

# **Interdisciplinary Learning: Creative Thinking for a Complex World**

## ***Introduction***

Interdisciplinary Learning (IDL) is at the heart of Scotland's Curriculum for Excellence (CfE) – identified as one of its four contexts for learning. It is about connecting, collaborating and innovating and should be playing a critical role in joining up thinking and learning across the curriculum and connecting students to the wider world. Yet in his conference introduction, chair of the organising committee Professor Colin Graham FRSE, said it has been relatively poorly articulated, poorly exemplified and often poorly understood by schools and that there has been little research into its impact or implementation. Recent reports suggest a similar situation in higher education. Most students probably go through their educational career without being properly exposed to IDL. Prof. Graham said a key purpose of the conference was to gather information and explore the issues surrounding the progress and direction of IDL.

## **Morning Session 1: Educating for the Future**

*Chaired by Dr Heather Reid OBE, Meteorologist and Education Consultant*

### **What Does the Future Look Like?**

*Professor Ian Goldin, Professor of Globalisation and Development, University of Oxford*

The fall of the Berlin Wall, according to Professor Goldin, helped initiate a process of globalisation that has fundamentally changed the way the world works. It was a period of immense change with a wave of democratisation, Nelson Mandela's release from jail and the economic opening up of China. Flows of information, goods, people, information and ideas across national boundaries accelerated and have generated a world of cascading complexity that can only be properly understood with interdisciplinary thinking.

This new sharing means that "genius is erupting around the world," said Prof. Goldin with old ideas being discarded and new ones being adopted at an ever-faster rate. Despite rapid population growth there has been a burgeoning in literacy and connectedness and dramatic gains in health and life expectancy.

New perspectives have emerged, ranging from the simple recognition that smoking kills through to the attitudinal shifts that have seen the rise of the #MeToo movement and the introduction of gay marriage. There has been a structural transformation in formal education too. There has been a vast international expansion in education at all levels and the emergence of a 24-hour global research cycle.

However, bad ideas have emerged as well as good and a battle is taking place in which everyone has a responsibility to engage. According to Prof. Goldin this clash generates change.

One of the greatest challenges is that globalisation has not benefited everyone. When change is rapid, some get left behind more quickly and in many cases "place" is a determining factor with life prospects determined by postcode. Active measures are needed to increase inclusiveness by improving education and opportunity.

At the same time, though, national governments find their ability to determine events and deliver what their populations expect is diminishing.

While in many ways this is the best time in history to be alive – a Renaissance moment, the risks are growing. This is partly because “while the walls are coming down between societies, within societies they are going up”. There are other threats from globalisation, such as the high-speed spread of instability through international finance networks, or of disease through international aviation. There are also dangers from spillovers – can we all consume more goods, food and energy without having catastrophic effects on the climate and environment?

The professor then turned to describe a series of megatrends. One of these is demographic change. The world population is expected to stabilise at around 10 billion with numbers in many places, such as Western Europe, facing steep decline. At the same time growing life expectancy means that populations will be far older.

Dealing with the costs of maintaining a very large non-working population of elderly people, often with complex health needs, with a shrinking tax base is something that will demand interdisciplinary thinking.

Economic growth, with the expansion of many developing countries being three times faster than that of the industrialised Western nations, represents another fundamental trend. Emerging economies are often better managed and have governments that are more responsive to change, whereas the professor said advanced economies “are like old men who have lost their CEO jobs and can’t quite come to terms with it”.

In terms of technology, the megatrends include the immense possibilities from our effective doubling of computing power every 18 months. This is bringing revolutions in many fields, such as genetics and medicine. At the same time the financial crisis resulted in part, said Prof. Goldin, from the failure by the senior management at major banks to understand the new processes and technologies they were using. Advances in AI and machine learning mean that about 40% of UK jobs are vulnerable over the next 20 years.

The future is almost impossible to predict, however we have to prepare for what it will bring, and that demands deep thought. This, according to the professor, is something we have failed at so far. Indeed, the growing popular distrust of experts and authority is unsurprising given the complete failure of the financial system to anticipate and tackle the crash.

