15	16	25	-	25	-	17
S16	14	5	-	16	17	-
S17	-	13	1	19	-	15
S18	17	22	-	-	18	18
S19	10	-	16	19	13	-
S25	18	13	-	9	12	11

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Student feed back

Most student very strongly agreed that the laboratory assignment was very useful as learning aid.

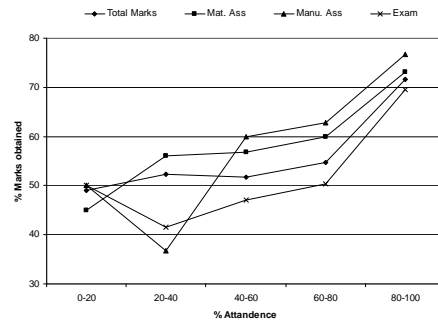
Comments on course content:

'The course was too desperate, the amount of course materials was far too great for the level of details required in exam.'

'There was quite a large degree of material to be covered in this subject.'

'There was too much material in the lecture notes to be covered for the exam.'

Correlation between results and percentage attendance



Discussion (Cont.)

- A large number of methodologies for evaluating individual learning styles.
- Student's that learn better with active and concrete experience

Discussion (Cont.)

- Students in later years of University education show a preference for remote access to the course content.
- Barriers to learning through remote access
 - lack of student motivation in a self learning environment and a lack of insight
- With the introduction of module delivery via a VLE
 - students are initially less likely to adopt a deep approach to learning and rated these courses as less favorable

The screenshot displays a VLE interface for a course titled '2007/2008 MM409 Adv Eng Materials & Manufacturing Processes'. The interface includes a navigation menu on the left with options like 'People', 'Activities', 'Search Forums', and 'Administration'. The main content area shows a 'Weekly outline' with a list of dates and activities, such as 'News forum' on 4 February and 'Activity since Satud September 2007, 021' on 10 March. There are also sections for 'Latest News' and 'Recent Activity'.

Discussion (Cont.)

- To achieve improved learning
 - the course content delivery structure needs to be reviewed on a regular basis and made as clear as possible.
- To meet the goals of increased student numbers and improved teaching methodologies
 - a readily implementable system of CI needs to be an integral part of engineering programme structures.
- Effective methods in improving content delivery
 - include blended learning and access to the latest technology

Thanks!
Questions?