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


Introduction (Cont.)

An effective learning environment should be
- Learner centered
- Knowledge centered
- Assessment centered
- 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
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
Students’ total marks, exam marks, continuous assessment marks, and attendance

<table>
<thead>
<tr>
<th>Student No.</th>
<th>Total Marks %</th>
<th>Lab Assign. %</th>
<th>Final Exam %</th>
<th>Materia'l Assign.</th>
<th>Manual Assign.</th>
<th>Attendance %</th>
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% attendance vs. % marks obtained

Exam results for questions one to six

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**Student feedback**

Most students very strongly agreed that the laboratory assignment was very useful as a 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.”

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**Discussion (Cont.)**

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

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**Correlation between results and percentage attendance**

- **30**
- **40**
- **50**
- **60**
- **70**
- **80**

% Attendance

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**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.

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**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?