

**The Royal Society of Edinburgh
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Conference

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

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Report by Matthew Shelley

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 teachers, and that there has been little research into its implementation and impact in Scottish education. Recent reports indicate a similar situation in higher education. Most students may go through their educational career without experiencing IDL. A systemic response is needed. Professor Graham suggested that pillars, lintels and foundations provide a helpful metaphor for IDL in which the pillars are the disciplines and the lintels the interdisciplinary connections; without the pillars and lintels will fall. He concluded that a key purpose of the conference was to gather information and explore the nature, relevance and development of IDL in 21st century education, and to develop a strategy for its wider implementation.

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 Professor 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. 6.5B out of 7.5B people are now literate. Average life expectancy has increased by 20 years: as great an increase as took place between the Stone Age and the 1970s.

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 Professor 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 spill overs – 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 Professor Goldin, from the failure by the senior management at major banks to understand the new processes and technologies they were using. Advances in artificial intelligence and machine learning mean that about 40% of UK jobs will be 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. Managing technological change, for example, is

an interdisciplinary task, calling on ideas from ethics and law as much as from science. This kind of thinking, according to the professor, is something we have failed at so far. We are living in a time of excessive data and insufficient wisdom. Much of today's intellectual excitement is to be found in interdisciplinary activities. 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 Professor 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 Gombrich, Professorial Teaching Fellow in Interdisciplinary Education, University College London

While recent centuries have seen a strong trend in favour of specialism, Professor Gombrich 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% of 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.

Professor 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, often mediated entirely by screens or other electronic devices, with a constant flow of new ideas and challenges.

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 seen over the last 100 years is set to continue, according to Professor Gombrich, as globalisation means the only way we can compete in manufacturing and production industries is to work for the low wages paid in developing economies, which is neither desirable nor likely. He said: “We are a knowledge economy and a knowledge economy relies on services – which are 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 such as accountancy) is likely to be done better, faster and cheaper by AI or robots.

Finally, Professor 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. Much of today's intellectual excitement lies in interdisciplinary activity. IDL also plays a major role in cognitive development. "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 sectors. 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 **Calderglenn High School** was 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 Calderglenn.

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 Professor 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”. Professor Priestley 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.

Professor Priestley said there is often a lack of “conceptual clarity” around IDL. One 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. This is useful, but under-developed.

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 on 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 every day and disciplinary knowledge.

Professor 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-themed day”, with different subjects including content related to sausages.

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 and is often not inter-disciplinary. Sometimes there is shared planning across subjects to provide an interdisciplinary character to learning, even while it’s happening in different times and places.

Professor Priestley advocated “defragmenting” current subject areas and setting up hybrids such as social studies.

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. Collegial 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.

Professor Priestley then 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, Professor Priestley said, the progress of IDL demands a clear understanding of what schools and education need to achieve and a structured approach to its development.

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 Modules. Every student must have the chance to engage in IDL at least once a year – in practice it tends to be more. The modules, 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 which had been previously selected at time of booking.

Workshop 1: *The Journey to Implementing IDL in the Curriculum: Implications for Practice*

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 groups 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 having to explore a given topic. A bold and brave approach is needed and can yield excellent results – one student created an interactive map of things to do on Edinburgh’s Royal Mile and this is now available online. Other projects have included students working with MSPs, studying fracking, looking at smoking in cars and drone technology.

Mr McLeister made the point that there was a need to build in staff capacity to allow new ways of working, including, for example, new ways of planning. Building in this capacity had been in part achieved through partnership with the University of Edinburgh and experimenting by learning as the partnership went forward. This experimentation led them into stumbling into place-based outdoor learning as an effective integrating approach to IDL.

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

Workshop 2: IDL Approaches to Global Challenges – Learning for Sustainability

Led by:

Professor Pete Higgins, *Professor of Outdoor and Environmental Education, University of Edinburgh; and*

Dr Laura Colucci-Gray, *Senior Lecturer in Science and Sustainability Education, Moray House School of Education, University of Edinburgh.*

Schools have to find effective ways of helping students to confront ‘wicked’ issues. Such issues are ones that are extraordinarily hard to solve not only because of incomplete information, but because they often evolve over time as a set of interconnected issues, each one becoming a subject of new research producing new evidence. Most importantly, the nature of most, if not all ‘wicked issues’ is inherently practical, linked to our everyday actions, habits and behaviours.

