

Education and Training Inspectorate

An Evaluation of the Innovation Fund: Employer Support Programme

April 2011

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PART ONE

1. INTRODUCTION

The report summarises the findings of an evaluation by the Education and Training Inspectorate (Inspectorate) of three strands of the Innovation Fund: Employer Support Programme, Carbon Zero Northern Ireland (NI); the Inno Tech, and the Open Source Software Solution Centre¹. The Innovation Fund: Employer Support Programme was introduced by the Department for Employment and Learning (Department) in 2008 to enhance the colleges' economic engagement with employers, including prospective foreign direct investor clients and expanding companies in the priority skill areas². In the three-year period, 2008-2011, colleges were asked to submit bids to secure funding out of the £3 million annual budget that was made available to the sector³. The Fund has, and will be used, to support colleges' engagement with local employers, and their entrepreneurial activity as well as improving cross-border collaboration in the development of an 'all island workforce,' particularly in border areas. More recently the focus of the programme has been on fostering cross-college collaborative approaches and/or supporting small to medium-sized enterprises (SMEs) during the economic downturn.

The evaluation was undertaken by the Inspectorate during the second term of the 2010/11 academic year. The main purposes of the evaluation were to inspect and report on the impact the dedicated funding stream had on, the curriculum in the colleges, teaching and learning, standards and outcomes of students' work, and on the effectiveness of leadership and management of the projects. In addition, the evaluation was to identify best practice in teaching and learning, and to provide advice to the Department on the effective dissemination and mainstreaming of best practice across the NI further education sector.

1.1 METHODOLOGY

A team of inspectors met with the senior management teams and members of staff who were managing and delivering the projects in each lead college. They met with a sample of employers from NI and a small number from the Republic of Ireland who participated on the programmes, to evaluate the effectiveness of the support provided by the participating colleges. The inspectors met with students and, via a video link, interviewed placement students who were participating on the Pittsburgh Sustainable Leadership Programme under the Carbon Zero NI project. The inspection team visited most of the other participating colleges⁴ who were involved in the Carbon Zero NI and the Open Source Software Solution Centre projects to evaluate the effectiveness of the cross-college collaboration arrangements. The views of a wide range of stakeholders were also considered including specialist advisory groups, key industrial sectoral bodies, and representatives from local government, and local enterprise and development agencies. A sample of lessons was inspected to evaluate the impact on teaching and learning approaches. Members of the team also visited a small sample of training events and conferences provided to industry and key stakeholders, including local government, which took place during the inspection. In addition, the team inspected relevant planning documentation, marketing, promotional and training materials, quality assurance records, and curriculum development plans.

¹ The evaluation did not include three other projects funded by the Department: Advancing Enterprise; Bio Science Skills Academy and the Rapid Response NI.

² These are the priority skill areas that were identified in 1999 by the Northern Ireland Skills Taskforce of being of vital importance to the Northern Ireland economy: Construction; Electronics; Information and Communications Technology; Hospitality Catering and Tourism; Manufacturing and Software Engineering.

³ The actual spend each year was £1.4million in 2008/09, £2.4 million in 2009/10 and £3million in 2010/11. The funding in the third year of the pilot was, Carbon Zero NI £734,339, Inno Tech £583,224, and Open Source Solutions £320,953.

⁴ Details of the other colleges visited are included in the appendices

1.2 CONTEXT AND SUMMARY OF EACH PROJECT

a. **Carbon Zero NI: this is a cross-sector project led by the South West College.**

This project has been running for two years.

This project aims to:

- position the NI further education sector as an engine for the development of smart, innovative sustainable technologies in the areas of clean energy, including wind energy, energy from waste and clean energy storage with the aim of securing a leadership position in the exploitation of specific technology areas in the global market;
- identify international market opportunities in the areas of sustainable development and clean energy and assist NI companies to exploit these opportunities. This will be facilitated via the establishment of a Knowledge and Technology Platform in the area of clean energy; and
- develop a model of high impact 'clean and green' regional capacity building and business development programmes throughout the NI further education sector.

b. **Inno Tech: the project is managed by the South West College.**

This project has been running for three years.

