STEM, STEAM, and Dream: Educating an Imaginative and Skilled Workforce

An EU perspective

Dr Jill Cush
The South West College

- Spans the Counties of Fermanagh and Tyrone in West of Northern Ireland
- Annual operational budget £39 million
- 18,000 annual enrolments
- Approx 700 staff between full-time & part-time academic and support staff
- New campus buildings in Cookstown, Dungannon and Omagh
Structure

• SWC Economic Engagement Model
  – Strategic Direction
  – College Development Plan
• Economic Engagement Activity
  – InnoTech Centre
• Innovation Centres
  – STEM Agenda
  – Design and additive manufacture
  – Renewable Energy
• Discussion
Economic Engagement - SWC

- Industry R&D
  - ~120 R&D projects per year
  - 25 staff – scientists, technologists and engineers
  - £10.7 million NPV
- Industry standard equipment in innovation centres
- Local, regional, national and international focus
  - 5 EU technology projects
- Industry driven curriculum
- 2500 annual engagements with businesses
Strategic Direction

- 99% of business in SWC catchment <50 employees
- 45 business with >100 staff
Regional Economic Strategy

- Knowledge and skills transfer
- Support industrial economic activity in priority areas
- Stimulate interest in and enthusiasm for STEM
- Support manufacturing and private services productivity
- Skills and Jobs in Low Carbon Economy
- Increase capacity for R&D and Innovation
- Interact with collaborative networks
- To work in partnership with other Departments, primarily DETI

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Innovation R&D Creativity Skills Employability Business Growth Competing Globally Economic Infrastructure
College Development Plan

AT THE SOUTH WEST COLLEGE WE BELIEVE THAT WE HAVE THE CAPACITY TO MAKE A MAJOR CONTRIBUTION TO THE SOCIAL AND ECONOMIC WELLBEING OF THIS REGION IN A PERIOD OF UNPRECEDENTED TURBULENCE AND CHALLENGE

1. A service to business and industry that is bespoke innovative and increases both the business stock and economic wealth of the region;

2. An outward and forward looking College within a globally focused region;

3. An intelligent and industry facing curriculum;

4. A College that is entrepreneurial in its spirit balanced against the risks of the challenge;
Economic Engagement Activity

- R&D Support for SMEs
- Technical and business mentoring
- Training for business
- Industry Focussed Foundation Degrees
- Into employment programmes
- Staff and student innovation support
- EU funded Technology R&D
Stakeholders
InnoTech Centre

SUSTAINABILITY
Solutions for environmental & renewable technologies

DESIGN
Design skills for any industry

ELECTRONICS
Innovation in Electronics, Software & ICT
InnoTech Centre Context

• Broaden the **international reach** of the College

• Develop capacity to deliver high quality **industrial knowledge transfer and technology development**

• Extend the capability of the College to deliver **bespoke training** and technical mentoring to industry in priority skills areas

• Increase the number of students in South West College who are studying courses in the area of **Science, Technology, Engineering and Mathematics (STEM)**
• Leading delivery agent for r&D with SMEs within the region?
The InnoTech Centre

- **Established in January 2009**
- **Key Activities**
  - Industry r&D
  - 120 R&D projects Per year
  - Offices in Cookstown & Enniskillen – 14 Staff
- **InnoTech Centre self-sustaining - 6 years**
  - Industrial R&D funded work
  - Regional development tenders
  - EU project applications
- **Budget £3, million**
## New Ideas on R&D and Economic Development

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Progressive</th>
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<tr>
<td>The idea that invention, rather than imitation, is the major source of innovation and economic development.</td>
<td>In fact, ‘creative imitation’ and exploitation of the existing stock of knowledge accounts for most economic development</td>
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<td>The idea that basic science is the ultimate source of innovation and therefore of economic development (the so-called ‘linear model’ of innovation).</td>
<td>From the perspective of economic innovation, science is generally more interesting as a source of trained people than as a source of new and commercially relevant knowledge</td>
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<td>The neo-classical model of the firm as a well-informed, rational robot.</td>
<td>Real firms are fallible, have variable capabilities, lack information and make progress through learning</td>
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InnoTech Case Studies

• Tourism iPhone App
• Cow Cubicle Design
• Casing Design & Prototype
• Winch System Design
• Access Bridge Engineering Design
• Type Approval Consultancy
Outcome and Impact

• Create 70 new jobs
• Sustain 250 existing jobs
• Sales in 160 companies increasing by 10%
• 80 companies to enter new markers
• Value of project to local economy £6,720,000
Internationalisation

- 5 EU projects live
  - income £4,820,869
- 41 partners across 11 countries
- Projects in
  - Renewable energy
  - Green Transport
  - Mobile Technologies
  - Sustainable Agriculture
- First FP7 project for any College in Northern Ireland
SouthWest College