These sorts of issues are shaping the world young people live in; issues related to climate change, energy security, obesity or mental health characterise the world of schools as well. So, it is important to equip young people with the means to address them.

Sustainability is the biggest of them all, according to Professor Higgins – of such magnitude that it qualifies as “super wicked”.

So, what should schools do when the core responsibilities of teachers are literacy and numeracy, health and wellbeing – and the main concerns of teachers within their subject areas are to promote attainment and achievement?

IDL can present a way forward, equipping young people for a world of complexity and rapid change. Following the ideas of Funtowicz and Ravetz (1993), in the face of high levels of uncertainty, where values are disputed, and the stakes are high, there is a need to engage 'an extended peer community', by means of dialogue amongst a multiplicity of knowledges, disciplines and cultural perspectives.

Dr Colucci-Gray went on to look at the tools needed to address 'wicked' issues in schools, using nuclear power and genetic modification as an example. One issue she addressed was that the world faces enormous issues over energy security. Energy sources, sustainability and usage are critical to the debate and raise concerns that are technical, political, ethical and financial – not least over dealing with nuclear waste. In another example, she referred to the extensive debate in the US over human consumption of genetically modified, fast-growing and extra-large Pacific and Atlantic salmon hybrids; the Aquabounty salmon™ is defined as a 'reverse male' – sperm producing female infertile fish for global consumption. Do we know they are safe for human consumption? Do they have a role in spreading allergies? Is it acceptable to allow them to be eaten when we will only know if they harm people after that has happened? And in what way is the aquaculture of GM salmon changing resource use in global food production?

These are the sorts of issues that cross disciplinary boundaries and address values as well as facts – key features of the complexity of the modern world, as noted by Funtowicz and Ravetz (1993). Thinking around them, gathering information and assessing our conclusions, she said, requires an interdisciplinary approach.

The group then broke up to consider key questions around supporting learning that is complex and dealing with the emotional and value dimensions of local and global issues. The workshop was set out to develop awareness of (a) the partial nature of disciplinary knowledge; and (b) the unexpected learning leaps which derive from comparing different disciplinary perspectives around a topic/ issue when participants adopt a dialogical stance.

For the purpose of generating interaction in a limited period of time, participants were divided into groups. Four groups were asked to look at the components of a generic, everyday 'cup of tea' (milk, tea, water, sugar) adopting a set of disciplinary stances (e.g.: physics; geography; history; art; maths, biology etc.). At least two disciplines were represented in each group. Two other groups were asked to use generic mindmap/brainstorming about a whole 'cup of tea'. Participants were given a perspex sheet mounted on a 45 x 55 cm frame upon which to jot down their contribution using a non-permanent marker. The task at the plenary was to 'overlay' the frames to identify inter- and possibly trans-disciplinary connections amongst the different contributions in a three-dimensional matrix.

Participants reported afterwards that they were able to make links between their own disciplines. They said that the exercise had forced them to think 'outside the box' and come up with thoughts they might not have normally had. From a facilitator's perspective, it is important to note that the unassuming and common nature of the 'cup of tea' enabled people to share their disciplinary knowledge as well as tap into the extensive amount of personal and cultural knowledge that each person held. It was also worth observing that the disciplinary frames supported participants to think in detail. Conversely, the more generic 'mind map' or theme approach appeared less useful, particularly for people who are commonly used to planning for multidisciplinary learning. This point was made by a group of primary teachers who were accustomed to 'mind

mapping' their lesson plans yet found it difficult to put the map into operation.

However, concerns were raised that when it comes to applying interdisciplinarity in the classroom, some suggested that teachers will feel they do not have the expertise, whilst others felt it valuable for teachers to recognise that in IDL they cannot be the source of all knowledge and answers. Rather, teachers need to facilitate young people's research by showing them how to find the answers to their own questions. It was also noted that the point of IDL is not always to find a 'correct answer' but to create a recognition and ability to address complexity – and an enthusiasm to engage with it.

From a teacher learning perspective, the workshop activity supported interactions amongst groups of different people. In a longer session or in a community more used to working with each other there may be 'power dynamics' or specific interest issues to consider (e.g., between primary and secondary). On the day one participant made an interesting comment about the power of 'holding the pen' (i.e. being the writer on the perspex).