Despite the challenges Prof. Goldin says he is optimistic because we have never been more able to empathise with people of the other side of the world – likewise the talent pool is greater and the ability to manage risk more advanced than ever before. It is also encouraging that, as the Paris Climate Change Agreement shows, politicians are starting to listen to scientists. The necessity, he concluded, is for us all to engage – and interdisciplinary thinking will allow that to happen.

### **Specialists, Generalists and the Knowledge Economy**

*Professor Carl Gomblich, Professorial Teaching Fellow in Interdisciplinary Education, University College London*

While recent centuries have seen a strong trend in favour of specialism, Prof. Gomblich argued that generalism, polymathy and interdisciplinary thinking are essential to address the issues presented by an increasingly complex world.

Indeed, a survey by The Association of Graduate Recruiters showed an overwhelming number of respondents (82% or 194 sampled) said the degree subjects of job

candidates did not matter. What does matter are the skills and disciplines students develop through higher education.

Prof. Gombrich went on to address two themes. The first is that most graduates will spend their careers in “new worlds” and the second is our nature as humans. The world today is multiply connected, with a constant flow of new ideas.

Today’s students need to be able to navigate and adapt in an environment where change is the norm, and that requires broad skills and to be able to make links across many areas. At present our education systems are failing to cope as they are geared towards narrow specialisms.

One way forward, said the professor, is to teach across disciplines in a way that ceases to worry about whether students are learning history or biology, focusing instead on giving them the skills to solve problems. This more closely reflects what is happening in workplaces where employers value creativity above specific skills, and roles are becoming broader.

The massive decline in manufacturing and rise in service industries is set to continue according to Prof. Gombrich as we do not want to work for the low wages paid in developing economies. He said: “We are a knowledge economy unless we want to make ourselves destitute and a knowledge economy relies on services – and services are naturally about human interaction.” This does not demand narrow specialist knowledge but the capacity to understand and respond to the needs of other humans.

Our education system needs to prepare people for the reality that it is these capacities that will be valuable in the future. Anything rules based (including skilled professions like accountancy) is likely to be done better, faster and cheaper by robots.

Finally Prof. Gombich challenged the idea that interdisciplinary learning is shallow, saying all the most stunning things his graduates are doing demand hybrid expertise because reality does not conform to academic subject areas. He cited examples of PhD theses that bring together AI, psychology, mobile technology and energy saving.

“We need much more interdisciplinary thinking and have people who can tackle complex, real-world problems, connecting dots and living with uncertainty,” he said.

### **Educating for the Future**

*John Swinney, Deputy First Minister of Scotland and Cabinet Secretary for Education and Skills*

Governments face a difficult job, according to Mr Swinney, in providing reassurance and protection to their populations in a world that faces many challenges. This is all the more so given the uncertainties of Brexit.

Given the scale of the issues and the small size of Scotland it would be possible to feel overwhelmed. But, according to Mr Swinney, we share an obligation to create a positive future.

“When we as a government pioneered in 2007 some of the most ambitious climate change targets that any country had ever contemplated, and then legislated for them, against a body of opinion that questioned why we were busting a gut to deliver the hardest targets anyone had signed up to it came back to a moral duty. If we failed to do that we failed in our responsibility to our citizens,” he said.

Scotland has also faced population decline, with fears that it might dip below five million. Free movement within the EU solved the problem by allowing people from member

states to come here and settle. They and their families have ensured that we have a strong workforce and a good tax base.

Education, said Mr Swinney, plays a vital role in addressing the challenges faced by Scotland.

One of the major debates has been over just what we want education to achieve. When he became Education Secretary there was a great deal of concern over whether government should prescribe a curriculum or if it should outline a vision for what education ought to achieve.

The decision was to have a more open approach which developed young people as being responsible citizens, successful learners, effective contributors and confident individuals. "With those capacities," he said: "they would be best placed to navigate the world they are going to have to operate in, and at a pace of change none of us can yet conceive."