Innovation Centres

- High quality approved Teaching & Learning
- Innovation as an ethos in curriculum development
- Strong Student centred philosophy
- Unit Based Industry Researched Curriculum
- Embedded Entrepreneurship
- National & International Staff - Student & Knowledge Exchange
- An International Physical Learning Centre

Staff Students Industry

Physical College

- Centre for People & Workforce Development
  - Strong, embedded leadership philosophy and practice
  - A “Highly Skilled” flexible workforce
  - All staff adopting a “business focused” philosophy
  - Strong “Change Management” culture
  - Transnational workforce philosophy
  - Delegated managerial decision making at all levels.

Virtual College

- Innovation & Development Centres
  - International standard Innovation Centres
  - Industry standard demonstration models
  - Some contribution to academic research
  - Technology transfer Initiatives
  - Product Development Initiatives
  - National & International commercial activities and partnerships.
Innovation Centres

It is essential that the work & development taking place within the Innovation centres adds value to:

• Staff
• Students
• Curriculum
• Industry
The UK's only dedicated Science, Technology, Engineering and Maths Centre

www.stemcentreni.com
Led by a team of dedicated STEM experts, the centre encourages excitement for scientific investigation and enthusiasm for discovery.
Impactful learning - Feedback from participants indicates that 96% are more likely to select STEM subjects for further study following a visit to the STEM Centre.
The ultra-stylish learning environment is packed with the very latest technology and is specially designed to spark the imaginations of budding scientists, technologists, engineers and mathematicians.
Curriculum ...

- Developing Key Skills
- Introduce students to the importance of STEM
- Impact on GCSE subject choice
- Develop T-Shaped Learner qualities
- Contextualising Theory
- Specific curriculum development
IDEA Centre Omagh
Product design and development studio

• Interactive learning and exhibition space
• Encourage students, companies & community …
• ....to participate in creative process of generating ideas and creating own prototypes
• ‘Studio’ learning – focussing on innovation, creativity and enterprise
• Proof of concept prototypes
IDEA Centre Omagh

Product design and development studio

- Investment of almost £1 million
- Industry standard equipment
- Rapid prototyping – 3D printing
- Laser cutting equipment
- Workshop machines linked to College workshops
- CAD & Graphics facilities
- 3D projection & touch screen
- Follow on from InnoTech Centre work
- Focus on bringing products to the market
- Students, Industry
Overview of CREST

- Centre for Renewable Energy and Sustainable Technologies
- Interreg Funding - £2.9 million
- R&D Support for SMEs in renewable energy and sustainable technologies
- 9 Staff + 2 placement students

Partners
- SWC
- IT Sligo
- Dumfries & Galloway College
- Cavan IT
Technology areas of focus

- Biomass – production & drying
- Biofuel – crops and processing
- Biogas – feedstocks & system design
- Sustainable & Passive Construction
- Waste – product re-use
- Recycling equipment
- Energy use and conservation
- Modification / adaptation of renewables
- Environmental Management
- Energy Storage and grid optimisation
- New product development and testing
Extensive Living Roofs - these incorporate low-lying plants from 2 to 6 inches high. They require only a few inches of soil to support them, and only need a low weight-loading roof. They are low maintenance and can be used for any kind of roof.

Triple glazed windows - windows are oriented and installed to take advantage of passive-solar heat gain.

Structural insulated panels (or structural insulating panels, SIPs), are a composite building material. They consist of an insulating layer of rigid polymer foam sandwiched between two layers of structural board.

Glued laminated timber, also called Glulam, is a type of structural timber product comprising a number of layers of dimensioned timber bonded together with durable, moisture-resistant structural adhesives.

Zero Carbon breeam
Impact

• Innovation experience accessible for all students
• Academic staff
  – Focus for involvement in industry projects
• Seminars and Conferences
• Specialist lectures
• Site visits, tours & international trips
• Student placements
• Access to specialist equipment
• Course team involvement for project staff
Key Strengths – Economic Engagement

• Stakeholder Engagement
  • Regional basis – Innovation Vouchers, Fusion & KTPs
  • Enhanced linkages with UK Colleges
  • Internationally – Interreg, Atlantic Area & NPP
  • EU FP7 application approved & Scoping Horizon 2020

• 3 Beacon Awards 2012 for Innovation Centres and strategy
  • Overall presidents award for STEM Centre

• Lead College for NI FE Sector Initiatives – InnoTech NI, Carbon Zero, ‘InnovateUs’

• ETI Grade one for Innovation in Employer Engagement
  – “outstanding” provision in the area of industry innovation.

Leading delivery agent for r&D with SMEs within the region
Questions

An EU perspective
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