Interdisciplinary Learning: ambitious learning for an increasingly complex world

A thought paper from Education Scotland, NoTosh and a Co-Design team from across Scotland

Introduction

Overview

Despite being at the heart of Scotland's Curriculum of Excellence (CfE), interdisciplinary learning (IDL) has not yet become a habitual learning approach in all of Scotland's schools. It exists, and it is a way of thinking and learning that can have a significant impact on improving student engagement and performance, but its application and quality is inconsistent. There are still questions for many educators about what it is, what it isn't, how to plan it effectively with colleagues, and where in the learning process it should come.

The Refreshed Narrative on Scotland's Curriculum was launched in September 2019. It aims to

- celebrate the successes of CfE and build confidence for future development;

- maximise and develop opportunities to meet the aspirations of our learners;

- stimulate fresh thinking about Scotland's curriculum;

- engage in professional dialogue in curriculum design and inspire, share and nurture innovation.

Interdisciplinary Learning (IDL) is a vital component to achieve all four of these, and needs a concerted effort from everyone in the profession to understand what it is, and how to engage with the planning, pedagogy and mindset that will open up greater opportunities for learners. The rationale is further amplified by the increasing complexity and interdisciplinary nature of the way the world works: in life, in business and in public affairs. Discipline specialism has been the driving force for centuries of educational effort, but it is polymaths, generalists and 'T' thinkers with interdisciplinary thinking who are required across the board to make sense of ever more complex and global issues.

In January 2020 Education Scotland engaged NoTosh, a design thinking agency, to collaboratively plan a series of creative curriculum co-design events to be delivered in a creative and interactive way, and generate a set of recommendations from the profession, for the profession.

Representatives from local authorities and national partners embarked on three days of curriculum design thinking on two themes: Learner Pathways and Interdisciplinary Learning. This is our paper on Interdisciplinary Learning (IDL).

Our thoughts are focused on three key considerations:

- The whole person - knowledge, skills and wellbeing

- IDL *is* Learning

- Realising ambition, embracing opportunities and building confidence

COVID-19

Our final IDL engagement session was due to take place the week Scotland went into lockdown. As schools across Scotland closed as a result of the Covid-19 pandemic, we gave time to our co-design partners to lead their communities through challenging times ahead. And yet, the need for learning at home to be as rich and engaging as it could be kept bringing our participants' attention back to IDL: anecdotal and initial research evidence shows that most successful home learning experiences were interdisciplinary in nature, built on children and young people's interests, and gave them the autonomy to work out how to plan their own learning (Huang, R.H. et al. (2020).

We brought our participants together into two short online sessions to bring their input to a head, and the emergent pre-pandemic conclusions seemed to come into even sharper focus.

We are determined that education in Scotland doesn't just go 'back' to whatever was there before. We see the impressive array of material schools and local authorities have exhibited daily during this crisis to show how young people and their practitioners have grasped this challenge, and many young people have visibly thrived. However, we are mindful that this has not been the experience of every young person. Inequities may have reappeared.

At the same time, there have been early anecdotal stories of some young people achieving far more through experiences of learning at home, which have been largely based on more dialogic, collaborative, open-ended IDL practices (Li, 2020). The "old" way doesn't suit every learner, and the "new normal" we've experienced this spring doesn't work for everyone either. So schools may want to consider how programmes work for both extremes.

There is a chance to build on the innovation and positive outcomes some have managed to create in spite of this crisis, and ensure that every young person in Scotland has the opportunity to build the resilience, skill and mindset that empowers them to own more of their own learning.

We have watched how organisations and their staff have had to use their own skills and innovation to adapt to survive. This ability to cope and adapt to the fragility of 21st century life was a key concept throughout discussions with the IDL group. Now, perhaps more than ever, schools must be places where young people learn and develop a rich knowledge, but also the skills to thrive in a future which is increasingly unpredictable. That learning does not and should not solely sit within the confines and limitations of traditional silo-ed subjects.