The inclusion of IDL as one of the four contexts for learning in the Curriculum for Excellence was aimed at making it part of the fundamental architecture of Scottish education. In turn this was to ensure that young people had the skills they needed for their future lives.

Scotland's approach, said Mr Swinney, rests on recognising the strength and professionalism of teachers and their ability to provide an education that is dynamic and exciting rather than rigid and static. This also allows schools to be responsive to an ever-changing world.

The National Action Group on Interdisciplinary Working has contributed greatly to the Scottish Government's approach by bringing together many of the key players in education.

Scotland's future place in the world, and the ability of government to face the challenges thrown up by Brexit, demands an interdisciplinary approach across the board. Indeed, Mr Swinney said, none of the problems faced by society can be neatly solved by the actions of one department.

Right now, he said, the most important thing Scotland can do is to close the poverty related attainment gap in education. This cannot be achieved by a teacher alone in their classroom but demands collective action by the public, private and third sector. Success requires an interdisciplinary approach that "throws the kitchen sink" at the problem so that every child can prosper.

### **Car of the Future**

A group of young people from **Calderglen High School** were introduced by Deputy First Minister John Swinney to talk about their direct experience of IDL in action. S2 students from the school in East Kilbride had worked with its STEM partners from XDL Semi Conductors to design and build a model rocket-powered car.

Car of the Future allows young people to work with industry experts on a practical project with tangible outcomes in which they have to bring together, and develop, their skills in IT, teamwork, leadership, design, science, engineering, IT and problem solving.

By designing and building a model, which is then raced against other vehicles, they had to learn about everything from fuels to aerodynamics and follow a design process to create the fastest car.

The students said they benefitted greatly from the disciplines involved – meeting deadlines, conducting experiments, taking specific areas of responsibility, working as a team and applying a range of skills to solve a problem.

Particularly memorable was the chance to experiment with rocket fuels, with one young person now wanting to pursue a technical career in the RAF and describing the experience as a “real highlight” of their time at Calderglen.

The students said that they valued the way that IDL allowed them to work to their strengths and gain inspiring insights into future career possibilities.

## **Morning Session 2: Pillars, Lintels and Foundations: IDL Across Education Systems and Curricula**

*Chaired by Walter Humes, Honorary Professor of Education, University of Stirling*

### **Knowledge, Subjects and IDL: Issues for Curriculum Making**

*Professor Mark Priestley, Faculty of Social Sciences, University of Stirling*

From a curriculum making perspective Prof. Priestley said Scotland has a considerable amount to do, especially in the early secondary school years.

His own introduction to IDL had been while teaching in New Zealand and it transformed his outlook on education.

While supportive of the aims of the CfE it has problems, such as the “lack of detailed specification on knowledge”. The professor said it is of “fundamental” importance to identify what sorts of knowledge should populate the curriculum so students can learn to navigate an increasingly complex world.

However, where learning is rigidly prescribed it gets out of date, with curriculum change failing to keep pace with real-world change.

Prof. Priestley said there is often a lack of “conceptual clarity” around IDL. One useful piece of Scottish guidance says IDL involves “revisiting a concept or skill from different perspective” and that this deepens understanding and can make the curriculum more coherent from the learner’s point of view.

Disciplines and subjects, he said, are too often conflated. Disciplines are bodies of knowledge with their own internal structures and ways of thinking. By contrast, school subjects are “means and mechanisms” “rather than ends in their own right”. Much that passes as IDL is not genuinely interdisciplinary because it fails to draw propositions, epistemology or knowledge from two or more disciplines in a connected way.

One reason we need IDL, he argued, is that aspects of Scottish secondary education can be fragmented. In some schools young people see as many as 20 teachers a week, which makes coherence difficult. IDL also reflects the reality that there are no simple solutions to most real-world problems and they demand interdisciplinary approaches. It is also important to make connections between everyday and disciplinary knowledge.

Prof. Priestley said that some approaches to IDL have been contrived attempts to “shoehorn content into rich task structures”. He cited tales of one school having a “sausage day” which included geography lessons of sausages of the world.

He added that IDL is not a priority for many teachers who find it a challenge to move beyond their accustomed subject boundaries.

