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CoCREATE: Collaborative Curriculum Reimagining and Enhancement Aiming to Transform Education

Barry J. Ryan
Technological University Dublin, barry.ryan@tudublin.ie

Adrienne Fleming
Technological University Dublin, adrienne.fleming@tudublin.ie

Catherine M. Deegan
Technological University Dublin, catherine.deegan@tudublin.ie

See next page for additional authors

Authors

Barry J. Ryan, Adrienne Fleming, Catherine M. Deegan, Claire McAvinia, Colm O'Kane, David Williams, Edmund Nevin, Eric Bates, Fionnuala Darby, Jen Harvey, Lesley Murphy, Maebh Coleman, Miriam O'Donoghue, and Nicola Duffy

Co-CREATE

Collaborative Curriculum Reimagining and Enhancement Aiming to Transform Education

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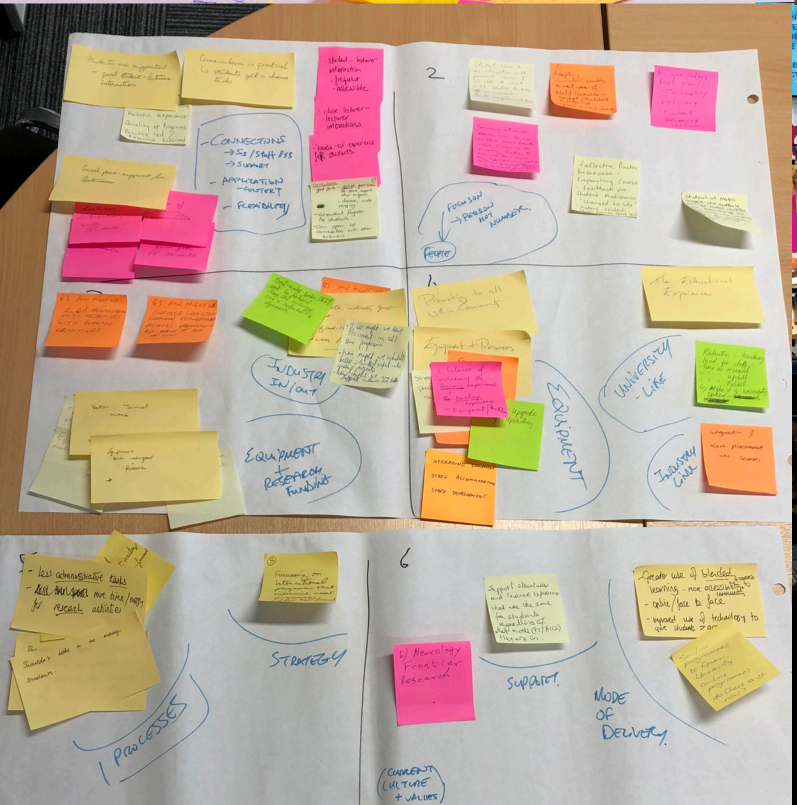
UNIVERSITY DUBLIN




REDUCING DUPLICATION OF EFFORT
Should be doing Shadowing - Getting feedback on Lecturing
Alternative Teaching methods
JOINING UP SYSTEMS TO MAKE THEM WORK (SO MUCH LOST TIME + ENERGY!)
Blended Learning



THE CoCREATE PROJECT
AN EXECUTIVE SUMMARY

The establishment of TU Dublin in January 2019 provided a unique opportunity to create a bespoke curriculum framework for students, staff and stakeholders of TU Dublin, produced by the students, staff and stakeholders of TU Dublin. A curriculum framework is a set of guiding values that inform the design of teaching and learning activities within TU Dublin.

A Teaching Fellowship Team, comprising eighteen teaching academics from across the three TU Dublin campuses and supported extensively by the Learning Teaching and Technology Centre (LTTC), was formed to collaboratively craft, in partnership with all stakeholders, a curriculum framework for TU Dublin. Working collaboratively under the project name CoCREATE (Collaborative Curriculum Reimagining and Enhancement Aiming to Transform Education) the Teaching Fellowship Team developed TU Dublin's CoCREATED Curriculum Framework over eighteen months.

The design and development of the CoCREATED Curriculum Framework was informed by consultation with all key stakeholders across all campuses, examination and synthesis of local, national and international best practice and policy, as well as relevant scholarly literature. The framework is underpinned by the core values and mission of TU Dublin, as well as local and national strategic plans. It provides a distinctive but tangible learning philosophy for all at TU Dublin. The framework is both considered, flexible and progressive so as to adapt to the diversity within TU Dublin, including accredited programmes, and is inclusive of all learners across the university.

The four curriculum values of the TU Dublin CoCREATED Curriculum Framework are:

1. Step forward and try new things
2. Use all of our talents; everyone has something to learn and something to teach
3. Make our learning experience active, useful and related to the world
4. Create the space and time to do work that matters

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// THE COCREATE PROJECT: AN EXECUTIVE SUMMARY

This new, dynamic and evolving TU Dublin CoCREATED Curriculum Framework characterises an innovative, responsive and caring learning environment for the diversity of our university's student population across all programme levels. Simultaneously, it developed a synergy between staff, students, professional bodies, industry and community partners through a collaborative design process. It is as inspiring, distinctive and pioneering as Ireland's first Technological University.

