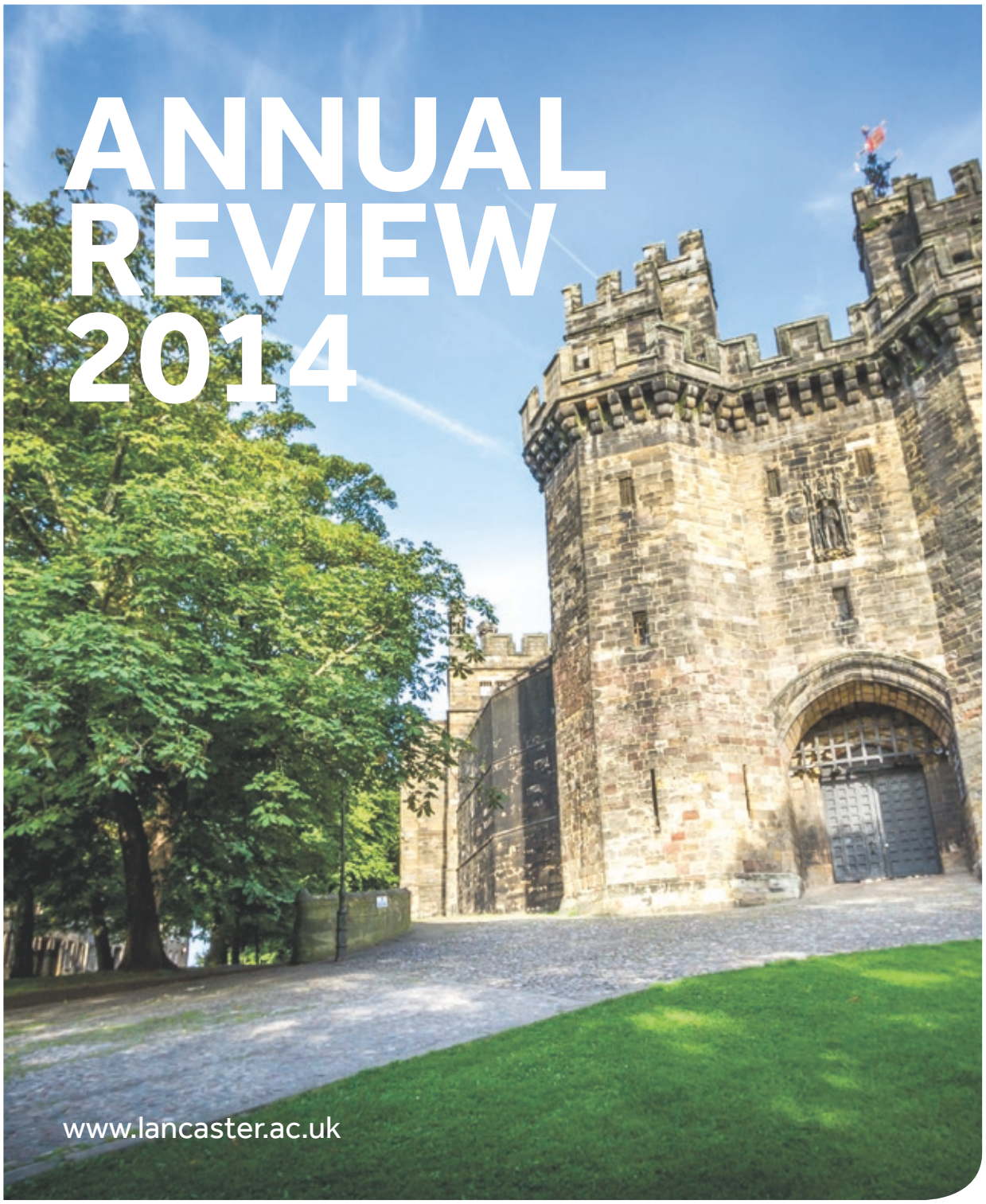
Lancaster University

ANNUAL REVIEW 2014



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VICE-CHANCELLOR'S STATEMENT

Our rapid and sustained success in recent years has helped position Lancaster as one of Britain's best universities.

Our strengths in excellent research and teaching, and our vibrant, diverse community based around collegiate values and a beautiful campus combine to make us distinctive amongst our peers.

This year Lancaster has extended its reach and influence through exceptional work – some of which is mentioned in this review. We have moved up the Guardian league table of universities to achieve 10th place and we maintained our position of 12th in The Times and The Sunday Times Good University Guide. Lancaster also rose in The Times Higher Education World University league table to 131st.

We perform at the leading edge of academic endeavour. Our staff rightly have a reputation for the quality of what they do and for their positive approach to working in partnership with people from all sectors and all parts of the world. This year Lancaster's research income has increased by 11.8% to £29.5m.

Appointing the best people at all levels of the organisation is crucial to achieving our priorities and I am pleased to say that a number of senior appointments are now in post. These include Pro-Vice-Chancellor for Education, Professor Sharon Huttly; Pro-Vice-Chancellor for Research, Professor Stephen Decent; Director of Quality Assurance and Enhancement, Professor Mike Wright; Dean of the Faculty of Arts and Social Sciences, Professor Simon Guy and Dean of Health and Medicine, Professor Neil Johnson.

I would like to pay a particular tribute to Sir Chris Bonington CVO CBE DL who retired at the end of last year, after ten tremendous years of being committed to Lancaster as our Chancellor. We are delighted to welcome alumnus The Rt Hon Alan Milburn who will start as our third Chancellor from 1 January 2015. The University, like him, is committed to making sure that higher education is open to all young people to develop their talents, whatever their social or economic background.

Our future is exciting as we explore new opportunities to extend our teaching and research links around the world. We have an ambitious strategy to become truly globally significant – a leader in higher education that provides the highest quality research and teaching, and a university which engages locally and internationally to add to knowledge and address the issues that concern us as a society.

Professor Mark E. Smith
Vice-Chancellor

HIGH NOTES OF THE YEAR

Engineers have helped explorers discover the world's biggest cave.

The exciting discovery of the giant Miao Room cavern, in China, was featured in National Geographic magazine.

The cavern was scanned as part of a 2013 expedition into the cave, which was co-led by Richard Walters from Penrith-based company Commendium Ltd.

The scan data was provided to engineers at Lancaster University, who used this raw data to make calculations on the area, volume and other values of the underground spaces.

More than 4,000 people poured onto campus in September to take part in a Community Activities Day.

The all-ages event was designed to strengthen links with all sections of the regional community and to showcase the University's research, teaching and facilities.