The objective of this project is to enhance employer engagement, entrepreneurial activity and to support industry research and development in the areas of electronics and software, industrial design, sustainability, and more recently technical tourism. Through the development of an Inno Tech Centre within South West College it was planned to expand the international reach of the college and provide industry linked research and development services, innovation support by bringing new ideas and products to the market, and bespoke training. It was also intended to use the programme to help increase participation in science, technology, engineering and mathematics (STEM) courses in the college and to raise awareness of STEM to local schools.

c. **Open Source Software Solution Centre: the project is led by the Southern Regional College.**

This project has been running for three years. Since 2010 it has been extended to include the Belfast Metropolitan College, North West Regional College and South East Regional College.

The main aims of this project are to develop the skills base of the NI workforce in the use of free open source software applications and in the development of applications of open source applications to meet the needs of small to medium sized enterprises and micro businesses. The Open Source Software Solution Centre which is based in the Southern Regional College is the only such centre in Ireland. Over the last three years the centre's remit has been to support businesses in the use of software applications both open source and proprietary to meet the needs of industry. The services include awareness raising to business, information and communication technology (ICT) audits to identify alternative applications, mentoring services in the

use of the applications, and the development and testing of bespoke software solutions. As part of the third year of the programme, the aim is to expand the geographical coverage of open source solutions to the catchment areas of the North West Regional College and South East Regional College. The main aim of the work of Belfast Metropolitan College is to audit the existing desktop websites of businesses in respect of their mobile accessibility, and where appropriate offer mentoring support in transferring their web presence for mobile access. In addition, the college is to develop and deliver technical training programmes in mobile web, iPhone and Android technologies through a combination of classroom training sessions, and online learning, including the use of mobile browsers.

PART TWO

2. SUMMARY OF MAIN FINDINGS

2.1 OVERALL EFFECTIVENESS

The quality of the three programmes inspected is either very good or outstanding. The quality of the provision in the Inno Tech is outstanding, and the quality of the provision of the Carbon Zero NI and the Open Source Software Solution Centre is very good.

2.2 LEADERSHIP AND MANAGEMENT

The quality of leadership and management of the three projects is either very good or outstanding. It is outstanding on the Inno Tech project and is very good on the other two projects.

The rationale and planning of the three projects are strategically well-informed. They are well aligned to Government policy and are based in areas of strength within each of the lead colleges.

Each project has been effectively managed by the lead colleges; the managers leading the projects have well developed management and technical skills in leading such complex projects.

With few exceptions, the cross-college projects have been well-managed by the lead colleges and the participating colleges; this has done much to foster cross-college collaboration in curriculum development and/or in economic engagement. The collaboration between the Southern Regional College and Belfast Metropolitan College under the Open Source Software Solution Centre project is outstanding.

Most of the colleges have a good deployment of well-qualified and highly skilled staff to support the aims of each of the three projects. The projects have done much to further up-skill the expertise of lecturing staff in the colleges.

Sustaining the scale of the colleges' current levels of work will be a major challenge for them beyond the life of the pilot.

2.3 QUALITY OF TEACHING AND LEARNING

Across the areas inspected, the quality of teaching and learning of the observed sessions ranged from good to outstanding; a significant proportion of these sessions were outstanding.

Recurring strengths included innovative teaching and learning approaches and the effective use of industry-based projects.

2.4 CURRICULUM

The impact on the curriculum was very good on the Inno Tech project and good on the other two projects.

Each project has offered good opportunities for most of the colleges to refresh their curriculum offer and to enhance their levels of economic engagement with industry.

The projects have also helped the colleges enhance the range and quality of work-related learning for students in their professional and technical units.

2.5 STANDARDS AND OUTCOMES

The standards of work and the outcomes attained of the work inspected are very good in each project.

Each project has enhanced the colleges' support for industry and has contributed effectively to raising standards of students' work in the participating colleges.

PART THREE

3. LEADERSHIP AND MANAGEMENT

The quality of leadership and management of the three projects is either very good or is outstanding. It is outstanding on the Inno Tech, and is very good on the other two projects.