The CoCREATED Curriculum Framework will support staff and students to develop a unique approach to teaching and learning, which will characterise a TU Dublin teaching and learning experience, and ultimately a TU Dublin graduate, in a competitive national and international higher education space. Going forward, the TU Dublin CoCREATED Curriculum Framework will empower the judicious creation of rich and diverse curricula across all disciplines and levels within TU Dublin, from apprenticeship, through undergraduate, to structured PhD.

How will this happen in TU Dublin?

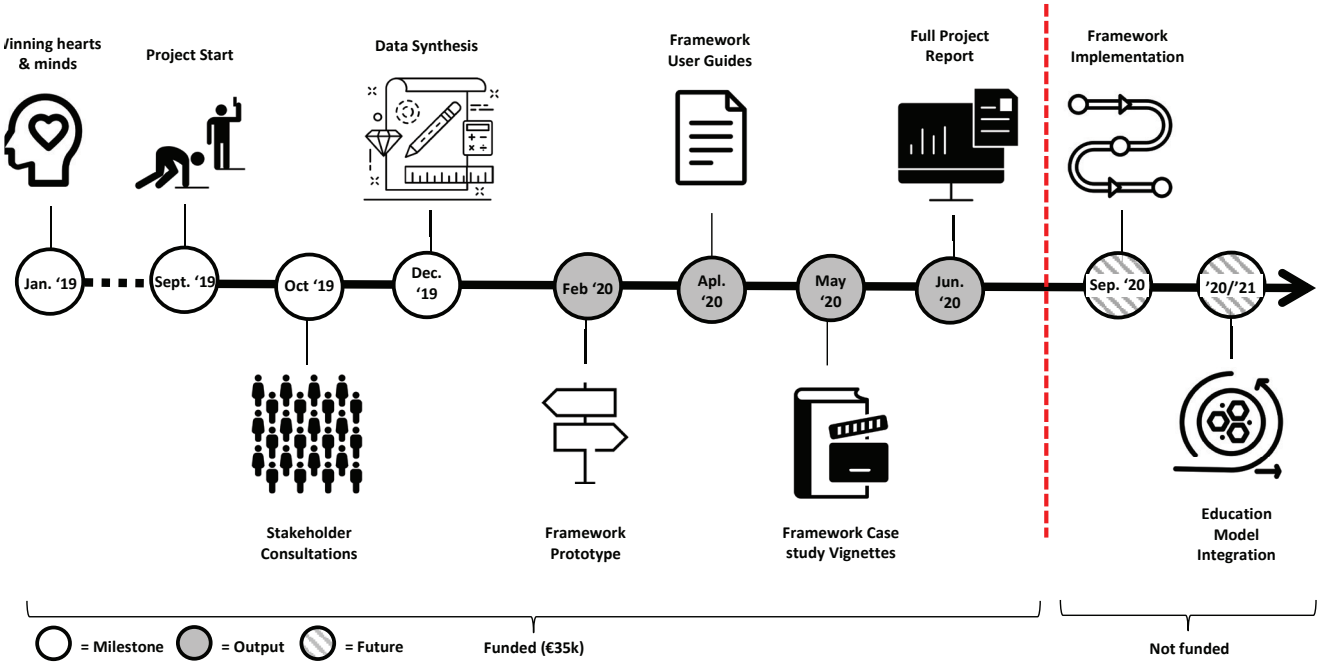


***Figure 1**: The CoCREATE project timeline detailing the key dates, milestones and outputs. The future implementation is detailed to the right of the red hashed line.*