Through real-life experience, we have learned the value that each person contributes to our society. We now know for certain that in times of crisis, the resilience, big picture thinking, communication and creativity of a shop assistant or care worker is as valuable to us as our law enforcers or medical professionals: this should be reflected in what we value in Scottish schools today. The learning experience of each child at school today, and their capacity to learn swiftly from deep experiences, will decide how well we cope with future challenges.

'Skills are central to achieving sustainable, innovation-driven economic growth and social inclusion', OECD (2020)

What is IDL?

Defining and agreeing what IDL is has been a source of discussion for some time and has an impact on its implementation in practice. Global influencers such as the OECD, for example, refer to IDL as one form of cross curricular learning. The discussion on definition formed a large part of the work of the co-design group. What follows is the group's definition of IDL.

Interdisciplinary Learning is a planned experience that brings disciplines together in one coherent programme or project. The different disciplines plan and execute as one. These disciplines might fall within one curricular area (e.g. languages, the sciences) or between several curricular areas. **IDL** enables children and young people to

- learn new knowledge or skills, and develop new understanding of concepts;
- draw on prior knowledge, understanding and skills;
- transfer and apply that collective knowledge to new problems or other areas of learning.

This is different from learning, for example, which takes place when several disciplines or subjects are linked up through a common theme or topic, but the student's experience and educator planning is discreet, or separate in each discipline or subject. This can be referred to as **multi-disciplinary learning**.

�: Required ✓ : May include	Interdisciplinary Learning (e.g. several disciplines collaborate on one project)	Multi-disciplinary learning (e.g. several disciplines contribute to a project)
Practitioners from different curricular areas plan together.	✓	✓
Learning is generally framed as projects, and may use Project-Based Learning planning tools and approaches.	✓	✓
Planning connects disciplines and project outcomes across the four contexts.	✓	✓
Discipline knowledge, understanding and skills are necessary and directed towards the project's outcomes.	✓	
Prior knowledge and skills are transferred and applied to new problems, challenges or contexts.	✓	✓
New knowledge and skills are encountered.	✓	✓
Learners take planned time to reflect on connections between disciplines.	✓	
Learners reach each outcome using several disciplines.	✓	
Assessment of the learning is shared between disciplines.	✓	

Key challenges and suggestions

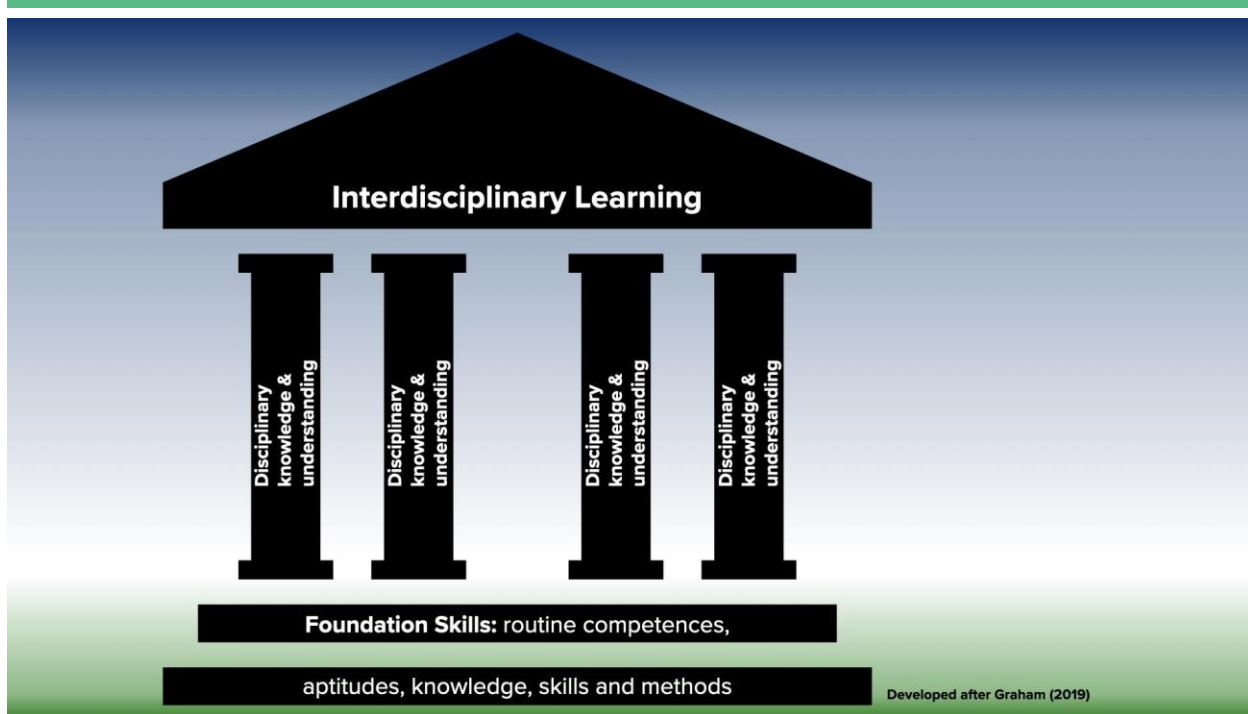## The whole person - knowledge, skills and wellbeing