Professor Higgins concluded that the idea of co-construction of knowledge is fundamental to engaging in IDL, for example, as part of a social inquiry into everyday practices which are enmeshed with critical questions about the use and distribution of energy; flows of materials and the 'hidden connections' amongst places and times in our global lives. This, he said, is of tremendous importance as teachers consider how to tackle issues such as sustainability, which is an area of growing importance in Scottish education. Drawing upon the strengths of IDL and the interconnected nature of 'wicked issues', may help participants to move from deconstructing a 'cup of tea' to looking further into other, substantial and significant aspects: nuclear power; intensive farming; food labelling etc, which are part of pupils' lives.

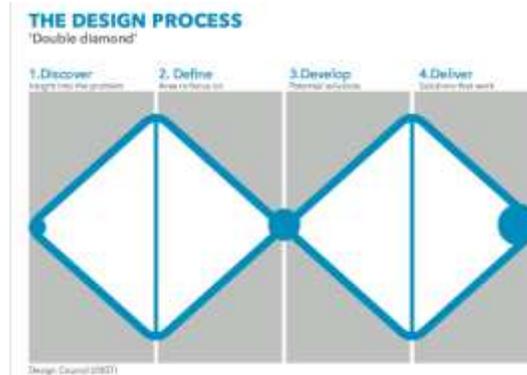
The time allocated for the workshop however was not enough to explore such potential in greater depth; equally, there appears to be a need for a more guided and structured approach to uncovering underlying value- positions.

Workshop 3: *From Theory to Classroom Practice: Designing Future IDL Practice*

Led by Iain Aitchison, Programme Director, Glasgow School of Art.

Iain Aitchison's workshop began with an introduction to Glasgow School of Art and some key themes driving pedagogy, such as Ambiguity, Shared Space, Critically, Dialogue and Making ideas tangible. It was emphasised that design should not be considered simply as a discipline, but rather a practice that can be applied to examine and shape possible futures, including the future of IDL practice.

Iain presented the Double Diamond model: a widely recognised and utilised model of design, with which some, but not all, of the workshop participants were familiar. The model has four key stages: Discover, Define, Develop and Deliver that progress through two stages of diverging and then converging thinking. He described how design thinking could be applied across a range of challenges, and consequently adopted this interdisciplinary tool to structure discussions for the remainder of the workshop.



Design Council Double Diamond Design Process model (2007)

After giving participants time to individually consider the challenges of implementing IDL today (*Discover*), they were divided into groups of 8 to share ideas, annotating post-it notes that were shared on cards around the workshop room walls. Discussion focused on the first three stages of Design Thinking: Discover, Define and Develop.

Discover

The Discover phase focused on the challenges of IDL today. Many participants identified existing structures as the key challenge – from traditional curriculum subjects and their timetabling to the domineering focus on exams, particularly in later stages (proposing that this is why IDL may be more prevalent in the earlier years). Participants also discussed the need for teachers to change perceptions, to break away from identifying with subject discipline and focus on pedagogy and the ‘bigger picture’. However, this not only requires political perspectives and existing structures to change, there needs to be time for thinking, training, confidence building, and importantly, greater clarity on what IDL means and how it is enacted.

Define: Future challenges/opportunities

The Define phase focused on future challenges and opportunities for IDL with respect to the future economy, work, policy and curricula. Many of the future challenges echoed the existing ones previously discussed, namely changing structures and perspectives around disciplines, assessment and teachers’ roles. However, there was positivity in discussions about how IDL met the changing world of work, where employers are increasingly seeking candidates with more interpersonal skills, creativity, flexibility and ability to solve novel problems. In this way, IDL was seen as an ideal approach to face the challenges of digital automation. To achieve this, there would not only need to be a clearer understanding of what IDL is, and how it can be adopted, but more supportive structures on which to ‘hang’ IDL. And, as well as developing teachers’ skills and confidence, there would be a need to recruit teachers with a broader range of experiences.

Develop: potential solutions

The final phase looked to solutions for how the future IDL design brief might be realised. With limited time left in the workshop, solutions were quite general and re-iterated discussions from the previous two phases: to change assessment culture, rethink existing structures, provide teachers with more space and time, and build more recognition and understanding of the contribution of IDL. However, discussions did

extend to identifying ways of linking education more with work, from work experience and partnerships to greater valuation of vocational routes. There was also general positivity about the need for a shift in mindsets, encouraging greater risk taking and relevance, and empowering students to be more playful, experimental and self-directed. To achieve this, there needed to be improved communication between all stakeholders, including politicians and parents.