In Scotland the approach to IDL tends to be thematic (like the sausage day). More positively there is shared planning across subjects to provide an interdisciplinary character to learning even while it's happening in different times and places.

Prof. Priestley advocated “defragmenting” current subject areas and setting up hybrids.

Advancing IDL cannot be done simply by expanding the expertise of teachers – though a great deal can be done through increasing their agency. Structural and cultural barriers also have to be addressed. Collegiate working is welcome, but the professor said more needs to be done in areas like timetabling and looking at how qualifications drive curriculum decisions.

Curriculum making is at the heart of the issue and must be seen holistically. It includes the content, pedagogy, infrastructure and assessment.

The professor described a series of approaches to creating a more integrated curriculum. He then argued for structural change and a move towards more targeted curriculum development projects, with some resources being developed nationally (for example in integrated science teaching). There also need to be changes in teacher training. Eventually a rethink of qualifications would be valuable to ensure that they drive rather than impede IDL.

Ultimately, Prof. Priestley said, the progress of IDL demands a clear understanding of what schools and education need to achieve and a structured approach to its delivery.

### **Rethinking Learning – Multidisciplinary Learning in the Finnish Curriculum**

*Päivi Nilivaara, Education Consultant, CEO, Innoline Oy, Finland*

Finland has a largely free and state-run school system and recent years have seen extensive curriculum reform.

Guidelines and priorities are determined by government with a core curriculum set by the national education agency but local authorities and schools decide the specifics and allocate resources.

Ms Nilivaara said the curriculum was reformed in order to respond to the increasing complexity of the world and to ensure there was more joy, excitement and depth in learning. It is based on a series of values that include social sustainability, the uniqueness of all pupils and having high expectations of students. In tandem with this are concepts that regard students as “active agents” in their own learning.

The Finnish approach also sees interaction as vital to promoting learning. The most important skill it aims to develop is “learning to learn”. There is also an emphasis on stimulating the desire to discover. Schools are conceived as places where everyone, including staff, are learners and collaborators.

Education has an IDL component, called Multidisciplinary Learning Models. Every student must have the chance to engage in IDL at least once a year – in practice it tends to be more. The models, which each last around 30 hours, are designed to involve a variety of disciplines and approaches and to take account of what the students would like to learn about.

The approach to IDL can be based on problem solving or be enquiry based, it can involve team working, events and activities, but is always intended to be imaginative and stimulating. Ms Nilivaara said joint projects with museums, libraries and others mean they also “open the doors of the school to society and the environment”.

There is ongoing assessment, including self-assessment by the students, throughout the IDL activities.

One of the most fundamental changes involved with IDL, she ended by saying, is that teachers have had to “let go” of the idea that they are the source of knowledge, but are mediators and facilitators.

## **Workshops**

*Participants had a choice of four workshops to attend including **The Journey to Implementing IDL in the Curriculum: Implications for Practice**. This was led by **Steve McLeister**, Teaching Fellow, Moray House School of Education, University of Edinburgh and **Clive Hembury**, Head of Science, Boroughmuir High School, Edinburgh.*

The workshop addressed questions around what structures promote IDL in schools and how to build capacity among teachers and leaders for creating IDL opportunities.

Mr Hembury described how schools such as Boroughmuir High approach IDL. This can involve whole year group or whole school IDL activities. These often take place outdoors, outside the school itself, with extensive advance preparation and structured assessment after the activity where students can demonstrate their skills and knowledge.

The IDL activities often serve more than one purpose, such as contributing towards John Muir Awards.

Young people also have the chance to adapt the IDL opportunities to address socio cultural issues that interest them, rather than simply have to explore a topic they are given. A bold and brave approach is needed and can yield excellent results – one student ended up creating an interactive map of things to do on Edinburgh’s Royal Mile which is now available online. Other projects have seen students working with MSPs, studying fracking, looking at smoking in cars and even drone technology.

Mr McLeister described how the school’s approach to IDL has been advanced through a close relationship with the University of Edinburgh. Through the emphasis on outdoor learning they have also realised the value of place as a means of integrating learning.