Lifelong breadth in learning

Individual disciplines provide great opportunities for young people to gain depth and specialism, but this can be at the expense of tackling the ambiguity of challenge that they will face in whatever walk of life they enter. Many disciplines have been fragmented by carving the curriculum up into subjects, making broad interdisciplinary learning hard to achieve.

82% of graduate employers would consider graduates across all degree subjects (The Royal Society of Edinburgh, 2019). Disciplines are important, but so, too, is the capacity to apply thinking in different disciplines. Increasing numbers of further and higher education institutions are creating interdisciplinary courses that hope to develop more 'T-shaped' people (Heikkinen, 2018; Saviano et al 2016). The vertical bar of the letter *T* represents the depth in a single subject or discipline, with the horizontal bar expressing the ability to collaborate across disciplines. In Scotland, the metaphor of pillars and lintels has been used to express the same idea:

> *Interdisciplinary working requires that all subjects should continue to be founded on deep and coherent pillars of knowledge and understanding. Interdisciplinary understanding will lack rigour and utility if it is not part of a structure in which the disciplines are the pillars with interdisciplinary working as the lintels. Without the pillars, the lintels will fall. These pillars and lintels are supported by foundations – routine competences, aptitudes, knowledge, skills and methods in and across subjects, including basic literacy and numeracy.*

> Graham, C. (2019)

Interdisciplinary Learning

Disciplinary knowledge & understanding

Disciplinary knowledge & understanding

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Disciplinary knowledge & understanding

Foundation Skills: routine competences, aptitudes, knowledge, skills and methods

Developed after Graham (2019)

Creating interdisciplinary experiences that bring together the breadth of disciplines depends on schools creating ample co-planning time for practitioners from across those disciplines, providing the time and expertise for upskilling of those in the profession, and initial teacher education placing greater emphasis on the craft of planning and supporting IDL in the classroom.

Beyond the Broad General Education, from early years to S3, qualifications need to reflect the complexity of interdisciplinary learning: we need more qualifications designed for the experiences young people need, not what is easy to administer and manage. There are a smattering of courses and qualifications which actively pursue an IDL experience. For example, the Scottish Baccalaureate in Expressive Arts, Languages, Science and Social Sciences requires three different courses, two of which have to be at Advanced Higher and one at Higher. It also requires the Interdisciplinary Project unit, which can also be taken as a standalone qualification. And already in colleges and universities, assessment formats have been rethought away from traditional essays to richer, more formative assessments that show student growth. It is not the assessment of discrete subjects alone that will drive the closing of our attainment gap, nor create the heightened skill, empathy and practice at dealing with complex new challenges: rich interdisciplinary learning experiences can help achieve all of this.

There is still a perception in some quarters that an IDL experience may not have the same currency as learners learning in more traditional ways: there is no evidence of this, but the perception may act as a block to practice moving forward faster.