Workshop 4: *The Curiosity Imperative: Interdisciplinary Learning in Scottish Higher and Further Education*

Led by:

Professor Steve Olivier, Deputy Principal and Deputy Vice-Chancellor, University of the West of Scotland;

Dr Alastair Robertson, Director of Teaching and Learning Enhancement, Abertay University; and

Audrey Cumberford FRSE, Principal; and Chief Executive, Edinburgh College.

A sense of curiosity and the capacity for true critical enquiry are invaluable assets, according to Professor Olivier, but he fears these assets are lacking in some undergraduate students, whose interests do not stretch beyond their own degree courses. He and Dr Robertson find a reluctance among some students when they are called on to do interdisciplinary work.

He argued that critical thinking has suffered because Scottish universities have narrowed their focus, becoming more like their English counterparts. Social criticism and liberal democracy require an interdisciplinary mindset. A move to 'true interdisciplinary learning' is necessary to broaden students' minds.

Dr Robertson gave some examples of their efforts to introduce IDL at Abertay University. They have been working together on curriculum reform since 2013 and trying to broaden and deepen student learning. "We were very excited by the notion of interdisciplinarity and felt it was so important that we wanted to make it compulsory," he said. They have developed 26 interdisciplinary electives that are compulsory for Stage 1 and 2 students. These were created following an open call to academics to see what they wanted to do, stimulating a series of new partnerships.

They have also taken innovative approaches to assessment, moving away from a traditional essay-based format. Timetabling issues have been addressed by having two set afternoons a week for IDL electives.

Ms Cumberford then spoke about the approach at her college. IDL is often centred around the concept of "work integrated learning" where multiple disciplines can be brought together and taught around work and live industry led projects.

There is an increasing emphasis on meta-skills and the skills needs of tomorrow's workplace along with the relevant and specific vocational and technical skills. Ms Cumberford believes it is vital for colleges and industry to work together – to shape the curriculum, including the design and delivery of live work projects. This collaborative approach focuses not simply on the skills gaps of today but on the skills required by industry for the future.

She then spoke about the *Daydreamers Project* in which Edinburgh College students spent a week talking to school pupils about the creative process. The pupils then had their timetables changed and for the next 15 weeks worked with industry partners to find

solutions to real world problems. The impact was considerable for everyone involved, especially for the pupils as they considered their future goals.

Another large initiative was the FutureEquipped *Project*, which brought together colleges, innovation centres and industry to work together to support business innovation, specifically around smart housing solutions. They looked at how to build houses with integrated digital health solutions – something that demanded an understanding of data, IT, health, construction and engineering. This project was defined by IDL with lecturing staff from all of these disciplines working together, focusing on new and emerging technologies and how they impact on the skills required to design and build homes for the future. The benefits of this type of IDL approach are huge, according to Ms Cumberland, but there are some barriers to doing more, ranging from the confidence of staff and some wider system constraints such as qualification design and funding.

The success of IDL projects can be helped by anticipating problems. The participants were divided into groups to do a “pre-mortem” in which they were given a scenario and had to consider why it might fail. They then fed back on their discussion.

One scenario was that a local company wishes to run a joint project, with students helping tackle a real business issue (and with an eye to future recruitment). Reasons for potential failure included:

- Responsibility was given to lower status staff rather than organisational leaders;
- Unfair and unreasonable expectations.

Another scenario involved a college or university principal demanding that all students should be free to take any courses they wanted. Reasons why this might fail included:

- Practicalities such as timetabling;
- Absence of base knowledge required to take a subject forward at a higher level;
- Lack of staff and student buy-in.

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 in the form of an interdisciplinary project but has a small take up.

According to Dr Brown the IDL in education can cover everything from road safety to employability and leadership. It is often present in vocational qualifications. “These are very job 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 21st 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 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 school 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 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, again, previously selected at time of booking.

Workshop 1: Promoting IDL across Regional Improvement Collaboratives

Led by:

Elizabeth Morrison, Senior Partnership Officer, West Partnership Regional Improvement Collaboratives;

David Hughes, Head Teacher, Thornlie Primary School, Wishaw: and

Liz White, Head Teacher, Calderglen High School.

Ms Morrison offered some context about Regional Improvement Collaboratives (RICs) and their interest in IDL before introducing speakers from the frontline of its delivery. She said the collaboratives exist to provide support for schools across given geographical areas. The idea is for people and organisations to be able to work together more closely and to enhance what local authorities already do. It works at all levels from class teachers to directors of education.