The session then broke into groups to discuss the issues they felt were most important in IDL.

## **Afternoon Session 1: IDL Development in Practice – Challenges and Goals**

*Chaired by Ken Muir, CEO and Registrar, The General Teaching Council for Scotland*

### **IDL in Practice – Opportunities and Challenges**

*Gayle Gorman, Chief Inspector of Education and Chief Executive, Education Scotland*

There is excellent practice going on in IDL in Scottish schools but, Ms Gorman said, it is not consistent.

She challenged the idea that students could go through their educational careers without encountering IDL as it is thriving across the early years and primary education where there is an interwoven curriculum.

The principal challenges are in the secondary sector where barriers need to be broken

down to make IDL easier. It is also important, she said, to look at what makes IDL effective. One of the best approaches is to carry out projects in the local community, which have relevance to the learner, and where they feel they are making a genuine difference.

Many of the best examples involve partners and give the opportunity to solve real-life problems. While teachers may provide the stimulus, the learning journey is most effective when it is designed by the students – so it needs to be “fluid and agile”.

There has to be a sense of authenticity in order to promote deep learning, said Ms Gorman, and that means avoiding creating false situations for IDL and having situations that are “real, realistic, local, contextual and driven by the learner”.

She gave the example of a primary school that has picked up on the story of The Glasgow Girls to engage their pupils in issues about social justice and food poverty. It has been a “true piece of interdisciplinary learning”, she said, with the children interviewing the public at railway stations and going into the parliaments at Holyrood and Westminster to talk to politicians.

There are innovative projects taking place every day, said Ms Gorman, but consistency is an issue. There are a series of challenges to be overcome including time, capacity and teacher shortages. Schools often feel under pressure and that they only have the time and resources to make sure they are “covering the basics”. “It’s quite a challenge but we know ... the challenge is worth the outcome,” she said.

Skills Development Scotland have identified capacities young people will need for the future including self-management, social intelligence and innovation. The question is how to adapt education to deliver this – some will take time, some will take money.

In many cases schools feel compelled to make exam results their focus rather than broader and deeper educational objectives. And while there is rightly an emphasis on closing the poverty related attainment gap, she said it’s important that does not lead to a narrowing of the curriculum or stand in the way of innovation. Ms Gorman argued that the way to improve is to broaden and become more imaginative rather than to narrow.

### **Union Street Regeneration Project**

Children from Middleton Park School were introduced by Chief Inspector of Education Gayle Gorman to talk about their project looking at how the Aberdeen Street could be made more interesting for young people. A local historian showed them around and talked to them about Union Street’s past.

The children looked at old maps and photographs in the city archive to see how Union Street had once thrived, and contrasted it with today when there are many empty units plus pawn and betting shops. They worked with architects, retail experts and others to look at what makes shopping streets appealing and the health and wellbeing benefits of going to the High Street rather than doing everything online.

The students identified priorities for a welcoming High Street including places that are pleasant to spend time, welcome dogs, have classes and workshops, have environmentally friendly businesses, hold birthday parties and offer Wi-Fi. They also designed exciting businesses that would make use of the buildings – models were built and put on show. The children also made a public presentation and shared their ideas with the group creating a new city centre master plan.

The children said they had gained experience in areas including maths, literacy, history, expressive arts, social studies and technologies.



## **The Scottish Baccalaureate: A Project-Based Approach to the Assessment of Interdisciplinary Learning**

*Dr Janet Brown, Chief Executive, Scottish Qualifications Authority (SQA)*

IDL is embedded in SQA qualifications such as the Scottish Baccalaureate, which is respected but has a small take up.

According to Dr Brown the IDL elements cover everything from road safety to employability and leadership. It is often present in vocational qualifications. “Yes this is very jobs and subject specific, but there’s an awful lot of generic skills and interdisciplinary learning that goes on through these things,” she said.

The SQA also has to respond to the fact that organisations taking on young people want to know what subjects they are qualified in.

While looking at the skills young people need for the future, Dr Brown said the SQA is also looking at the future of learning itself: “It’s not just IDL it’s how we teach it ...”.