3.1 STRATEGIC MANAGEMENT

There is a high level of commitment from the lead colleges, and the other participating colleges' senior management teams, to make use of the pilot to align their curriculum offer and to enhance their levels of economic engagement to support the strategic aims of the main policy driver for the sector, 'Further Education Means Business'⁵. In the best practice, in the South West College, the programmes are embedded effectively into the strategic planning of the college. The strategic planning of the Inno Tech project, for example, is integrated fully into whole-college development planning. The senior management team has effectively linked the planning and implementation of Inno Tech programmes across three whole-college projects: curriculum development, economic engagement and broadening the international reach of the college.

The vision for each of the three projects is strategically well-informed, and is articulated effectively in the lead colleges, particularly in how they can assist in supporting the knowledge and skills base of the NI economy. They are well-aligned to Government priorities in economic development, and in supporting the emerging technologies in the areas of computing and software development, engineering, and in sustainable development. The specific details of each project are technically complex and are based on sound research from NI and globally. As a consequence, the projects offer advantages to the NI economy, in supporting local enterprise and in attracting foreign direct investment. A further strength of each project is that the participating colleges are offering support to industry where there are gaps in existing provision from higher education institutions and from the private sector. There is also strong coherence in the work of the lead colleges for each of the three projects; the submissions to the Department were based on areas of strength within each of the colleges. A common strength in each was the capacity building and expertise key members of staff had developed in one or more of the legacy colleges prior to the formation of the six regional colleges. Members of staff in one legacy college in the South West College, for example, have been leading practitioners in sustainable technologies since 2004. This expertise has been well complemented with the formation of the clean energy Knowledge and Technology Platform (KATP) which is used effectively to guide and inform the planning of the programme. The KATP, which is made up of leading academics and business people in sustainable development and clean energies, provides effective oversight of the main activities of the project, as well as facilitating the college's understanding of the needs of industry, and helping them ensure that course materials produced under the project are fit for purpose. More could be done, however, to inform the other five participating colleges of the remit of the KATP in the overall planning of the Carbon Zero NI project.

All of the projects have developed a good range of programmes to support the needs of industry. Most of the provision includes initial awareness raising, auditing of need, as well as specialised mentoring support. All of the colleges offering business support services have a well-defined remit in helping participating firms identify business solutions to meet their needs.

⁵ Further Education Means Business' March 2004

The three projects have done much to develop effective links with the best practice globally with other academic institutions, support agencies and with industry. The range of links established by the colleges under the three projects is extensive. This has done much to raise the international profile of the participating colleges as well as facilitating knowledge transfer across these areas. Under the Carbon Zero NI project, the South West College and the South Eastern Regional College have forged strategic links with many key international agencies, including the Global Wind Alliance, and the Global Maritime Alliance. The Pittsburgh Sustainable Leadership Programme in conjunction with the Ireland Institute of Pittsburgh does much to aid knowledge transfer in sustainable development. Under the programme, which is managed by South West College, graduates are placed in companies that specialise in the application of sustainable development. This arrangement has significant potential in enhancing the skills base of the NI workforce, particularly when the current cohort of graduates, and the subsequent cohort complete their internship training programmes.

All three projects have been well-managed by the lead colleges. Roles and responsibilities for the managers of each programme are clear and there are appropriate communication channels with senior managers in the colleges, especially the curriculum managers; there are significant strengths in each college. The lead managers for each programme have well-developed management and technical skills in leading complex projects. There is evidence that the targets set have been mostly exceeded, and that the programmes have had additional positive spill-over effects in excess of the terms agreed in the planned submissions. These outcomes enhanced the range and relevance of the curriculum offered to both full and part-time students, and the lecturers' skills and expertise.

3.2 CONNECTIONS WITHIN COLLEGES AND COLLABORATION ACROSS THE COLLEGES

The evaluation identified examples of good practice of effective connections made within a minority of colleges across the different funding streams of the programme. In Southern Regional College, for example, members of staff who work on the Carbon Zero NI project have worked effectively with software developers based at the Open Source Software Solution Centre project to develop a sophisticated web-based carbon mapping and visualisation application using a range of open source software tools. The close working relationships and joint work undertaken by research lecturers in the South West College Inno Tech and those working on the Carbon Zero NI project has resulted in synergies to meet the needs of participating firms. In one project, for example, staff from the Inno Tech Centre has worked effectively with local manufacturers of pre-fabricated poultry housing to design energy saving buildings.