Learning with purpose, with partners

In IDL, there is often an emphasis on learner thinking creating a positive impact on their immediate world, or in the wider community. It has, in their eyes, a real-life purpose.

That real-life purpose needs to be realistic, too - IDL is not about learners solving global poverty. But they will have opportunities to show off their learning, sometimes in public, and as a result their learning has to be tangible and 'worth' showing.

To create learning that's worth showing, we might also question what is worth teaching: Scotland is fortunate to have flexibility in its curriculum, and has had national debate on what a Scottish education is designed to achieve. So merely continuing, unquestioning, to fill up a curriculum with what we used to do decades ago is missing an opportunity to rethink what matters most. Our curriculum should be dynamic and flexible enough to create new experiences that bring disciplines together in creative ways, but we also need practitioners and schools to design, with intention, what knowledge and skills populate the curriculum, at which point.

That kind of relevance will often require partners to lend a helping hand, sharing their ideas and challenges for learners to attempt a solution, for example. Partners might be not-for-profit organisations charities, businesses, or colleges and universities. Practitioners cannot be expected to be experts in all the potential areas an IDL experience might touch, but helping learners make connections, do research, and work with a network of partners can open the doors on a richer context in which to learn.

This kind of experiential learning is not easy for practitioners to organise as learners head into later years of secondary school today - we need to develop a pipeline of learners with the skills, mindset and expectations, while also freeing up practitioners from structures that get in the way of their co-planning. Another assist for practitioners comes from the development of a partnership network. IDL doesn't just need practitioners to collaborate beyond their classroom or their corridor: Developing the Young Workforce (DYW) has already had a significant impact on engagement and positive destinations for young people, but the same partners can continue to enrich what goes on in the classroom, too.

Planning learning with partners takes time, and time with the right people around the table at the same time. It's not just timetabling of learners that needs rethought, but timetabled time for practitioners and partners to co-design experiences needs set aside. However, the impact of these deep, creative and engaging experiences on both learners and practitioners outweigh the real and perceived challenges of planning them. At Abertay University, for example, two afternoons a week are set aside for first and second year undergraduates to undertake compulsory IDL electives. At West Lothian's Inclusion and Wellbeing Service, dedicated collaborative planning time is diaried and integrated to working time arrangements of staff. And the Service also makes use of flexible timetabling of its staff, outdoor and out-of-school locations

for learning, all of which build on partnerships formed and reinforced each year in their Partnership Planning Event.

Taking this even further, schools might consider how IDL practice intersects with Learner Pathway choices: work-placed learning, when well structured and co-designed with learners and partners, will often end up a rich IDL experience. This brings value to young people and to the economy, increasing the skills base and economy of the country, if we look towards those in Germany and Switzerland already placing value on workplace learning in this way.

Suggestions

- Qualifications bodies might consider more sophisticated assessment strategies, especially those that help young people show and celebrate their growth. Assessments today are too focussed on summative tests and encourage a fixed mindset about success.
- Qualifications for subjects don't always sit comfortably with approaches that seek mastery of a subject or discipline. While the Scottish Baccalaureate is designed to offer the chance for learners to undertake an interdisciplinary project, qualifications might more broadly include this kind of challenge.
- Where colleges, universities and schools partner on creating new accreditations with the SCQF, the cost of using them is sometimes proving prohibitive. Colleges and universities need to consider the long-term advantage of partnership with co-designers in schools, and ensure accreditation of learning is affordable.
- Initial Teacher Education should include several opportunities for practitioners to participate in quality co-design and planning of IDL, and experience the execution of an IDL experience.
- The worlds of business, public policy and education need to come together to understand what IDL is, what IDL experiences involve, and place a value on those skills - the experience needs to have value, that value needs to be demonstrable, and it needs to be valued by qualifications providers, society and employers. The capital built up by DYW should be a key enabler here.
- Approaches to evaluation of the curriculum need to adapt to reflect the value of IDL. For example, this could be reflected in How Good Is Our School.
- Timetables in school are designed around one practitioner at a time working with 20-30 learners. There is little planned time for practitioners to co-plan and design IDL experiences between disciplines. Timetabling needs rethought, and the right kind of planning time created. Curriculum-based collaboratives with Principal Teachers, practitioners and support workers might centre on a specific grouping of disciplines over time.