The day was arranged as part of the University's 50th anniversary celebrations and with more than 100 activities lined up for visitors, from babies through to senior citizens, the 'open doors' event was the first of its kind of this magnitude on campus.

High-value manufacturing is to be bolstered by a new £11.3m technology facility.

The Collaborative Technology Access Programme (cTAP) will include a purpose-built facility that will offer businesses managed access to a suite of cutting-edge instrumentation and facilities worth almost £7m.

The new facility will sit alongside the new Department of Chemistry and also include the provision of additional instrumentation to the Department of Physics.

Lancaster has launched a £1.7m Engineering Design Academy which will help boost the performance of more than 128 small and medium enterprises and bolster the North West's engineering skills-base.

The academy will safeguard 90 jobs and help to create an additional 43 jobs in the region.

Funded by the European Regional Development Fund (ERDF), with matched funding from Lancaster University as well as from private sector partners, the academy will use research expertise in the Engineering Department to support businesses, with a particular focus on advanced manufacturing.

In addition to bringing significant benefits to North West SMEs, the academy will also increase the employability of students and help to plug skills gaps in the region's engineering sector.

Historians invited local people to help flesh out the stories of more than a thousand men from the city who died in World War One.

'Streets of Mourning,' a unique map highlighting the homes of the dead, was showcased in Lancaster as part of Campus in the City, where Lancaster University brought its research into the community.

Streets coloured red on the map suffered heavy casualties; these include Ullswater Road in Freehold with at least 17 dead, in Primrose, Clarence Street suffered 15 losses and Prospect Street ,14, while Norfolk Street in Skerton also had 14. Many other streets had similar numbers of deaths.

By clicking on their street, neighbourhood or school, people can find out the names and personal details of the casualties along with information about their next of kin.

Lancaster is part of a new national research programme looking at ways of dealing with Britain's nuclear waste.

The £8m project, called Decommissioning, Immobilisation and Storage solutions for Nuclear waste Inventories (DISTINCTIVE), includes ten universities and brings together the nuclear industry, the Government's nuclear advisors and the country's leading academic researchers.

More than 40 doctoral and post-doctoral researchers will work over the next four years on issues including how best to handle different types of spent fuels, packaging and storing waste, and dealing with nuclear sludges in ponds and silos at nuclear power stations.

Professor Colin Boxall, Director of The Lloyd's Register Foundation Centre for Nuclear Decommissioning at Lancaster University, will be leading DISTINCTIVE's work on the safe storage of plutonium.

Lancaster is also involved in the recently announced Next Generation Nuclear Centre for Doctoral Training which will train 80 PhD students over five years.

A Cultural Partnership between The Dukes and the University has been officially launched.

The three-year partnership aims to develop arts, education and learning in Lancaster and to enrich the city's cultural life.

It was officially launched at The Dukes Centre for Creative Learning where several of the partnership schemes have already taken place with young people from Lancaster district, particularly those living in areas of social economic deprivation.

Live at LICA, the University's core arts provider, is funded by the University and the Arts Council. LICA's purpose is to cultivate excellence in and engagement across the performing and visual arts and steward the University's art collection.

Earlier this year, the University extended its portfolio of support for the arts, forming a Cultural Partnership with The Dukes. This will see the University support The Dukes over three years and develop joint activities with the theatre.

A grass roots student food growing initiative pioneered at Lancaster University has helped inspire a nationwide network of sustainability projects.

Lancaster University Students' Union was one of the first places to catch onto the rising interest in food production among young people and back in 2009 set out to transform a small patch of land tucked away beside a University playing field into an allotment. Supported by the National Union of Students' Student Green Fund, the project has now grown beyond all expectations. Hundreds of volunteers are now involved in maintaining the growing sites across campus, including ten chickens and an orchard of more than 100 native fruit trees.

Lancaster University has launched the first phase of its Quantum Technology Centre.

The centre is a highly significant development for Lancashire and the North West as the Government pushes regions to identify smart technologies that can give them a competitive advantage and drive economic growth.

The Government recognises the huge potential of quantum technology and is investing £270m, through the Engineering and Physical Sciences Research Council (EPSRC) and Technology Strategy Board, to establish a network of quantum technology hubs across the UK.

Lancaster University will actively engage with the business community to exploit the market potential from the Centre's research – which also aims to develop a new cluster of high-tech companies setting up in the region to take advantage of the Centre's research output.

The new development will provide additional areas for future growth and recent new specialisms such as nuclear, energy and chemical engineering.

From Everest to Lancaster University's Bowland Tower, Sir Chris Bonington knows no bounds. As part of the University's 50th anniversary celebrations, the Chancellor and pioneering mountaineer abseiled down the 150-foot tower for charity.

Sir Chris, who will be 80 in August and who retired as Chancellor at the end of last year, is an outstanding mountaineer who led the expeditions that made the first ascents of the South Face of Annapurna and the South West Face of Everest. He realised a dream in 1985 when he reached the summit of Everest.

The Rt Hon Alan Milburn will start as Lancaster University's Chancellor from 1 January 2015.

The Chair of the Social Mobility and Child Poverty Commission and former Health Secretary will take over from mountaineer Sir Chris Bonington CVO CBE DL, who will have served for ten years.

Alan Milburn was Labour MP for Darlington (1992 to 2010) and now runs his own consultancy, advising governments and corporations worldwide. He is also involved in a variety of charitable projects as diverse as working with Tony Blair in Africa, to acting as a trustee for Yorkshire Sculpture Park.

He credits the skills he learned at Lancaster, where he studied history, as a foundation for the whole of his working life and career. He was later awarded an honorary degree in 2000.

The resounding thwack of leather on willow was heard as Pakistan TV broadcast parts of Lancaster's cricket team's visit to Lahore as part of Lancaster University's 50th anniversary celebrations.

The men's cricket first team visited partner university, COMSATS Institute of Information Technology (CIIT) in Lahore in April 2014.

The Lancaster University team took on teams from CIIT Islamabad and CIIT Lahore first elevens in the cricket tournament before meeting Pakistan's national U19s' cricket team in a friendly fixture at Pakistan's premier test cricket venue the Gaddafi Stadium, Lahore.

The match against the U19s, filmed on Pakistan national television, resulted in, not surprisingly, a win for the home team as it included a number of potential future test stars who had recently finished second in the most recent U19 World Championship.

A course that is helping to produce the crime fighters of the digital age has received a seal of approval by the UK's national security and intelligence agency – GCHQ.