A key challenge for the two lead colleges in the Carbon Zero NI project and the Open Source Solutions Centre is managing the project with the other participating colleges. Nevertheless, both of the cross-sector projects have been managed effectively by the lead colleges. There is some evidence that both projects have contributed much to cross-sector collaboration across most of the colleges. Each college under the Carbon Zero NI programme has been able to specialise in key areas of sustainable development where it had existing expertise in curriculum development and/or in supporting economic engagement. More could be done, however, in the Carbon Zero NI project, to ensure that the outcomes of research programmes within the South West Regional College are disseminated fully to the other five colleges. Key members of staff leading these programmes have good or better project management skills. In the best practice, they have fostered well-developed strategic links with at least one of the other participating colleges. In the Open Source Software Solution Centre project, the links established between the lead college, Southern Regional College, and Belfast Metropolitan College, are outstanding.

Lecturers from both colleges are working collaboratively to share their expertise, well in excess of the targets agreed in the submission for the project. A minority of the participating colleges, however, were unable to deploy an adequate number of staff at the start of the projects to manage and deliver their provision; this has had an adverse affect on the overall effectiveness of their provision.

In addition, the evaluation, found some shortfalls in the management of these projects across the other participating colleges, which include:

- service level agreements not focusing sufficiently on the quality of the provision; and
- a lack of knowledge transfer from the lead college to the participating colleges, to prevent undue duplication of work across the sector.

3.3 QUALITY ASSURANCE

Overall, there is little evidence that the three projects have been linked effectively to the colleges' quality assurance arrangements. Most of these arrangements were discrete and do not focus sufficiently on the overall effectiveness of the quality of the provision.

Only two of the projects have been evaluated by external consultants. In the best practice, the external evaluation of the Inno Tech included an evaluation of the net contribution to those businesses participating on the programme.

3.4 STAFFING AND PHYSICAL RESOURCES

Most of the colleges have a good deployment of well-qualified and highly skilled staff to support the aims of each project. A novel feature of the work of the Inno Tech and work undertaken by South West College in the Carbon Zero NI project is the appointment of research lecturers to support economic development in their own areas of expertise. The college has three research lecturers deployed in the Inno Tech Centre and three on the Carbon Zero NI project. Nearly all of the research lecturers are qualified to post-graduate level; four have doctorate degrees. At least two of the research lecturers who are primarily based at the Inno Tech Centre also work on Carbon Zero NI projects which helps offer a responsive level of support for industry. The research lecturers in the Inno Tech Centre are also supported by 13 Industrial Training and Technician Associates who work on a wide range of industry projects initiated through their expanding network of contacts with industry and referrals from partner organisations. Across all of the projects, most of the staff involved in managing and delivering the programmes have good or better experience of working in industry.

Lecturing staff involved in the projects have participated on extensive staff development activities to support the aims of their work; some of this has included working with leading global practitioners. This professional development along with their experiences of economic engagement has added significantly to the skills of the lecturing staff across a wide range of professional and technical areas.

Across all of the projects the quality of the physical resources and specialist equipment is very good or outstanding. The South West College, for example, has invested heavily to develop sector-leading resources, including the STEM centre, an anaerobic digester, and an eco-classroom in wind turbine training equipment, with further investment planned. The South East Regional College has developed an Environmental Skills Centre, which includes a wide range of renewable technology equipment from well-established local and international manufacturers.

3.5 PUBLIC VALUE

Sustaining the work of the programmes beyond the life of the pilot is a major challenge for the colleges, especially those colleges which have appointed a range of well-qualified staff to support the programmes. The evaluation found examples of colleges planning to sustain their work beyond the life of the pilot. The South West College, for example, has raised income through a range of initiatives including income from Invest Northern Ireland Innovation Vouchers, as well as income from the STEM Centre. Other options being considered by the college include taking equity status in industry research projects, and potential profit from intellectual property. A key area of progress made by the colleges in sustaining the work of the projects is through the extensive up-skilling of college lecturers in their work. The Southern Regional College, for example, through its lecturer release scheme, is offering computing lecturers the opportunity to work on real industry projects through the Open Source Software Solution Centre. In addition, computing lecturers employed in Belfast Metropolitan College, will be updating their technical expertise in mobile applications for smart phones. The challenge, however, will be for the participating colleges to sustain the scale of their current levels of work, for example, through full-cost recovery training and support for industry.