- S6 provides an opportunity for some of the richest, deepest and most broad IDL experiences. Schools might set aside time and set expectations for learners to design their own collaborative capstone projects, which have meaning to them beyond getting into college or university.

IDL *is* Learning

More than just "engagement": deep thinking and deep learning

A common misconception is that IDL is just project work to be done after the 'serious' work of learning knowledge and skills has been done. It is perceived as a consolidator of learning, not a vehicle for learning new knowledge and skills in its own right. It might even be seen as one tool to engage learners, while the real work gets done elsewhere.

Quality interdisciplinary learning is none of that. Interdisciplinary learning *is* learning - it is a way of learning and thinking, and is challenging for learners. The challenge is personalised, owned by the learner, and so intrinsic engagement is higher than in a more traditional one-size-fits-all experience. Attendance at schools has improved as a result of engaging in this more personalised, more challenging approach to learning. Engagement and attainment have improved, too.

IDL relies on learners developing certain skills over the long haul, if they are to be able to seek out different ways to tackle a project or topic, for themselves, and not one set path defined by the practitioner.

Often, IDL experiences are typified by active learning, learning you can see. There will be elements of any experience that are hands on and practical. There are other experiences which are clearly "brains on": picture whiteboards of student thinking, incomplete works in progress, and learners reflecting through conversation and reflection on where they're going wrong, as well as where they're going next. Classrooms, and schools where IDL is a common planned experience, demonstrate an overriding institutional culture of thinking.

This culture of thinking needs designed and worked on: learners are taught habits of thinking, and given regular opportunities to use their habits; they're encouraged to seek answers beyond the obvious or perceived 'right' answer. Young people don't just learn about history; they learn to think like historians. They don't just do science; they learn to think like scientists.

Collaborative learning, teacher coaches

Collaboration is a key feature of IDL, for practitioners and learners alike. Practitioners need to collaborate on planning - IDL demands co-design and planning around common goals together, or one simply ends up with a ramshackle collection of subjects opaquely working around a theme, with no sense of 'completion' for learners. Learners need to collaborate in order to learn from each other's prior knowledge, peer mentor each other on skills that bring projects to life.

And when they don't know how to overcome their hurdles, it takes a coach rather than a teacher to help them jump: prompting, encouraging, mentoring from the adults in the room, which might mean more creative timetabling and grouping of learners. That could mean larger groups, in

larger more flexible spaces, with more adults on hand. Potentially it requires a mix of adults' skills, too: practitioners, assistants, partners from beyond school and volunteers.

So there's less whole-class teacher talk than a traditional classroom, because every actor in the classroom knows how and when to work together, independently, in outdoor settings or remotely. Building the skill set of young people and their teachers to manage learning beyond the physical classroom is an investment of effort that should last beyond any crisis: it can open up the potential for deeper, broader projects for young people over longer periods of time.

Shared goals, not dictated goals

Whether working alone or together, young people need to have a constant picture in their minds of where they're headed, of the learning objective. Where, in a traditional classroom, the practitioner holds the keys to the next step, in an IDL experience every learner can express what they're learning today, and why. That means that planning is less linear than regular unit plans, and more likely resembles scenario planning: "if the learners do this, then we'll probably head in this direction…" In their planning, practitioners need to empathise with learners' motivations within the content, skill development or provocations they're planning, and figure out where the plan may have to pivot.