Lancaster University's MSc in Cyber Security, which is delivered by experts from the Security Lancaster research centre, is one of only four Masters degree courses delivered by UK universities to receive a newly launched 'Full Certification' status by GCHQ.

Pulitzer Prize winner Paul Muldoon has taken up a Distinguished Professorship within the Department of English and Creative Writing. A former Professor of Poetry at the University of Oxford, he is currently Howard G. B. Clark '21 Professor at Princeton University.

His work at Lancaster will take the form of a mix of undergraduate lectures, MA workshops, tutorials with PhD students, and public readings.

Paul Muldoon said: "I'm thrilled to be associated with a University that has for so long been at the forefront of teaching writing – and reading – to poets in verse and prose who, along with physicists and political scientists, will help us understand ourselves in the world."

A key appointment to a new regional NHS organisation will ensure Lancaster University is at the forefront of health care transformation.

Professor of Musculoskeletal Science, John Goodacre, has taken up the major role of Medical Director for the new North West Coast Academic Health Science Network (AHSN) – one of 15 AHSNs recently set up by the NHS across England.

The networks aim to transform healthcare, benefiting both patients and economic growth.

AWARDS AND DISTINCTIONS

Lancaster University has been named the top university in the North West for the 9th consecutive year, according to The Times and The Sunday Times Good University Guide 2015. Lancaster maintains its ranking of 12th overall due to consistently good results in student satisfaction, a strong graduate jobs record, high entry standards and outstanding research.

Lancaster also charged ahead of its Russell Group peers to be ranked 10th in the Guardian league table 2015, confirming its place among the world's elite institutions.

Lancaster University is the highest placed UK university in the Times Higher Education 100 Under 50 ranking of the world's best young universities. Ranked 10th, a climb of four places, Lancaster is the highest ranked of only 14 UK universities to be listed.

A lecturer has won the Commonwealth Short Story Prize 2014.

Jennifer Nansubuga Makumbi from Uganda has a PhD in Creative Writing from Lancaster where she teaches in the Department of English and Creative Writing.

The Commonwealth award was presented in Kampala by the novelist and short-story writer Romesh Gunesekera. Her short story entitled "Let's Tell This Story Properly" was praised by the judges for what they called its "risk taking, grace and breadth".

Lancaster University has won two Athena SWAN Silver awards aimed at encouraging women in science and technology careers.

Both the Faculty of Health and Medicine and the Department of Physics in the Faculty of Science and Technology have been given the national awards.

The Athena SWAN Awards recognise success in developing employment practices to further and support the careers of women in science, technology, engineering, maths and medicine (STEMM) departments in academia.

Credit: Press Association Images

Distinguished Professor of Operational Research Kevin Glazebrook has received the Beale Medal, the Operational Research Society's top award.

The Medal is presented in recognition of a 'sustained contribution over many years' to the theory, practice or philosophy of Operational Research in the UK. Operational Research is the application of advanced analytical techniques to improve management decision-making.

Cary Cooper, Distinguished Professor of Organisational Psychology and Health, has been knighted for his services to social science.

Professor Cooper has been chair of the UK's Academy of Social Sciences, an umbrella body of 47 learned societies in the social sciences representing 90,000 social scientists, since 2009.

In 2001 he was awarded a CBE for his contribution to occupational safety and health. He was also lead scientist on the Government Office for Science Foresight project, Mental Capital and Wellbeing, in 2008.

Computing giant Google has recognised research to develop eye-tracking technology.

Professor Hans Gellersen from the School of Computing and Communications has received a Google Faculty Research Award to expand his work on eye-tracking for interaction with display devices. This award enables his team to study how gaze input can be combined with multi-touch, in order to create natural user interfaces where people use both their hands and eyes.

Professor Anne Garden, the Head of Lancaster Medical School, has been awarded the MBE for services to medical education.

Professor Garden arrived at Lancaster University in 2006, having previously been Head of the School of Medical Education at the University of Liverpool.

Professor Sir Cary Cooper has also been voted HR Magazine's Most Influential UK Thinker 2014.

Three other academics from Lancaster University Management School are in the top 11. These are Professors Stephen Bevan, Paul Sparrow, Dr Anthony Hesketh and Professor Mike West.

According to HR Magazine, attributes that make the academics and authors on the list include bold and challenging thinking, combining the skills of academic leadership and practical relevance, taking a stance on HR matters and taking HR directors out of their comfort zone.

Lancaster University has the best university halls of residence in the UK according to the National Student Housing Survey. Lancaster retained the title of Best University Halls for the fifth year running in the survey, where students vote for their favourite accommodation.

The nationwide survey of 19,000 students at more than 200 universities and colleges from around the UK also found Lancaster to have the best value for money for accommodation.

Lancaster University is also one of just 11 higher education providers to have gained the International Accommodation Quality Mark which recognises organisations achieving at least 90 per cent satisfaction among international students.

CELEBRATING THE SUCCESS OF OUR ALUMNI

The following are recipients of the Lancaster Alumni Award

Clare Amsel is a senior manager with over 25 years' experience in the conference and events management industry.

Graduating from Lancaster in 1979 in Religious Studies, she was a leading member of the team which produced the London 2012 Olympic and Paralympic opening and closing ceremonies.

English graduate Caroline Rookes was appointed Chief Executive of the Money Advice Service in 2013. She left Lancaster with the potential to take on some of the top jobs advising the government. She was awarded the CBE in 2010.

Gary Foxcroft is an award-winning human rights advocate from Lancaster who completed a postgraduate degree in Environment and Development in 1997. Moved by the plight of abandoned children in Nigeria, he set up the charity "Stepping Stones" which has helped shape UNHCR policy and action on child torture and abuse.

Andrew Leaitherhead is a highly successful and entrepreneurial Lancaster law graduate. He has led the meteoric rise of the Manchester-based law firm, DWF LLP, since 2006 when, at 35, he became one of the youngest managing partners in the UK's legal sector.

Dr Nahed Taher, who took a PhD in Economics at Lancaster in 2001, is founder and Chief Executive Officer of Gulf One Investment Bank, which has its headquarters in Bahrain. Ranked 72nd among the 100 Most Powerful Women in the World by Forbes Magazine in 2006, Dr Taher was also listed 24th in a Financial Times table of the 50 most prominent international businesswomen in 2010.

Professor Hellen Sambili is a renowned Kenyan educationalist and politician who has devoted her career to improving the academic opportunities available to young people in her country and to women's rights across East Africa.

Allan Chapman graduated from Lancaster in 1972 in History, and then did postgraduate work at Wadham College, Oxford.