Recalling her own student days here people simply attended lectures and took notes, Dr Brown said: “We need robots, but we need robots that are mechanical not human. We need humans to be thinkers, we need to help people to think around problems. We do need specialists but we don’t need everyone to be specialists, we need problem solvers.”

In recognition of this Advanced Highers already incorporate some higher level interdisciplinary thinking and independent learning.

Turning to the Scottish Baccalaureate Dr Brown said that while the uptake is low it is highly valued by bodies such as the universities of Edinburgh, Oxford and Cambridge and within the business world. It has a strong IDL element which demands that the student can think around a problem, carry out independent research and demonstrate their solution.

The baccalaureate IDL projects also allow students to work with bodies beyond their school and are of undergraduate (SCQF level 7) standard.

The most significant advances being made in the world today are at the interface of disciplines, and education needs to reflect the reality that everything is interlinked. We need, said Dr Brown, to enable people to “apply all their knowledge in all spaces”.

A problem then comes, she said, in how to assess achievement so that students have a qualification that provides a currency for their futures – and it’s not something that has been got right yet.

Looking at how we encourage IDL in a subject dominated environment Dr Brown said the education system needs to collectively consider what it wants to deliver, how it will be measured and the way it fits with higher education entry requirements. In the meantime the SQA is already looking at what can be introduced at SCQF level 6 (Highers).

IDL is invaluable, she said, because it aligns with the skills needed in the 21<sup>st</sup> century world – but it needs to be done well and to be accepted by the higher education institutions and employers.

## **Human Skills, Meta-Skills and Work-Based Learning: An Integrated Approach**

*David Coyne, Director, Centre for Work-based Learning*

For 200 years economic growth has driven improvements in health and wellbeing but as the population heads for 10 billion we need to change course to continue making gains.

Mr Coyne said the emphasis needs to be on sustainability and, despite its small size, Scotland can continue to play a significant role in finding ways forward. This requires innovation, intelligence and a “degree of kindness” in the way we treat fellow citizens.

The Centre for Work-based Learning has responded by helping expand the apprenticeship system. It has also been looking at how to spread best practice and at fresh approaches.

According to Mr Coyne there are clear benefits from work-based learning. The advanced economies (like Switzerland and Germany) with the lowest youth unemployment and highest employer engagement place a high social value on work and work-based learning. They have curriculums linking the education sector, society and industry.

Likewise work-based learning yields benefits in terms of finance and wellbeing.

In Scotland 30,000 young people a year start Modern Apprenticeships, Foundation Apprenticeships are spreading through the schools system and most universities deliver Graduate Apprenticeships. Pilot schemes are taking place for other initiatives.

Mr Coyne said that the advantages go beyond the learning itself. Fewer young people now have Saturday jobs – which gave them independence and wider experience. Apprenticeships help fill that gap and promote maturity.

Graduate Apprenticeships can also be at the cutting edge of modern industry. Mr Coyne cited a data science initiative developed between Scottish universities and PWC that trains people in areas such as cyber security from the start of their degrees. This provides the kind of nimbleness needed for the future economy.

While people are highly aware of the meta-skills needed in the working world the centre (in collaboration with the SQA) is currently focusing on how these can be taught and assessed.

Mr Coyne closed with a series of questions for industry and educators need to consider:

- 1) How do we develop IDL in schools and continue to teach the complex technical skills people need?
- 2) How do we develop the role of manager as pedagogue?
- 3) Will we become a learning nation so that our workforce of 2.4 million continues to develop?

### **Questions**

Asked about whether he knew of attempts to spread the cost of learning more widely Mr Coyne said that Bosch in Stuttgart has a scheme where people apply to the company and it then sends the person to university as part of the training.

Dr Brown was questioned on what contribution Regional Improvement Collaboratives can make in embedding IDL in school practice. She said that despite being embryonic they are working across all ages and sectors and beginning to support learners and educators and to promote best practice.