The West Partnership, which is made up of eight local authorities, is growing a learning system that leads to sustained improvement for students, educators and stakeholders. The RIC includes five of the nine most deprived local authorities in Scotland and are part of the Scottish Attainment Challenge. Even the most affluent of its local authorities have areas of significant deprivation. It also has more than a third of Scotland's school population which means that improvements in attainment in this region would have a substantial impact on the national picture. There are 708 schools and around 160 early learning childcare establishments.

One West Partnership workstream is focused on curriculum design. While at an early stage, work will be done with schools, early-learning and childcare establishments to support the development of IDL within their curriculums. Where there is good practice, they aim to share it across the partnership.

Ms Morrison then introduced Mr Hughes who spoke about IDL at his school and in the relationship with the RIC. He said that educators are "duty bound to interrogate our disciplines, our subjects, our curriculum" and the starting point is whether they serve learners and deliver what they need to flourish.

Thornlie was the highest excluding school in Scotland. This crisis, combined with poor reports and new leadership, brought a complete review of the way it worked. Change involved looking at long-term and sustainable improvement. One project was how to improve the school grounds. They made pupils and parents part of the process and took an IDL approach. This involved consideration of everything from what should go in the grounds, to budgeting and anti-vandalism measures.

A contrasting initiative introduced the pupils to current affairs and was based on the Russian conflict with Georgia. This developed to cover a multitude of social issues, including Scottish volunteers in Georgian orphanages.

Mr Hughes said that classes now have IDL topics that they pursue across the course of a year – for example looking at sustainable development goals like gender equality and access to clean water. These provide inspiring ways to develop and apply a diverse range of skills from a variety of disciplines to consider complex real-world issues.

Ms Morrison then introduced Liz White from Calderglen High School. In their second year, students have two seven-day blocks in the summer term when they work on an IDL project. This requires teachers to take an interdisciplinary approach. They often find it rewarding because the young people become so engaged in the projects.

Ms White said the objective was for IDL to be meaningful and integral to the curriculum. In S1 they use thematic learning to investigate particular subjects across different disciplines. All S3 pupils have a weekly masterclass (which can cover anything from photography to sports journalism). There are a range of interdisciplinary health and wellbeing activities. Some projects involve external partners and ultimately contribute to employability and demand the application of design, maths and science skills. Others address human rights issues and are about ethics and values.

Among the benefits are the development of communication and presentational skills as the students frequently have to work with different groups of people.

Calderglen shares a campus with Sanderson High School, which caters for students with additional support needs. The IDL activities have proved popular for Sanderson students, inspiring some to learn more about issues and to earn national qualifications.

Overall Ms White said that young people from both schools are achieving more: “It is not IDL for the sake of it or for a different learning experience, it is so our young people get improved outcomes – it closes the attainment gap.”

Workshop 2: IDL and National Improvement: Engaging Disengaged Learners, Widening Access and Outdoor Learning

Led by:

Dr Neil Speirs, Widening Participation Manager, University of Edinburgh; and **Morag Pendry**, Harrysmuir Primary School Livingston (former member of the Commission for School Reform).

According to Dr Speirs there is a growing neoliberal tendency which suggests that we cannot slow down our rush to the future, we have no control. This is ideology not reality. At the same time, he added, education is used by the privileged to reinforce their authority.

Social reproduction and the use of education to reinforce privilege are major sources for concern, but they are not irresistible forces. However, the reform of the educational system requires radical changes in social policy.

According to Dr Speirs inequality is transmitted by curriculum, pedagogy and policy. The question is how this can be addressed. If we are to give children of all backgrounds the opportunity to thrive we cannot simply “re-jig” the existing system to embrace IDL as it will still be built on foundations that perpetuate inequity.

The education system, said Dr Speirs, sits within a wider social context that tends to define people’s life chances. Education has to have a strong and independent impact on the lives of young people if it is to help compensate for these biases. A “critical pedagogy” is needed to free education from its “class anchorage”, he added. And rather than seeing education in terms of employability – and judging it by mercantile measures – we need a curriculum that values compassion, decency and joy.

The session was then broken into groups and asked to discuss how there can be a radical pedagogy, that does not have a class anchorage, which allows young people to experience the emancipatory potential of education.