He is a historian and broadcaster whose particular research interests are in scientific biography and astronomy. He teaches the history of science in the Faculty of Modern History at Oxford.

Ranvir Singh is a British television presenter and journalist, best known as a newsreader for a number of broadcasters. She was born in Preston and educated at Kirkham Grammar School, and graduated from Lancaster in 1998 in English and Creative Writing.

THE FOLLOWING DISTINGUISHED INDIVIDUALS RECEIVED HONORARY DEGREES DURING 2013/2014

Bruce Sewell

Professor Clare Grey FRS

Professor Paul Boyle

Professor Paul Wellings CBE

Professor Jianhua Zhang

Carol Birch

Ian McMillan

The Chancellor's Medal, which marks the long service of founding Chancellor HRH Princess Alexandra, is presented annually to the most meritorious students.

Undergraduate medallists

Veronica Pérez-Campanero Antolín
Sean Sandison
Lucy Victoria Smalley
Leanne Walters
Drew Ellise Hodgson
Dominic Rose
Adel Winters

Postgraduate medallists

Amali Rodrigo
Janette Buckland
Sarah Catherine Fell
Zhifang Zhang

ADVANCING KNOWLEDGE THROUGH RESEARCH

Celebrating 20 years of Educational Research

Lancaster's strengths in Educational Research are distinctive – research in this area is consistently judged to be amongst the best in the country and it is the only Education department in the UK to solely offer programmes at PhD level.

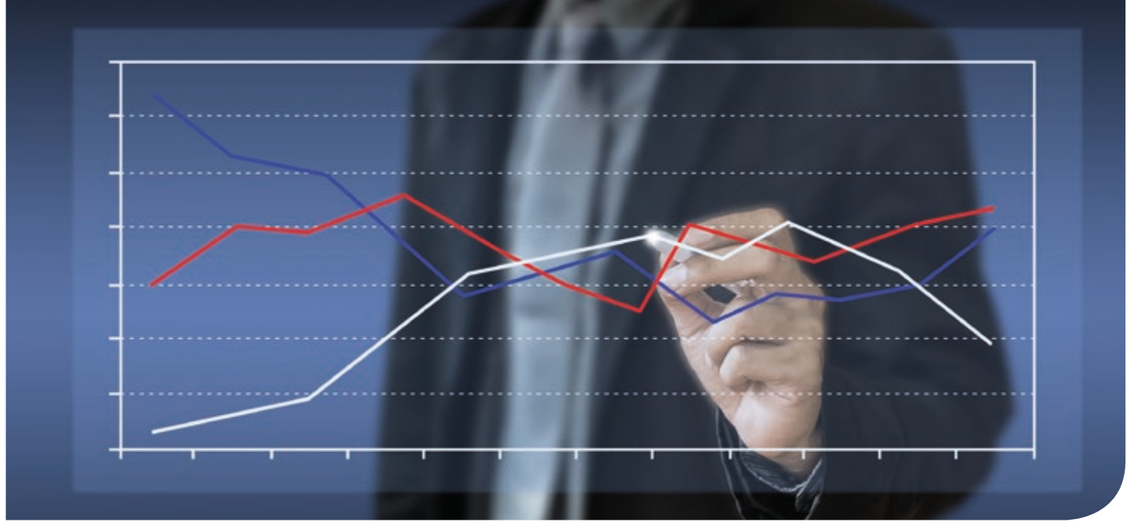
Research spans early years through to higher education, informal learning in the workplace and beyond. Recent work includes tackling truancy and exclusion among young people at school by gathering evidence of the role and potential for school farms. A study of 93 schools with farms examined the role school farms have in promoting a healthier lifestyle, providing a first-hand resource for diet, food types and cooking techniques that can be integrated into the curriculum.

Other recent research has assessed the success of creating video games as a means to engage hard-to-reach youngsters in education and plug a growing skills gap within the gaming industry. The research shows a way to cut the numbers of youngsters who end up not in employment, education and training (NEET) by demonstrating the potential for increasing levels of interest, motivation and ongoing commitment to school.

In higher education, research has included an examination of whether national university league tables offer a reliable indication of the quality of undergraduate courses. The research found that league table position did not reflect the quality of curriculum, teaching and learning within departments nor crucially the quality of students' engagement with disciplinary knowledge. This year the acclaimed PhD Doctoral Programme in Educational Research celebrated its landmark 20th anniversary.

A pioneering initiative when it was first launched in 1995, the programme has been hugely successful, with more than 100 students gaining PhDs over two decades. A large number of these have gone on to become national or international figures in higher education, research, policy and practice.

The Department is also pioneering different ways of delivering PhDs and has three unique online programmes available – Education and Social Justice; Higher Education Research, Evaluation and Enhancement; and e-Research and Technology Enhanced Learning.



SMALL BUSINESS CHARTER AWARD

Lancaster, through its Management School, is a trailblazer member of The Small Business Charter Award scheme which has already helped 4,700 students to find work placements in Britain's micro-business and start-up sector.

Lancaster was successful in winning the Small Business Charter Gold Award – one of only three – in recognition of the role it has played in helping to kick-start British enterprise.

Small Business Charter business schools have directly helped over 8,000 small businesses – working with them through workshops, mentoring and other business support. More than 800 new businesses have already been started as a result of Small Business Charter schools.

By receiving the award, the University has demonstrated exceptional dedication to helping improve links with and support the small business community in the local area.

The publication of Sir Andrew Witty's report in 2013 'Encouraging a British Invention Revolution' identified Lancaster as a top university in terms of the number of interactions with SMEs. An external review of Lancaster's ERDF projects revealed Lancaster boosted the economy by £15.80 for each pound received – almost double the national average of £8.70. Lancaster's ten-month leadership and management development intervention for SME owner-managers, LEAD, has supported more than 3,000 small-and-medium sized enterprise (SME) owners, creating over 10,000 jobs. In an independent evaluation, participants reported post-LEAD (per annum) turnover growth rates of 13.8 per cent, and employment growth of 16.8 per cent. A newly-launched programme is set to build on the success of LEAD. LEAD 2 Innovate takes the most successful features of LEAD and incorporates the latest research from Lancaster University Management School to offer a new outstanding programme for owners and managers of small and medium sized enterprises.

London Creative and Digital Fusion is a tailored programme of interactive and in-depth support for London-based SMEs in the digital and creative sectors. More than 1,050 companies have engaged with London Fusion project so far, securing 7,270 hours of business support to help innovate and grow.