3.6 QUALITY OF TEACHING AND LEARNING

The quality of the teaching sessions and the specialist conferences and events inspected during the evaluation ranged from good to outstanding. A significant proportion of the observed sessions was outstanding⁶.

Key strengths include innovative teaching and learning approaches, the high quality of the presentations, and the effective use of real industry projects to motivate the students. For many of the specialist conferences organised for industry, technical experts, and academic institutions, appropriate arrangements were made to allow students in the colleges to attend these events. This adds much to their overall learning experiences. The evaluation, identified examples of best practice, which are listed in the appendices of the report.

There were few examples of innovative use of information and learning technology (ILT), such as blended learning to meet the needs of businesses participating on the programmes. One exception is the training programme in smart phones and mobile-web technologies that was developed by staff in Belfast Metropolitan College through the Open Source Software Solution Centre project. Lecturers in the college have developed three different training modules (40 hours each) which combine face-to-face delivery and a blend of online learning platforms, including the college virtual learning environment and mobile devices for practical work.

3.7 CURRICULUM

The impact on the curriculum offer for students and industry is good or better across the three projects. It is very good on the Inno Tech and Open Source Software Solution Centre projects.

⁶ Exemplars of best practice are included in the appendices.

All of the three projects have offered good opportunities for nearly all of the participating colleges to refresh their curriculum, enhance their levels of economic engagement, and to improve the quality of the learning experiences for students, particularly in STEM courses. The outcomes of the projects include the development of a wide range of new STEM courses across the further education sector from level 2 or level 5 on the Qualifications and Credit Framework (QCF). The programmes have also, across a number of colleges, led to the development of new professional and technical units within existing qualifications; much of this is based on the experiences lecturers in the colleges have gained through their engagement with industry.

The Inno Tech Centre has been particularly successful in enhancing the STEM curriculum offer and learning experiences for students in the South West College; the impact on the curriculum has been significant. Key to this success has been the effective deployment of staff from the Innotech Centre in curriculum planning through whole-college curriculum conferences, informing course reviews, actively participating in planning days and in the development of bespoke training courses. Research lecturers from the centre have been used to good effect in helping course teams develop new courses, including engineering programmes with specialisms in industrial electronics, motor sports technology, and wind turbine technology. Research lecturers from the Inno Tech Centre and from the Carbon Zero NI project have also contributed to the development of renewable technologies through a range of programmes including the Higher Attainment Through Cross-Border Hubs initiative, anaerobic digester installer training, hydrogen safety, and new units in quarrying. Good use is made of their expertise across a range of professional and technical areas including engineering, construction and computing. They also deliver business support sessions based on their experiences with industry across a wide range of professional and technical areas in the college, as well as working effectively with course teams to design assignment briefs that are based on real projects in the Centre. Students in the college have good opportunities to broaden their learning experiences when they hear inspirational guest speakers at conferences organised by the Inno Tech Centre. The impact of the programme outside the college in promoting an interest in STEM courses and careers is significant. Since the programme commenced, 2,850 pupils from some 30 schools have participated on a range of relevant and motivational STEM activities in the college.

The Carbon Zero NI project has made a good contribution across the sector in raising levels of economic engagement with industry. The range of seminars, industry events, symposia and conferences provided by the colleges is extensive. It has also helped to realign the further education curriculum for most of the colleges visited as part of the evaluation to ensure that the curriculum offer, course content and course assignments match effectively the needs of sustainable technologies. The South West College, offers an extensive range of bespoke training and seminars for industry. The college has developed a wide range of new courses to match the needs of sustainable development, including the foundation degree in energy, environment and sustainability, and a range of Open College Network (OCN) NI short accredited courses in sustainability. The Carbon Zero NI project has facilitated one of the participating colleges, South East Regional College, to develop seven new courses to augment its present provision of energy installer courses, based at its new Environmental Skills Centre. One of the colleges in the Carbon Zero NI programme is making good use of its expertise in responsible sourcing of materials that has been based on its excellent links with industry and its engagement with key stakeholders. Two members of the lecturing staff are developing a higher education unit in sustainable construction.