Ms Pendry then spoke about her experience working with disengaged learners – much of which is nurturing. Part of her role is to help close the attainment gap, but she questioned exactly what this meant and said: “are we talking educational, social environmental?” Another question, she said, is about the purpose of education.

Once a week Ms Pendry teaches cookery and says this is class free and “truly emancipatory” because everyone needs to eat, and everyone should be able to cook. The incentive for the young people is that they get to eat what they have made. The work is interdisciplinary as they learn about nutrition, ingredients, weighing and cost. The children are taking things to a whole new level by setting up their own school shop.

Sadly, she said, these kinds of activities are often regarded as extra-curricular or for those in need of extra support. Many schools no longer teach these kinds of skills and so have lost “the joy, the fun, the engagement, the enthusiasm and the purpose of life – it is about creating social context”.

There is, she said, the need for a rethink of our approach to schooling. It is still based on a Victorian production line model where young people are filled with information in a succession of 50-minute sessions with the aim of turning out factory and office workers. This is combined with a 20th century subject-based curriculum which is increasingly out of date for the needs of 21st-century students.

Two further group sessions were held. Participants were asked to consider how IDL could add value to a class-free curriculum and pedagogy. Dr Speirs then spoke about the challenges for teaching staff who are often barred from innovating by the need to achieve set targets. For the second they were asked to think about “what stops us doing what we know is right, or why do we so often meet the target but often miss the point?”

In conclusion Dr Speirs said that IDL is not a radically transformational educational policy on its own. Wholesale change is required to free education from class structures, so it becomes emancipatory rather than a means of social reproduction. Only at that point can IDL yield all its potential benefits.

Workshop 3: Knowledge Matters

Led by:

Professor Kay Livingston, *Educational Research Policy and Practice, School of Education, University of Glasgow; and*

Dr Fiona Patrick, *Assistant Chief Adviser of Studies, Course Leader of Professional Enquiry (PGDE), IDL Education Technology and Society, University of Glasgow.*

This workshop looked at the importance of knowledge to IDL from a perspective of exploring current thinking about learning and teaching from an IDL perspective.

Professor Livingston discussed a research project involving teachers from five local authorities and members of staff from key educational agencies in Scotland. The project was not specifically designed to collect data about IDL but within the findings some participants mentioned their understanding and implementation of IDL. The responses varied, for example: “IDL is a rather nebulous concept”, “it enhances learners’ knowledge and understanding”, “it enables us to work outside the boxes”.

Looking at IDL in practice also demonstrated inconsistencies over what teachers were hoping to achieve through IDL. Prof. Livingston said one of the issues to emerge was about how to circulate knowledge about IDL within schools and how to provide teachers

with the time and space they need for planning IDL. There are also issues about whether teachers feel equipped and confident in the development and implementation of IDL.

Drawing from Bernstein's (2000) work Prof. Livingston said there is a need for greater awareness and critique of recontextualising principles when knowledge moves from its site of production to be recontextualised in a different educational area. IDL provides opportunities for making knowledge connections and developing understanding but there is also potential for distortion of knowledge in the recontextualised site. She emphasised that the opportunities and challenges for learning offered by IDL need more consideration in initial and Inservice teacher education.

Dr Patrick then spoke about her experience in redesigning an undergraduate teacher education programme in design and technology education. As part of this redesign, she and her colleague, David Morrison-Love asked questions about the nature of knowledge in the key areas of the design and technology curriculum. These areas have strong inter-relationships with respect to the knowledge they contain, but also distinctiveness. There is an assumption that these areas are already interdisciplinary in nature but trying to define the nature of knowledge within and across these areas is challenging.

The degree programme has interdisciplinary elements in which students create design and technology projects to solve, or respond to, real-world problems. However, there remained questions as the redesign continued about what the team were asking students to do in terms of knowledge transformation. Without understanding the knowledge base of the tasks there can be a risk of projects becoming 'make and do'. It was in discussion about this that Dr Morrison-Love and Dr Patrick began to explore at a deeper level the potential for understanding knowledge within and across the design and technology strands. Dr Patrick said: "We are teaching something, but are we really clear about what we are teaching and why at an ontological and epistemological level? Because if we are not then we cannot become truly interdisciplinary."

They are now researching and talking to others about the nature of knowledge in order to develop a more explicit intellectual underpinning for their work. As teacher educators, they are also thinking about how to support teachers and student teachers in thinking about the nature of knowledge within and across the areas of the design and technology curriculum in order to develop rich interdisciplinary learning experiences.

