

ACTIVITY-LED LEARNING

Experience –Led Engineering Degrees

The Royal Academy of Engineering
9th September 2008

Prof Peter White (Associate Dean)

Presentation overview

- Background
- Questions to be answered
- 1989-2008
- What are we going to do?
- Final remarks

Background

- Start of a new course in 1989 presented an opportunity to rethink the formation of engineers.
- Industrial Liaison Committee used to determine wishes of industry:
 - Technical ability
 - Application of theory to real problems
 - Motivation
 - Professional skills

Background

- Industry wanted professional skills and motivation but NOT at the expense of technical ability and scientific knowledge.
- One view was that engineering science should still occupy 85-90% of the curriculum.

Questions to be answered

- What was the baseline?
- What were the drivers for change?
- What did actually change?
- How much did it cost?
- How do we know that it achieved the objectives?

1989 - 2008

- Our evidence indicated:
 - Real (open ended) problems needed to be incorporated into courses
 - Professional skills were to be developed during the teaching/learning of engineering science
 - Any course must stimulate and motivate the students

1989 - 2008

- BEng Automotive Engineering Design started in October 1989:
 - Aim to develop engineering design skills inseparable from professional skills of engineering practice
 - Detailed objectives for technical and professional skills written as learning outcomes and competencies – similar to EPC “ability to statements”

1989 - 2008

- 39 detailed objectives under 3 main headings:
 - Personal qualities
 - Skills
 - Knowledge
- Assessment linked to objectives, and identified for each assignment

1989 - 2008

- Course structure – 4 year sandwich
 - Year 1
 - Conventional and common with Mechanical Engineering
 - Year 2
 - Studio based
 - Group working
 - Problem based – problem drives need for knowledge
 - Continuous and peer assessment
 - Reflective journals
 - Some tests

1989 - 2008

- Course structure – 4 year sandwich
 - Year 3
 - Compulsory industrial training experience
 - Assessed against course objectives, and counting towards degree classification
 - Year 4
 - Studio based as in year 2
 - 2 major individual projects
 - Design process
 - In depth advanced study

1989 - 2008

- Accredited by IMechE for CEng
- High level of student motivation – 90%+ progression after year 1
- Companies requested students for placement from this course
- 90%+ graduate employment
- Cost – dedicated studio space
 - Change in staff working

1989 - 2008

- Incorporation of Formula Student entry into the curriculum of the BEng Motorsport course in 2005 was the next major step, and led to the adoption of Activity-Led Learning (ALL) within the Faculty

1989 - 2008

- Activity Led Learning
 - Method used to provide and develop both technical and professional skills
 - Provides opportunity to develop “Ability to” skills, as defined in the EPC Engineering Graduate output standard (EPC 2002)
 - I do I understand
- To educate graduates “Fit for Purpose”