The Open Source Software Solution Centre project has enhanced the participating colleges' engagement with industry and has led to improvements in the quality and range of the students' learning experiences. The impact of the project has been well-mapped across the curriculum by the management team in Southern Regional College. Students studying

computing courses at all levels in the college have good opportunities to either apply or develop open source solutions in their professional and technical units. Students can also apply their technical skills through the use of real project work from the Open Source Software Solution Centre in their course assignments. In addition, across a minority of courses, course teams have started to make use of open source software, including multi-media and computer aided design applications to allow students to access software from home. Students normally would not be able afford these proprietary software applications, which have expensive license fees. One of the participating colleges, Belfast Metropolitan College has effectively developed a unique range of high quality employer-led training programmes and resources in leading smart phone applications and mobile web development. Following the planned up-skilling of some of the college's lecturing staff, mobile technology applications will be fully embedded into the curriculum of students undertaking courses in computing and ICT.

The programmes have also helped the colleges enhance the range and quality of work-related learning for full-time students, through industrial visits and visiting speakers from industry. The South West College employs a number of full-time foundation degree students in the Inno Tech Centre towards the end of their course to enable them to complete the work-based element of their qualification by working on industry projects. There is evidence that this programme significantly improves their prospects of gaining relevant employment once they complete the course. The Southern Regional College offers a similar programme for foundation degree students, where they work on real projects through the college based Open Source Software Solution Centre.

With the roll out of the QCF, all of the programmes, where appropriate, have been accredited on the new qualifications framework. Much of the new curricula developed by some of the colleges is so innovative that the sector skill bodies and the awarding bodies have not yet been able to accredit this provision under the QCF. This problem poses difficulties in providing colleges incentives to sustain this work beyond the life of the programmes. In the Belfast Metropolitan College, for example, any planned provision in mobile technologies has to be funded as leisure and hobbies provision even though it is meeting clearly defined skills needs in the NI economy.

3.8 STANDARDS AND OUTCOMES

Across the three projects, the standards of work and outcomes are very good.

All of the projects have enhanced the levels of support for industry, and have contributed to raising the standards of the students' work in the participating colleges.⁷ All of the employers interviewed reported high levels of satisfaction with the support provided by all of the colleges participating on each project. Common strengths reported included the flexible response from the colleges, the high levels of technical proficiency in the support provided, and the benefits to their businesses.

The Inno Tech Centre provides outstanding support to local SMEs to help them develop commercially viable products and services in the core areas of electronics and software, industrial design and sustainability; many of these businesses do not have the capacity to undertake this work on their own. At the time of the evaluation, some 102 projects had been completed or were ongoing. The centre staff provides a wide range of services to industry to provide solutions to complex technical problems. Effective project management skills have meant that these solutions have been provided on budget and within agreed time limits. Since the project commenced the college has secured 53 Innovation Vouchers to support local companies.

⁷ Exemplars are included in the appendices

The Carbon Zero NI project has helped to develop the capabilities of architects, building services consultants, product manufacturers and government agencies to design and specify sustainable buildings and construction projects. These groups have also gained a better understanding of the practical aspects of energy management and are more aware of government strategies, climate change regulations and targets. Installers of renewable energy systems have benefited from the wide range of modern heating systems on display in their local college and advice on how to install them. The project has also helped students develop good experiences in sustainable technologies to enhance their technical and broader employability skills.

The Open Source Software Solution Centre has achieved much in raising the skills base of the Northern Ireland economy in the application of open source software and mobile technology applications in industry. The work undertaken by the participating colleges is innovative in that there are very few other public or private sector providers offering similar services. Companies receiving support have realised benefits through the implementation of business solutions, as well as not having to pay expensive licensing fees for proprietary software applications.