Participants then formed into groups to discuss what they thought were some of the most important issues in IDL in relation to knowledge and teacher education. Observations included that there was a need for more national guidance on what is expected and what teachers can do in IDL – and also that teachers need more time 'to discuss, share, learn, teach, think, process, (and) make mistakes'. Teachers and student teachers need 'time and space for sense-making'. One group also noted that while schooling is driven by exam results and a stress on 'attainment' it would 'always be a battle' for secondary schools to move towards pupil-led interests. Another group noted the need for learning to enhance curiosity, innovation and creativity. Other comments focussed on the need for play and a sense of playfulness in learning and teaching. There was also a suggestion that teachers needed to 'understand what knowledge comes from the subject area' and to better understand IDL.

Workshop 4: Innovative Curriculum: Connecting the Broad General Education

Led by:

Greg McDowall, Head Teacher (Acting), St Margaret's Academy, Livingston; and **David Downham**, Principal Teacher, Curriculum Health and Wellbeing, St Margaret's Academy, Livingston.

The session looked at the issues and challenges schools need to address in order to develop IDL, from leadership and timetabling to teacher development.

St Margaret's said Mr McDowall is a well-regarded West Lothian state school with 1,100 students.

Across Scotland there has, he said, been a lot of change in the curriculum and the expectations placed on schools have been high. There are also competing priorities. And, as a leader, it's not just important to ensure that the curriculum inspires the young people, it also has to excite the teachers "they have to be really invested in it".

Looking back to the 2016 timetable Mr McDowall said the number of 50-minute slots made it difficult for teachers to achieve all they wished, especially in terms of developing skills like collaboration and critical thinking among students.

Participants were asked to discuss the extent to which their own curriculum structures inhibited meaningful learning.

The workshop then looked at how St Margaret's has developed a leadership strategy that supported capacity building and encouraged high quality teaching. The school now has three curriculum-based collaboratives (consisting of principal teachers, teachers and support workers) centred on STEAM, humanities/languages and wellbeing. This allows for better joint planning and a seamless approach that creates links across subject areas. There is also a young people's collaborative that allows students to have an input.

Many of the most major changes have occurred in wellbeing. These include a fresh approach in S1 that integrates subjects traditionally taught separately. One is creative technologies (a combination of CDT and art) where they learn design thinking. Other changes have included smaller classes and team teaching – all of which have advantages, but inevitably put pressure on budgets.

Mr Downham then discussed the way the health and wellbeing curriculum has developed. Time has been reallocated in blocks, so the traditional two weekly periods of PE, two of health and food technology and one of PSE for S2s have been replaced. Instead pupils come together at 10.30am each Tuesday and Thursday for wellbeing education which lasts to the end of the day.

The new system demands skilled and confident staff as they are having to teach outwith their own subjects and success requires flexibility and time for planning.

According to Mr Downham the feedback from students has been positive, with some reporting that they feel less stressed, found school more enjoyable and were more confident. They also felt the different pace of wellbeing education helped them with the rest of their week.

The session ended with a group discussion on the challenges and opportunities raised during the workshop.

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 Professor Hargreaves.

One is that it 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, Professor 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 become more specialised, and conservative, the closer young people are to the point of university selection.

Professor 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 Professor 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 around. 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 **Katy Smith**. They were joined by Professor Stuart Munro, Convener of the RSE’s Young People’s Committee.*

Asked why they had attended, Ms Doyle said she wanted to find out what IDL was and feed that back 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 deal to liven up lessons and engage the students. Ms Mitchell, who is taking Carl Gomblich’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 he 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, 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 that is focused on simply giving students the information to pass exams.

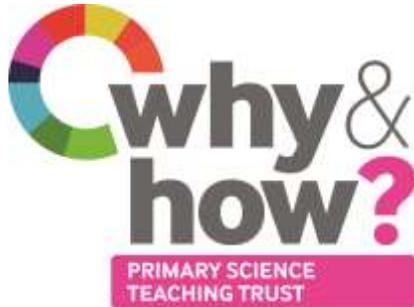
Mr Bird said the emphasis on equity and IDL's celebration of uniqueness had impressed him. Ms Mitchell added that IDL had not featured strongly in her own school career and she was delighted to see a conference hall full of people, from all sectors, who were ambitious to see it embedded in Scottish education.

The Conference ended with a Vote of Thanks to the organisers.

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