Lancaster is working hard to exploit its global reach and international contacts for the benefit of UK SMEs through projects like the Lancaster China Catalyst project. This initiative aims to develop collaborative research projects between UK and Chinese companies fostering innovation in small businesses to develop new products and services for export. This project is forecast to create 240 jobs within UK SMEs and boost the UK economy by £40m.

CENTRE FOR FAMILY BUSINESS

Two-thirds of businesses globally are family-owned, contributing an estimated 70 per cent of global GDP. Despite the importance of developing family businesses, their distinctive structures, goals and challenges can be overlooked or submerged within more general business understanding. A family can be the source of real competitive advantage in business – but also serious dysfunction.

The Centre for Family Business plays a leading role in the UK and internationally in focusing on the individual character and needs of family firms, actively engaging with networks of family businesses to deliver support and encourage growth and development.

A high-level Business Advisory Panel – involving a senior representative from the Department for Business, Innovation and Skills, from the Coutts Institute financial body, as well as leaders of major family enterprises such as the Beales Hotel chain and Booths Supermarkets – works on some of the key issues faced by family directors: the running of family boards, improving knowledge exchange, and specific new trends in management and leadership. The Centre is also working with the Institute for Family Business on improving family business branding among its national membership.

Further engagement and support for family firm leaders in the UK is delivered through a relationship with KPMG and its family business customers, programmes of tailored short courses, and the regional Campus in the City initiative, where business people have the chance to discuss their challenges and pick up specific family business advice. Workshops have been developed to help family firms and their leaders and managers determine their particular educational and development needs.

The Centre, its faculty and students, work together on 'live' family business case studies suggested by members of its networks. The new Family Enterprise Management Master's degree includes a case study competition. The winners will then compete globally in January 2015 at the University of Vermont's Family Enterprise Case Competition – the first from a UK university. Internationally, Lancaster's Centre is forming a partnership with the INSEAD business school on executive education for family business leaders; and will be working with Italy's largest banking group on providing advice and insights to its family business network. The Centre's Director, Professor Alfredo de Massis, is the European chair of the Global STEP Project for Family Enterprising, set up by Babson College in the US. The STEP applied research programme involves more than 200 scholars from 41 universities internationally to generate practical solutions to the problems faced by family firms in the modern business environment.

Rigorous research is at the heart of the Centre's mission. A world-renowned team of experts in family business studies leads an interdisciplinary research hub for both faculty and PhD students. Current areas being addressed include innovation and growth strategies, dealing with issues of succession within the family, and the dynamics of family teams. This year the Centre was awarded the 'best practitioner-focused paper award' at the Family Enterprise Research Conference (FERC) and has set its sights on becoming the global hub for family business educators from around the world with a unique repository of learning resources.

SEWING MACHINE IDEA GIVES INSIGHT INTO ORIGINS OF ALZHEIMER'S

Researchers have invented a new imaging tool inspired by the humble sewing machine which is providing fresh insight into the origins of Alzheimer's and Parkinson's disease.

These diseases are caused by tiny toxic proteins too small to be studied with traditional optical microscopy.

Previously it was thought that Alzheimer's was caused by the accumulation of long 'amyloid' fibres at the centre of senile plaques in the brain, due to improper folding of a protein called amyloid-β.

But new research suggests that these fibres and plaques are actually the body's protective response to the presence of even smaller, more toxic structures made from amyloid-β called 'oligomers'.

Existing techniques are not sufficient to get a good look at these proteins; optical microscopy does not provide enough resolution at this scale, and electron microscopy gives the resolution but not the contrast.

To solve the problem, physicist Dr Oleg Kolosov and his team at Lancaster have developed a new imaging technique – Ultrasonic Force Microscopy (UFM) – inspired by the motion of a sewing machine. Their work has been published in Scientific Reports.

Dr Kolosov said: "By using a vibrating scanner, which moves quickly up and down like the foot of a sewing machine needle, the friction between the sample and the scanner was reduced – resulting in a better quality, and high contrast nanometre scale resolution image."

It is one of a new generation of tools being developed worldwide to bring the oligomers into focus, enabling medical researchers to understand how they behave.

At Lancaster, Claire Tinker used UFM to image these oligomers. To help see them more clearly she needed to increase the contrast of the image and used poly-L-lysine (PLL) which kept the proteins stuck to the slides as the vibrating scanner was passed over them.

Lancaster University Biomedical Scientist Professor David Allsop said: "These high quality images are vitally important if we are to understand the pathways involved in formation of these oligomers, and this new technique will now be used to test the effects of inhibitors of oligomer formation that we are developing as a possible new treatment for Alzheimer's disease."

The technique worked so well that the team now hopes to develop it so that oligomer formation can be monitored as they are made in real time.

This would give researchers a clearer understanding of the early phases of Alzheimer's and Parkinson's and could potentially be one way of developing a future test for these diseases.

OLDER MEN MORE LIKELY TO BE CARERS THAN OLDER WOMEN

Men over the age of 65 caring for ill or disabled relatives often feel isolated and ignored according to a study from the Centre for Ageing Research.

There are around six million people in England and Wales caring for family members, saving the UK economy more than £119bn a year.

Though most women still undertake the bulk of informal caregiving, amongst older carers this picture changes. Amongst those over the age of 65, there are more men (15%) providing care than women (13%).

Professor Christine Milligan and Dr Hazel Morbey interviewed older male carers ranging from a retired doctor to a taxi driver. All but one had either retired from work or given up work to care for their wives fulltime.

They found that the older male carers often felt isolated and without any supportive networks.

Many of the male carers found it hard to identify themselves as being carers, feeling that it was their role to look after their families. They also felt excluded from carer support groups which were female-dominated.

Professor Milligan said older male carers often struggled on until they reached a crisis.

"Practitioners in health and social care need to provide more gender appropriate support for older male carers who can find it hard to see themselves as carers and even harder to ask for support.

"This could be through online support groups, peer mentoring schemes or counselling targeted at older male carers."

SHOWERS MAY BE LINKED TO CROHN'S DISEASE SAY RESEARCHERS

Humans may be exposed to bacteria linked with Crohn's disease through fine spray from rivers and showers, according to research.

Mycobacterium avium subspecies paratuberculosis (Map) is a bacterial pathogen that causes Johne's disease in animals, particularly cattle, and is significantly associated with Crohn's disease (CD) in humans, both chronic inflammatory conditions, mainly of the intestine. Johne's disease in cattle is widespread in UK and infected animals shed this pathogen in their faeces and in their milk. Therefore, humans are exposed through dairy products and the environment.