### **Workshops**

*Participants had a choice of four further workshops. One was **Knowledge Matters** led by **Professor Kay Livingston**, Educational Research Policy and Practice, School of Education, University of Glasgow and **Dr Fiona Patrick**, Assistant Chief Advisor of Studies, Course Leader Professional Enquiry (PGDE), IDL Education Technology and Society, University of Glasgow.*

The workshop looked at teachers and IDL, the current situation in schools and current thinking about teaching from an IDL perspective.

Prof. Livingston discussed research from across five varied local authorities which identified a lack of consistency among teachers and policy makers about awareness, understanding and implementation of IDL. Among the negatives were that it was sometimes seen as a “nebulous” concept, however some teachers were very positive and saw it as a way of teaching “outside the boxes”.

Looking at IDL in practice also demonstrated inconsistencies over what teachers were hoping to achieve. Prof. Livingston said one of the most important issues to emerge was about how to circulate knowledge about IDL among schools and how to provide teachers with the time and space they need for planning. Likewise there are issues about whether teachers feel equipped and confident to move forward with IDL.

To be successful with IDL, and to make sure young people have all the knowledge they require, means preparing teachers. It is not the case that students can always construct their own knowledge, sometimes they “need something to construct that knowledge from”. This, said the professor, requires thought about their initial training and ongoing training.

Dr Patrick then spoke about her experience in redesigning an undergraduate programme in design and technology in education (training design and technology teachers). This raised questions about what she and her colleague were aiming to do.

The course has a strong interdisciplinary element in which students create a project to solve a real-world problem. But while the degree was good at doing IDL it was not exploring why they were doing it and the value of bringing together different forms of knowledge. Without understanding IDL itself, projects can end up as “make and do”.

Dr Patrick said: “We are doing it, we are teaching something, but are we really clear about what we are teaching and why? Because if we are not then we cannot become truly interdisciplinary within the different strands of design and technology.”

They are now talking to others about the nature of knowledge in order to help them provide an intellectual underpinning for their work. She said: “We are beginning to realise we have been too focussed on the creation without thinking about the creation of what.”

They want to be sure that the undergraduates know why they are doing project work and, when they reach schools and develop projects there, that they can ensure that the students know why it's of value.

As teacher educators, they are now thinking about how to support teachers in thinking about the nature of knowledge across disciplines in order to develop rich interdisciplinary learning experiences. And how do they then support teachers to effectively plan and assess IDL.

Participants then formed groups to discuss what they thought were some of the most important issues in IDL. Observations included that there was a need for more national guidance on what is expected and what teachers can do – and also that teachers need

more time for planning. One group noted that schooling is driven by exam results and that so long as this is the imperative there will be insufficient space for creativity by teachers. Another commented that until the higher education sector changed its approach to entry requirements then secondary teachers would feel unable to take new approaches.

## **Afternoon Session 2: IDL in the Context of School Improvement**

*Chaired by Keir Bloomer FRSE, RSE Education Committee Convener and Education Consultant*

### **Learning to be Better**

*Andy Hargreaves, Research Professor, Lynch School of Education, Boston College, USA, Visiting Professor, University of Ottawa, Canada*

It's important to understand the threats to interdisciplinary learning, said Prof. Hargreaves.

One is that is easy to do very badly. Some people, he added, are doing it quite badly.

What is needed are approaches that deliver deep learning.

A second threat is that IDL has to overcome the tensions between disciplines, breaking away from the kind of curriculum where everything is neatly compartmentalised.

IDL requires a more integrated curriculum – which can look messy – but which is built around interconnection and underpinned by deep principles. To have good quality interdisciplinary work, Prof. Hargreaves argued, you therefore need teachers who understand their disciplines very well.

Citing Basil Bernstein he observed that curriculums are organised to reflect the principles of power and control in society. They also curriculum become more specialised, and conservative, the closer young people are to the point of university selection.

Prof. Hargreaves said: "If you get integration at all you get it with younger children who are a long way from selection so it's OK, you get it with poor children who no one cares about anyway, and you get it with lower ability groups and second language students to try and motivate them to get up to the standard of everybody else.