1989 - 2008



1989 - 2008

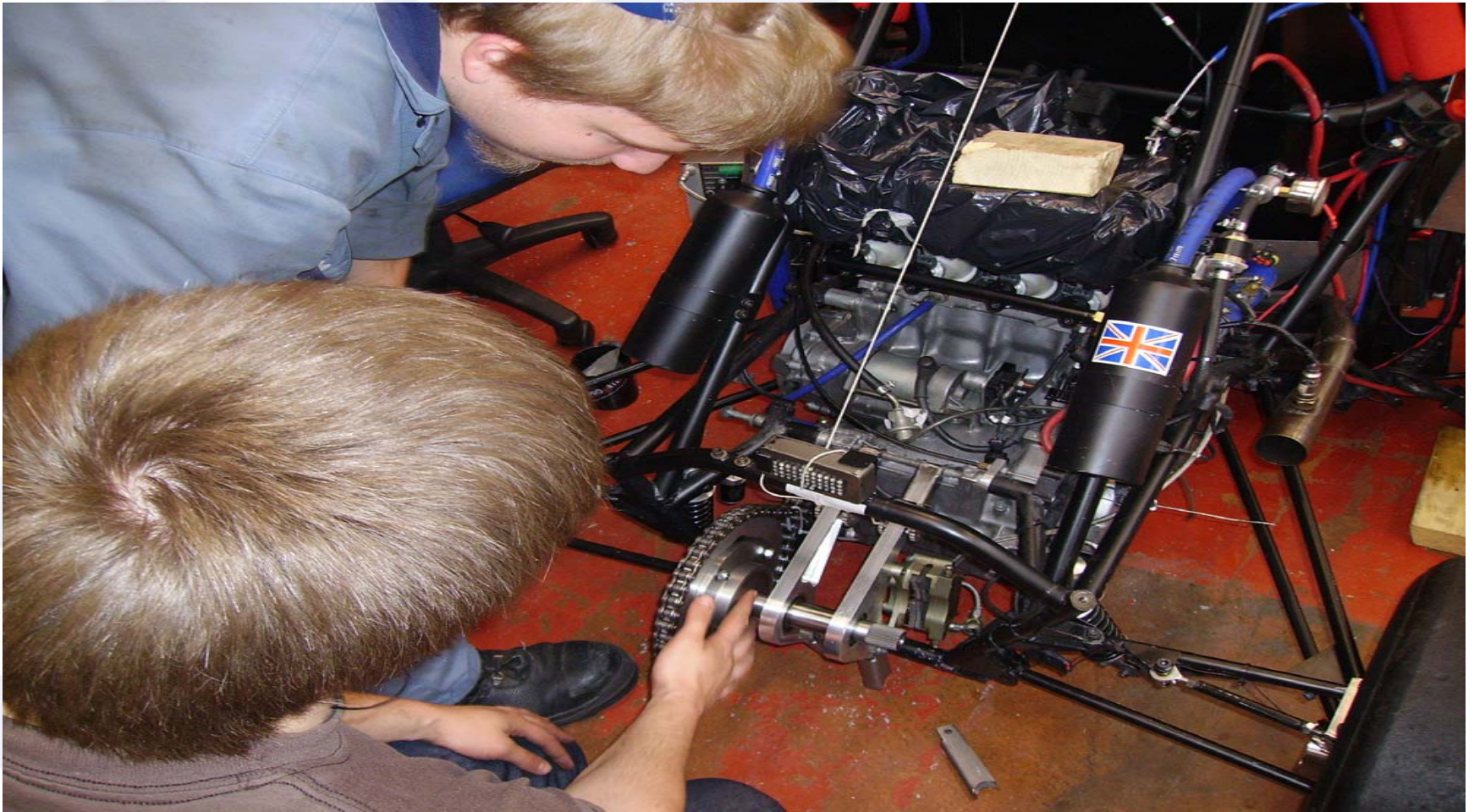
- “Formula Student is about building future engineering talent by designing and producing a single-seat racing car, not just in design and manufacture, but in many of the management, marketing and people skills so vital in the modern world, across all sectors of employment”

(Formula Student 2008)

1989 - 2008

- Prior to 2005 FS was a “voluntary” project
- Clear student enthusiasm illustrated an opportunity to incorporate it into the curriculum to enhance both academic and professional skills
- This was carried out in 2005, incorporating opportunities to get involved, right from year one of the course

Provision Of The Teaching And Learning Environment



Facilities



Facilities



1989 - 2008

- Support given:
 - Academic and, more recently, Development Officers
 - Intern students
 - Peer support, knowledge transfer and learning

Comments From Students

- “Helpful staff”
- “Working as a team”
- “The ability to gain experience”
- “Do what you want (with little constraint from staff)”
- “Fantastic platform to learn from”
- “Enables us to apply what we learn within a real project”

The Benefits

- Increased integration of all staff from Technician to Academic focussed on student learning experience
- Students taking greater responsibility for their own learning
- Peer learning
- Provides opportunity to reflect on career aspirations

Is ALL Effective?

- Formula Student integrated into the course in 2005
- Subsequent pass rate figures show, for an increased cohort size (33-46) there was a 10% rise in progression, level 2-3
- 96% success rate at level 3

Further Integration

- More design work carried out by second year students, through increasing opportunities to get involved in FS project from an early stage of the course
- This will encourage the opportunity for maximum academic rigour from third year students

1989 - 2008

- Integrating Formula Student into the course as a basis for ALL has been a success
 - Development of professional skills
 - Platform for deep learning
- Need for development of teaching spaces
- Graduates “Fit for purpose”

What next ?

- The Faculty is building new accommodation for 2011
- Opportunity to specify spaces within the building – adoption of new pedagogy defines new spaces and methods of working
- ALL has been adopted across the Faculty for full implementation by 2011

What next ?

- Problem and activity to drive need for knowledge
- Spaces designed to permit group working by subject and integrative projects
- Pilot starting 2008-9 for a major cross disciplinary project for year 1 students – to be rolled out across Faculty in 2009-10

What next ?

- Ideas formulated on our previous experiences
- We have visited and talked to colleagues involved in similar projects in the UK, Europe, USA, Canada and Australia, and the process is ongoing

Final remarks

- Positive experiences of Action-Led, Problem Based, Activity-Led Learning
- Opportunities of new building enabled adoption of ALL across Faculty
- Opportunity to attract, motivate and retain good students
- Opportunity to offer industry graduate engineers “Fit for Purpose”