The researchers previously proposed that disease clusters in Cardiff were influenced by the river and the aerosols (fine spray) could deliver the pathogen to the population. This is the first study – published in Pathogens – to provide evidence that fine water spray from rivers could possibly explain those disease clusters associated with the river and that both rivers and domestic showers provide new exposure routes for the bacteria to humans and that they may play a role in the development of Crohn's Disease.

Professor Roger Pickup from Lancaster University's Faculty of Health and Medicine led the collaborative research partnership together with the NERC Centre for Ecology and Hydrology at Lancaster, Royal Lancaster Infirmary, Cardiff University and King's College London. The team found Map bacteria in fine water spray collected above the River Taff in Wales.

The researchers said it was possible that the significant clusters of Crohn's Disease patients in Cardiff are, in part, due to inhalation of Map in fine water spray generated from the river and presented by the prevailing winds. Inhalation has been shown as a route for the infection of cattle and lung involvement is well described in adults with Crohn's disease; the disease in children often begins with a cough and a mild inflammation of the throat and lungs. Initial invasion via the oral route followed by Map's substantial tissue tropism for the gut may result in chronic inflammation of the intestine.

The team also examined domestic showers from different regions in the UK and detected Map in three out of 30 independent samples, providing a route for human exposure by fine water spray.

Professor Pickup said: "We recommend that in line with precautions against Legionnaires' Disease, that showers should be run for a short period before use, particularly those that have not been used for a while."

Previous studies by the same team have shown the Map bacteria to be present in UK rivers due to land deposition from chronic livestock infection and runoff driven by rainfall.

Although Map is difficult to detect in humans and even more difficult to culture, recent data has shown it to be significantly associated with Crohn's disease and, if appropriate tests are done correctly, that almost everyone with chronic inflammation of the gut of the Crohn's disease type is found to be infected with this chronic enteric pathogen.

TALKING THERAPY HOPE FOR PEOPLE WITH A RECENT BIPOLAR DISORDER DIAGNOSIS

Cognitive Behavioural Therapy could give people with a recent Bipolar Disorder diagnosis a better chance of recovery, suggests a new study published in the British Journal of Psychiatry.

New research compared a group of people with a recent bipolar diagnosis who had an average of 14 hours Cognitive Behavioural Therapy alongside 'treatment as usual' which includes medication and support from community mental health teams, psychiatry or a GP. This group was compared with a group of 34 people who only received 'treatment as usual' in a randomised controlled trial.

The group receiving Cognitive Behavioural Therapy – a psychological therapy which helps people address patterns of thinking and behaviour which they wish to change – made a better, more sustained recovery.

Professor Steven Jones of Lancaster University's Spectrum Centre, who led the study, described the results as "very promising".

He said: "Compared with the group who were only receiving treatment as usual, recovery-focused CBT significantly improved personal recovery up to 12 months after the therapy ended. This is an important result as better recovery outcomes can allow people to get on with their lives rather than having their lives controlled by their experience of bipolar disorder.

"Recovery enables people to feel able to take a lead in managing their own health, engage in activities which are personally meaningful and see recovery itself as a long term and potentially fluctuating process.

"The government and people with a Bipolar diagnosis have highlighted the importance of improving recovery in mental health. In Bipolar Disorder in particular, NICE guidelines highlight that with optimal treatment many more people with this diagnosis can return to work and live fulfilling and flourishing lives."

LAYERED GRAPHENE SANDWICH FOR NEXT GENERATION ELECTRONICS

Sandwiching layers of graphene with white graphene could produce designer materials capable of creating high-frequency electronic devices, scientists have found.

Writing in Nature Nanotechnology, the researchers have demonstrated how combining the two-dimensional materials in a stack could create perfect crystals capable of being used in next generation transistors.

The research, led by Nobel Laureate Sir Kostya Novoselov from the University of Manchester, was carried out with scientists from Lancaster University, Nottingham University and colleagues in Russia, Seoul and Japan.

Hexagonal boron nitride (hBN), otherwise known as white graphene, is one of a family of two-dimensional materials discovered in the wake of the isolation of graphene at the University of Manchester in 2004. Researchers have previously demonstrated how combining 2D materials, in stacks called heterostructures, could lead to materials capable of being designed to meet industrial demands.

Now, for the first time, the team has demonstrated that the electronic behaviour of the heterostructures can be changed enormously by precisely controlling the orientation of the crystalline layers within the stacks.

The researchers carefully aligned two graphene electrodes separated by hBN and discovered there was a conservation of electron energy and momentum.

The findings could pave the way for devices with ultra-high frequencies, such as electronic or photovoltaic sensors.

Professor Vladimir Falko, from Lancaster University, said: "Our observation of tunnelling and negative differential conductance in devices made of multilayers of graphene and hexagonal boron nitride demonstrates the potential that this system has for electronics applications."

TAKING THE ARTWORK HOME

Lancaster researchers are using Mobile Augmented Reality to allow people to digitally curate their own art exhibitions using content from the University's Peter Scott Gallery.

The mobile application allows users to view the gallery artworks as if they were displayed on the walls of their own homes rather than simply images on the screen. The application has been demonstrated at the Victoria and Albert Museum as part of their Digital Design Weekend.

Unlike many Augmented Reality systems that are primarily either technologically driven or only address the needs of the end user, this project also incorporated the views of the gallery and the original artist.

During the design stage, the research project involved design-led research centre Imagination Lancaster, The Peter Scott Gallery and m-ventions ltd engaged with potential users including volunteers and patrons of the gallery, schoolchildren and young adults with a broad range of physical and learning disabilities.

The application was released in June 2014 for Android phones and tablets on Google Play. All information from users of the application is being collected to suggest themes for future 'real' exhibitions in the Gallery.

ADDRESSING CHILD LANGUAGE LEARNING AND DELAY

Experts from Lancaster University and the universities of Manchester and Liverpool have secured one of the largest grants ever awarded by the Economic and Social Research Council (ESRC) to carry out research which will transform understanding of how children learn to communicate.

The £9m cash injection over five years will see a new ESRC International Centre for Language and Communicative Development (LuCiD) set up in the North West working with experts in the USA, Australia, Germany, Switzerland and Poland.

It will deliver the crucial information needed to design effective interventions in child healthcare, communicative development and early years' education.

The Centre will also develop new technological products for parents, including a Babytalk app, which will allow parents and health professionals to record a child's vocabulary and monitor their progress.