"But when interdisciplinary learning starts to come and threaten the existing structures of power and control and the historic disciplines that give access to them, is when you have pushback from other people outside the schools, from people in politics, from parents, also from teachers who've lived their lives in their subjects and built careers from them."

The result can be that when IDL comes into a school a team develops drawn from the "marginal subjects" that don't fit into the regular curriculum – the arts or drama teachers. If you want to make IDL sustainable, said Prof. Hargreaves, it's essential "to win over your maths teachers, physics teachers, English teachers, modern language teachers and so on ..."

IDL needs people with the expertise and recognised status to integrate at a high and a deep level.

A third threat is that the CfE could be eclipsed by the demands of the National Improvement Framework ending up with “a blood moon of Scottish education”. All too often traditional subjects and approaches will dominate over anything new and that looks “a bit fuzzy”.

Professor Hargreaves argued that we need an approach to education that is integrated and promotes deep learning because we live in a world which is “falling off its axis”.

Referring to a 1996 report by Jacques Delors he identified four vital aspects to learning: learning to know, to do, to be and to live together. The first two typically and traditionally get the most emphasis, while the current state of the world demonstrates that thinking about how “to be” and how to coexist are of overwhelming importance.

Turning to what education should achieve he spoke about working with the Canadian authorities, and especially in addressing the needs of indigenous children, and the growing appreciation that the curriculum must be created to fit the student and not the other way round. Inclusion is equity, he said, and you have to engage with people’s identity.

In conclusion he said it is essential to champion and connect the four areas of learning identified by Delors, by making sure that learning and wellbeing, education and engagement, are treated as interlinked, then we can help young people to grow into fulfilled adults.

### **Summary of Impressions**

*A panel of young people were invited to give their views on the day and on IDL. They were Abigail Mitchell, an undergraduate from University College London, Tom Bird, a physics graduate who is now in teacher training at Moray House, along with Our Lady’s High School, Cumbernauld, senior pupils Niamh Doyle and Katie Smith. They were joined by Professor Stuart Munro, Convener of the RSE’s Young People’s Committee.*

Asked while they had attended Ms Doyle said she wanted to find out what IDL was and feedback to her school and Ms Smith hoped to be able to tell teachers about the benefits it could offer future students. Mr Bird wanted to attend because Moray House is committed to IDL and he had seen excellent examples of it in practice. He explained that IDL, and spontaneity, does a great to liven up lessons and engage the students. Ms Mitchell, who is taking Carl Gombrecht’s arts and science degree, said she has been living and breathing interdisciplinarity for nearly four years, so she was interested to hear more about it from academics and policymakers.

The high school students were asked if more IDL would have helped them. Both agreed that a greater understanding of how subjects are interrelated would have helped inform the choices they made over exam subjects and possible future careers.

Mr Bird said the examples of IDL had seen in classrooms was shaping his own ideas of teaching and it is something he hopes to champion.

Ms Mitchell’s degree has allowed her to combine arts and sciences – and even study Mandarin. This, she said, has allowed her to stand out from the crowd while searching for jobs. Potential employers have seen it as showing an appetite for learning and taking risks. Despite the fact that she does not have a specialist background in computer sciences she has been taken on as a coder by IBM.

Asked about a perceived clash between IDL (as something that promotes generalism) and the demand for specialist expertise, Ms Mitchell said the education system should

cater for both. And right now, she said, young people often have to specialise too early. This was a view shared by the high school students who felt they had been forced to make subject choices too early – with Ms Doyle saying she regretted her initial decision to lean towards some sciences.

Giving their views on the conference, the Ms Smith said that she had no idea that interdisciplinary degrees were available and had thought education would inevitably become more specialised. Ms Doyle added that she was impressed that educators are trying to break away from a schooling system which is focused on simply giving students the information to pass exams.

Mr Bird said the emphasis on equity and IDL's celebration of uniqueness had impressed him. Ms Mitchell added that IDL had not featured strongly in her own school career and she was delighted to see a conference hall full of people, from all sectors, who were ambitious to see it embedded in Scottish education.

*The conference ended with a vote of thanks to the organisers.*