Therefore, curriculum coverage within an IDL experience may be hard to predict with certainty. In an effort to gain more certainty, we've seen some IDL experiences limited to those Experiences and Outcomes that "go well together", while other areas of curriculum are deemed inappropriate for inclusion in an IDL experience. What might feel 'covered' for the teacher, though, doesn't always translate into 'learned' by the student. As the Scottish system also seeks to empower learners with co-designing their own learning pathway, there is a need to view 'coverage' from the perspective of the student, not the syllabus. The fixed learning objective for a group of 30 learners, which we've been used to for decades, is not compatible with the flexibility of ever more personalised learner pathways. And when learners have both the skillset and opportunity to exercise that personal choice, they thrive. While some of the action required on increasing learner pathway flexibility is systemic, much of it depends on what goes on in the classroom and in the preparation of skills over time.

Suggestions

- There is still scepticism about the quality of learning achieved in secondary through IDL experiences. Colleges and universities might consider partnering with practitioners to measure the impact and requirements of quality IDL experiences.
- The commitment to IDL is unequal across schools and Local Authorities. The time, training, tools and resources need to be put in place locally, regionally and nationally so that practitioners and leaders can gain enthusiasm and understanding for what is

possible. Professional Review and Development programmes need to include detailed analysis of practitioners' needs to improve their practice.

- IDL is not just about structures and set up, nor just about planning: it needs practitioners who are skilled in collaboration and delivery, with approaches that help learners undertake deep learning. We need a strong national programme of upskilling, and stronger emphasis on initial teacher and practitioner education and the first years of practice, including team teaching and cooperative learning.
- The physical environment of school might need rethought, with an increased importance placed on easy access for learners to the provocations and research from the internet. Outdoor learning environments also provide scope for different thinking, different approaches to learning.
- Schools can start increasing non-IDL opportunities for more team-based and collaborative approaches, to raise confidence and skill sets. Leaders need to ensure that there is flexibility through built-in personalisation and choice that allows for creativity.
- Schools have an ongoing job in making parents and partners aware of the benefits of IDL and skills development, and actively seeking engagement from parents and partners during planning.

Realising ambition, embracing opportunities and building confidence

Challenge realises ambitious learning, opens opportunities

Learning is joyful when learners are engaged in an IDL experience. That doesn't mean it's a laugh-a-minute. Joyful learning is hard fun, meaning that practitioners' skill in pitching challenge is key, and questioning skills of practitioners and learners alike are tuned into stretching a little further than the last time. This means that learners and practitioners have to share and negotiate learning goals. Learners can do this when they know how, so from early years through primary and into secondary school, it's vital for schools to build up their own curriculum of thinking as much as their curriculum of content.

Learners at any age need to know how to co-design milestones and measures of success throughout an IDL experience, particularly those projects which grow in depth, breadth and length. Practitioners will find it easier to spot the potential for varied milestones for different learners by planning together ahead of time, and reviewing progress in an IDL experience throughout. Feedback between learners, and between learners and teachers will frame the pace and scope of what comes next. This is the kind of planning that really puts the child at the centre of curriculum development and seizes on the opportunities that learners' interests and discoveries present during learning.

Build confidence through a shared language

How one teaches and plans IDL is a technical question to which there are many answers, depending on the context and experience of the learners and practitioners. There are tried and tested models of planning learning: design cycles, planners, 'double diamonds'. But there are some common values that can guide all this work. In the Glasgow School of Art, for example, IDL experiences are a mainstay of learning, guided by certain core teaching principles: Ambiguity, Shared Space, Dialogue and Making Ideas Tangible. No matter the disciplines involved, all learners and educators apply these principles to their planning and execution of projects.

Suggestions:

- Leaders might reduce bureaucracy that isn't core to the development of skills and the design of experiences that bridge disciplinary silos.
- Leaders might invest professional learning time in creating those shared understandings of how to plan and execute IDL experiences, and in external support if it is required to get things started.
- Education Scotland might co-create tools, resources, principles and pilot and share examples of how schools are realising ambition through the development of bold IDL experiences.

- Individual classroom teachers and practitioners could experiment with and share their learning space, timetable and IDL planning tools with colleagues in similar contexts.
- Local Authorities could identify and amplify creative approaches to timetabling, planning of space and of learning that contribute to bold IDL experiences.

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