At Lancaster, researchers will look at the role of environment on language learning in children.

They will apply their cutting-edge methods – including developmental neuroscience, eye-tracking, and computational approaches – to help explain the behavioural observations of children acquiring language.

Research will focus on how children learn to use all the sources of information around them to learn the meanings of words, the role of words in sentences and the subtle interplay of meaning in conversations.

Psychologist Professor Padraic Monaghan said: "Learning to use language to communicate is hugely important for society. Failure to develop language and communication skills at the right age is a major predictor of educational and social inequality in later life.

"To tackle this problem, we need to know the answers to a number of questions which LuCiD will be able to explore."

The Centre will explore how children learn language from what they see and hear and look at how different kinds of evidence from behavioural studies, measures of brain activity and computational models can be integrated to understand how children learn language. The team will also look at how language delay may occur in young children and explore whether differences between children and differences in their environments affect how they learn to talk.

DEVELOPING 'BIG DATA' EXPERTS OF THE FUTURE

Lancaster University is helping to produce a new generation of analysts thanks to an investment in 45 Data Science MSc scholarships.

Advances in technology are enabling businesses and organisations to collect ever growing amounts of information from a wide variety of sources. The term big data is banded about, but what does it mean and why is it so important that we invest in a new generation of data scientists?

Responding to a global skills gap for data scientists able to analyse, manage and make commercial use of multiple data, Lancaster University has launched two new Data Science Postgraduate taught courses through its Big Data Education Catalyst programme. These MSc courses, (including one focusing on the environment) will deliver 60 professionals with the high quality technical skills and expertise in the field of so-called "big data" analytics with course content co-developed with industry. Seen as a skill crucial to growing the UK economy, scholarships have been funded by the Higher Education Funding Council for England for 45 of the 60 students.

The MSc programmes include students from a diverse range of career backgrounds – people that have sound statistical knowledge but need additional training to be able to analyse multiple data and to develop the systems and processes needed to support business growth.

Importantly, all the students spend three months in industry, with paid placements planned for example, with a multi-national cybersecurity centre, and a world renowned performance racing championship brand.

Dr Christopher Edwards, of the School of Computing and Communications said: "What sets the data scientist apart, is a strong business acumen and an ability to influence the way in which an organisation approaches a business challenge. The skills that data scientists bring add huge value to organisations, and as data sources continue to grow, these skills will become increasingly important."

TRAINING FUTURE INTERNATIONAL RESEARCH LEADERS

Highly skilled statisticians and operational researchers are all in short supply in the UK but Lancaster is filling that gap.

The Centre for Doctoral Training in Statistics and Operational Research (STOR-i) is developing highly employable people with a proven capacity for delivering excellent research in statistics and operational research of both significant academic and societal value.

It goes from strength to strength with the award of £8.6m this year, including substantial investment from the Engineering and Physical Sciences Research Council, Lancaster University and key industrial partners.

Across five cohorts starting from 2014, it will fund and deliver training to 60 students. They will benefit from a four-year doctoral programme with training provided by the departments of Mathematics and Statistics and Management Science.

Using industrial challenge as the catalyst for mathematical innovation, the centre will develop future international research leaders.

STOR-i currently trains 40 PhD students, and has already built an international reputation for the quality of its research training at the interface of statistics and operational research with industry.

The centre's distinctive mission is founded on a partnership with several of the UK's leading companies across a range of sectors, with key industrial partners including Astra Zeneca, ATASS, BT, DSTL, IBM, SAS, Shell and Winton Capital.

WHY MARVELLOUS ISN'T AWESOME ANY MORE

The digital revolution and America's growing influence on our culture have dramatically changed the way British people speak over the past two decades, new research has revealed.

'Marvellous' has been consigned to the dustbin of vocabulary – replaced by the American 'awesome', according to the study by Lancaster linguists and Cambridge University Press.

The changes also reflect the nation's eating habits – with 'marmalade' also falling out of favour as one of the country's most used words.

The study looks at the most characteristic words of today's Britain. Not surprisingly the internet age has had a massive influence on the words we use.

While in the 1990s we were captivated by 'Walkmans', today it has been replaced by the likes of 'online' and 'smartphone'. 'Awesome' has rapidly overtaken 'marvellous' as the most characteristic emotive word in today's speech.

The research shows that in 2014 the word 'awesome' appears 72 times per million words compared to 'marvellous', which has fallen in use from 155 times per million 20 years ago to only two times per million today.

Language expert Professor Tony McEnery, from the ESRC Centre for Corpus Approaches to Social Science said: "These very early findings suggest the things that are most important to British society are indeed reflected in the amount we talk about them.

"New technologies like Facebook have really captured our attention, to the extent that, if we're not using it, we're probably talking about it.

"The rise of 'awesome' seems to provide evidence of American English's influence on British speakers."

These are initial findings from a pilot of the project, named the 'Spoken British National Corpus 2014', which is now underway.

Research of this kind has not been completed to this scale in the UK since the early 1990s. Now researchers are gathering thousands of conversations to create a spoken corpus to continue to analyse the way language has changed over the last 20 years.

KEEPING IN TOUCH WITH THE PAST

Kendal Museum is to offer schoolchildren the chance to handle ancient Egyptian pottery and statues.

There are no worries about breaking the fragile 3,000 year old objects because these are 21st century copies.

The 3D replicas were printed out by engineers at Lancaster University as part of a project aiming to make historical artefacts more accessible to visitors.

Morag Clement, the archaeology curator at Kendal Museum said: "These Ancient Egyptian items are so rare that normally we don't let anybody touch them. With these copies, people can pick them up, touch and interact with them instead of just viewing them behind glass.

"We can also put them into loan boxes sent out to schools to teach the children about history."

The use of this technique could also make it easier to digitally repair broken antiquities.

The replicas were created by PhD student John Kaufman and Dr Allan Rennie from the Department of Engineering. John Kaufman painstakingly photographed every object from 360 degrees.

He said: "Normally this would be done with a laser scanner but as part of my research, I used a much cheaper digital camera to see if I could make this method more accessible.

"This is a great attraction, as with a little training the museum's own staff will be able to replicate many of the objects on display."

Up to 150 photos of each object were then digitally stitched together to create a 3D virtual image of the original.

This virtual image was then used to print out the 3D replica layer by layer using Additive Manufacturing equipment at Lancaster University.

The research was presented at the ASME Engineering Systems and Design Analysis Conference in Copenhagen.