4. CONCLUSION

The three projects have done much to enhance regional knowledge and skills in key STEM areas; much of this work is both complex and highly innovative. The projects have been well-managed by the lead colleges, and they have had a positive impact on teaching and learning, and in the curriculum offer across the sector. Sustaining the scale of this work beyond the life of the pilot will be a major challenge for the colleges.

COLLEGES VISITED IN THE EVALUATION

Carbon Zero NI

South West Regional College (lead college)
Belfast Metropolitan College
Northern Regional College
North West Regional College
South East Regional College
Southern Regional College

Inno Tech

South West College (lead college)

Open Source Software Solution Centre

Southern Regional College- lead college
Belfast Metropolitan College
North West Regional College

EXAMPLES OF BEST PRACTICE IN TEACHING AND LEARNING

1. **Symposium at Southern Regional College Newry - “A Sustainable and smart City?”**

The event was well attended by technical experts, local Government representatives, large and SME businesses, further education organisations (including cross-border), universities and members of the public, and students from the Southern Regional College.

The session was well-planned and the quality of the presentations was outstanding. The context was well set with the impact of peak oil and energy scarcity on social, economic and political decisions. Appropriate reference was made of Ireland being at the end of the supply chain, competing to buy scarce resources in an increasingly populated world, etc

The speakers were inspirational and motivational. They set challenging questions for the local decision-makers - how well prepared is Newry for an energy crisis? How do we reduce our energy dependence? How will the economy grow in an energy poor environment?

The technical presentation was also excellent and explored the future demands of technology in a smart city - Smart electrical grid, self-healing, load and demand much more effectively matched, and talking to each other to optimise and reduce energy use.

The attendees were enthused by the seminar and were looking at opportunities either to improve energy efficiency or to profit from the new technologies.

2. **An example of an outstanding presentation at the STEM centre to year 7 pupils from a local primary school.**

This was based on a project to investigate the STEM centre as a business through the local Business Education Partnership. The pupils asked relevant questions, including how much the centre cost, and how many people visit? A majority of the pupils were interested in a career in STEM and were able to talk about actual jobs they might be interested in (becoming a scientist, teaching a STEM subject, architect, electrician).

The planning and delivery of the STEM sample activity was outstanding:

- introduction to structures (worlds tallest buildings);
- challenge to build a structure out of marshmallows and spaghetti;
- specification provided – had to design and build a structure to hold a small book for 30 sec, min of 15cm high, budget of £150 (marshmallow £5 each and spaghetti £1); and
- working in groups of four – real competitive spirit and innovation.

At the end of the 20 minutes the whole group gathered round and counted down the 30 seconds as each structure was tested. Lessons were learned on which structures worked and why. In the end the winner was the structure which met the criteria and cost the least to build (pupils calculated all the costs themselves).

3. An example of a Research lecturer who teaches on a foundation degree course in engineering

The Research lecturer effectively uses his experience of local industry in the course delivery. In the session observed, students over a twelve week period were building a wind turbine from scratch based on a rough plan which lacked specific details to allow the students to improvise and improve the design. The students were divided into three teams, one to fabricate the turbine blades from lengths of timber bonded together and carved into shape. The second group manufactured the alternator and the third group manufactured the mechanical elements of the wind turbine. As a result of the well-planned activities, the students were highly enthusiastic and were developing excellent team working skills.

BEST PRACTICE IN PROJECT OUTCOMES

1. The development of an electronic control panel to regulate the output of a wind turbine generator

In the project, staff from the centre used a Printed Circuit Board milling machine to manufacture circuit boards. They made use of in-house specialist knowledge. For example, an electronics lecturer helped with circuit design and implementation. The project was successfully installed and commissioned. As a result, it has increased the knowledge base for the Inno Tech Centre, and is used by the research lecturer in his teaching on college courses.

2. The development of a Titanic iPad application for a local company.

The company had an iPhone application to showcase Titanic resources. These included licensed material such as unseen video footage, images, and documentary material. As part of the brief, the project had to port the iPhone application to the iPad in order to optimise the screen size and make use of new features on the iPad. Staff from the Innotech centre researched and project managed the development of the application to implement the solution. As a result of this project, the centre is working with college lecturers to develop a new curriculum and in-house expertise in application development.

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