REDESIGNING THE URBAN LANDSCAPE

Rachel Cooper, Distinguished Professor of Design Management and Policy, is one of the world's leading thinkers on our urban future and how cities can be made 'good to live in'.

A member of the EU's European Design Innovation Initiative Leadership Board that has shaped policy on design for prosperity and growth, Professor Cooper is also an advisor to universities internationally on design and research and a member of the Lead expert group for the Government Office for Science Foresight Programme on the Future of Cities sponsored by Minister for Cities, Greg Clark MP.

Recent work has included the development of the Urban Futures toolkit, involving a consortium of universities. The toolkit is currently being used by local authorities to explore different scenarios for urban areas in 2050 and ask 'what if' questions around changes in society, technology, environment, economy and policy. The process helps planners to escape the limitations of decision-making based on the current environment and help build greater resilience into plans.

A related ongoing EPSRC project is Liveable Cities, where a measurement tool is being used to better understand how cities are actually operating and performing. The measurement tool takes issues of both wellbeing and use of resource into account, alongside perspectives from city 'users' working in areas such as health, education and retail.

GROWTH HUBS BOOST BUSINESS GROWTH AND JOBS ACROSS THE UK

Lancaster University is taking a unique leading role in a £32m Government initiative to boost economic growth in cities across the country.

Drawing on its world-class Management School's expertise in supporting SMEs, and its outstanding reputation in the delivery of complex funding programmes, Lancaster is working in partnership with Government departments and Cabinet Office Cities Policy Unit to support cities across the UK.

A total of 15 growth hubs have been created in city regions through the Wave 2 Growth Hub (W2GH) programme and so far more than 12,000 UK businesses have benefited.

Supported by the Government's Regional Growth Fund the programme is designed to help cities support local businesses and to provide co-ordinated access to national and local business support packages.

Lancaster University, which was named a top-ten university for SME engagement in the recent Witty Review, successfully bid due to the Management School's long-standing reputation for innovative support to business.

It is led through the University's Institute for Entrepreneurship and Enterprise Development which has set up a peer-networking programme for cities to enable them to be able to exchange their experiences. These workshops have created an opportunity for the hubs to take a step back from their day to day operations and the space for them to reflect and be able to dedicate time to thinking strategically.

NEW APPROACH TO UNDERSTANDING HOW PEOPLE USE ENERGY

Researchers in the DEMAND (Dynamics of Energy, Mobility and Demand) Centre are examining changing patterns in mobility and building-related energy use.

For the first time researchers are asking fundamental questions about how and why people use energy at certain times in order to find new ways to reduce consumption. The DEMAND centre recognises that energy is not used for its own sake but as part of accomplishing social practices at home, at work and in moving around. The Centre's research challenges current thinking and policy on energy and demand such as:

- The idea that energy demand reduction depends on changing individual behaviour. Instead, DEMAND shows that many patterns of consumption are shared, and that people are 'locked in' to collective rhythms and routines. DEMAND also shows how patterns of mobility and energy consumption relate to changing infrastructures and technologies. For example, in the home the larder has been replaced by the refrigerator – tying households into a global system of frozen food provisioning. Conventions and practices of comfort have also changed as a consequence of technologies like central heating. None of this is a matter of individual choice.

- The view that when provided with more information, for instance through smart meters, people will use more energy in off peak hours. DEMAND's research shows that many of the practices that underpin energy consumption (like the laundry, or cooking) are part of complicated sequences of activities and are not easy to shift.

- That idea that energy demand and CO^2 emissions reduction is a matter for energy policy alone. DEMAND identifies the many areas of public policy that unknowingly impact on the range of social practices enacted in society, and hence on energy demand. These include education, employment, business, health, planning and more.

- By working with EDF's research and development group in Paris (ECLEER), the DEMAND centre has provided new insight into the timing of demand, the scope for flexibility and the need for synchronisation – crucial for assessing the impact of smart metering and demand management.

DEMAND is one of six centres funded over five years by the Research Councils UK to address 'End Use Energy Demand Reduction'. DEMAND also has funding from ECLEER (EDF R&D), Transport for London and the International Energy Agency.

FACTS & FIGURES

Students as full time equivalents

	UK & EU		Overseas		
	Full Time	Part Time	Full Time	Part Time	Grand Total
Faculty of Arts and Social Sciences	3,153	159	636	94	4,041
Faculty of Health and Medicine	645	199	96	42	982
Faculty of Science and Technology	2,660	55	442	36	3,192
Management School	1,925	58	1,836	61	3,881
Total	**8,383**	**471**	**3,010**	**232**	**12,095**

Overseas partnership students

COMSATS	2,648
Goenka	593
Sunway University	2,638
Other partnerships	222
Total	**6,101**

Staff as full time equivalents (FTE) academic/non academic

	%	FTE
Academic	43.8%	1,032
Non-academic	56.2%	1,325

Nationality [academic]

	%	FTE
UK	65.2%	673
Non-UK	34.8%	359

Gender [academic]

	%	FTE
Female	34.3%	347
Male	65.7%	665

All staff

	%	FTE
Female	42.7%	576
Male	52.3%	772

Income for the year ended 31 July 2014

	2013/14 £000	2012/13 £000
Funding Council grants	33,622	40,689
Tuition fees and support grants	103,617	82,681
Research grants and contracts	29,538	26,414
Other operating income	49,264	46,941
Endowment and investment income	900	1,114
Total	**216,941**	**197,839**

Expenditure for the year ended 31 July 2014

	2013/14 £000	2012/13 £000
Staff costs	115,706	106,105
Depreciation and impairment	19,751	13,021
Other operating expenses	67,951	60,841
Interest and other finance costs	4,021	4,209
Total Expenditure	**207,429**	**184,176**
Surplus after depreciation of assets at valuation	**9,512**	**13,663**
Release from revaluation reserve	4,964	688
Historical cost surplus	**14,476**	**14,351**

Financial highlights for the year

- Overall income growth of 9.7% incorporating the second year of the home/EU undergraduate fees regime plus continued growth in international student income (15%).
- An uplift to research income (11.8%).
- Continued improvement in underlying earnings as measured by Earnings Before Interest, Taxation, Depreciation and Amortisation (EBITDA) rising to £31.2m (£28.4m in 2012/13).
- The continued management of costs whilst targeting selective growth through a new academic planning and resource allocation process.
- A reduction in the net debt position to £18.7m from £27.2m.
- Lancaster's credit rating from Standard and Poor's maintained at 'AA-stable' following an upgrade in 2013. The credit agency acknowledged Lancaster's strong academic reputation and student demand together with its sound financial performance.

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