THE CoCREATE PROJECT:
A VISUAL SUMMARY

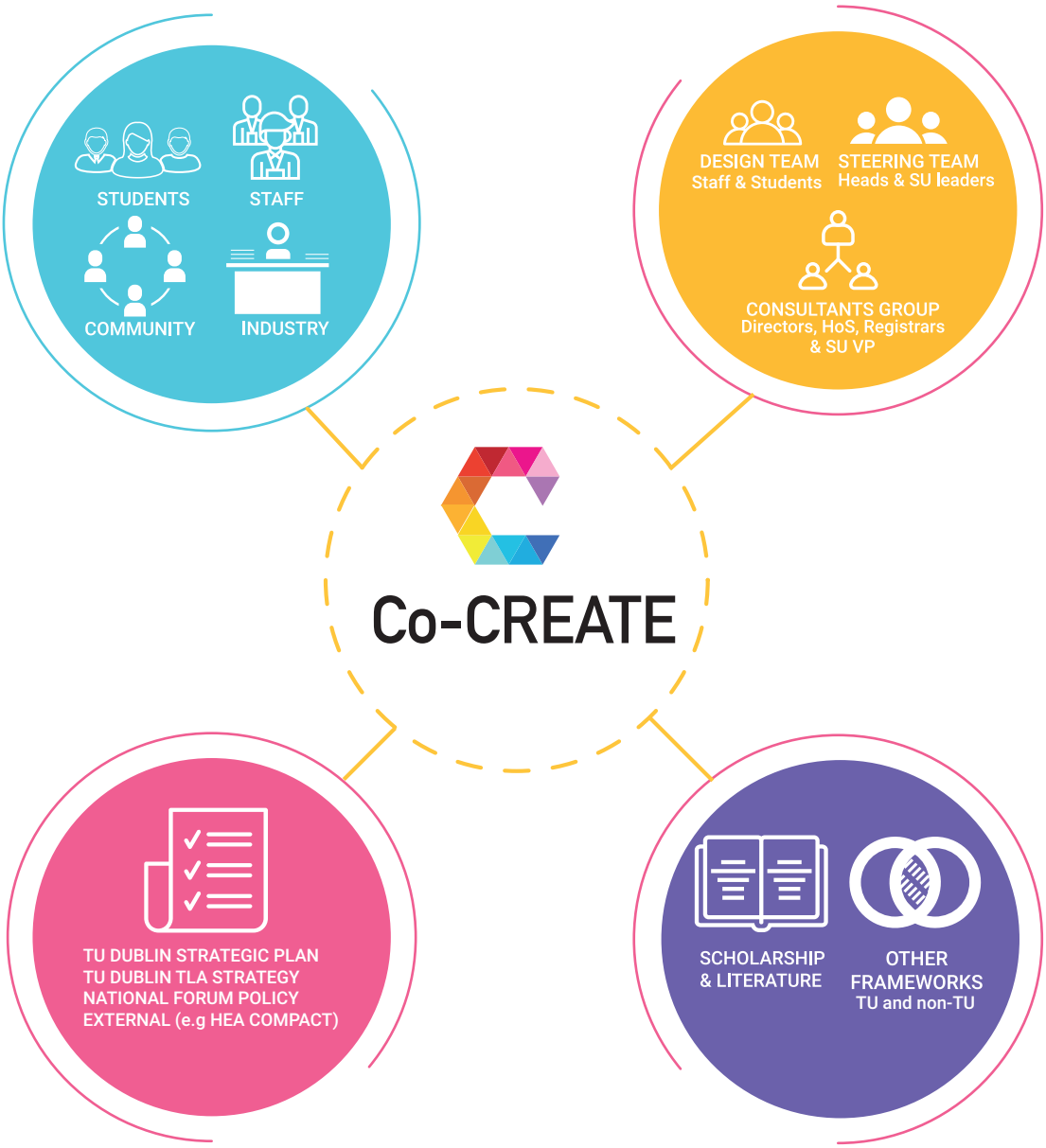
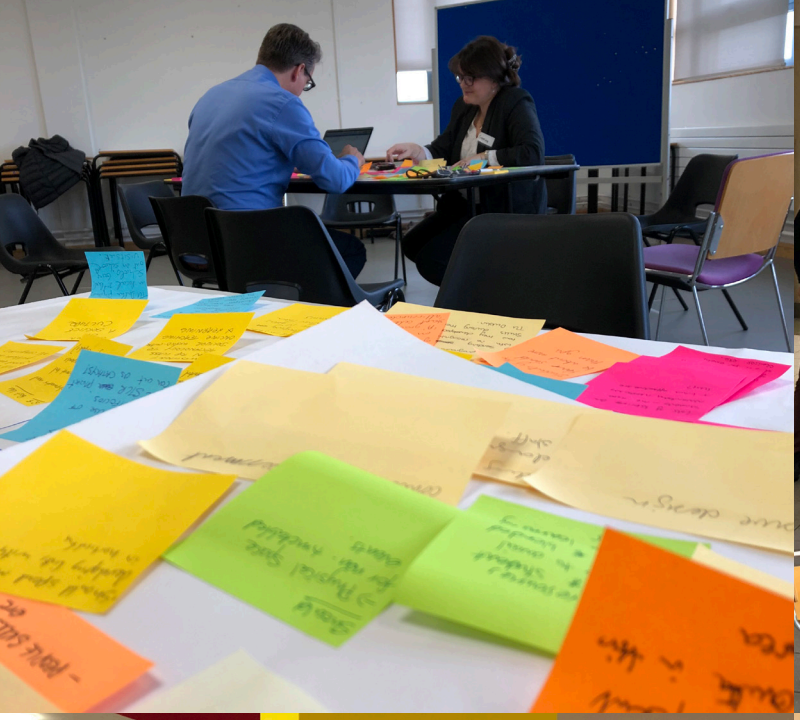


Figure 2: *The informing and underpinning components of the CoCREATE project. Data was gathered from multiple sources, including all TU Dublin stakeholders, the scholarly literature, strategic plans and policy documents, to support a whole-of-university approach to the design and development of the TU Dublin CoCREATED Curriculum Framework.*

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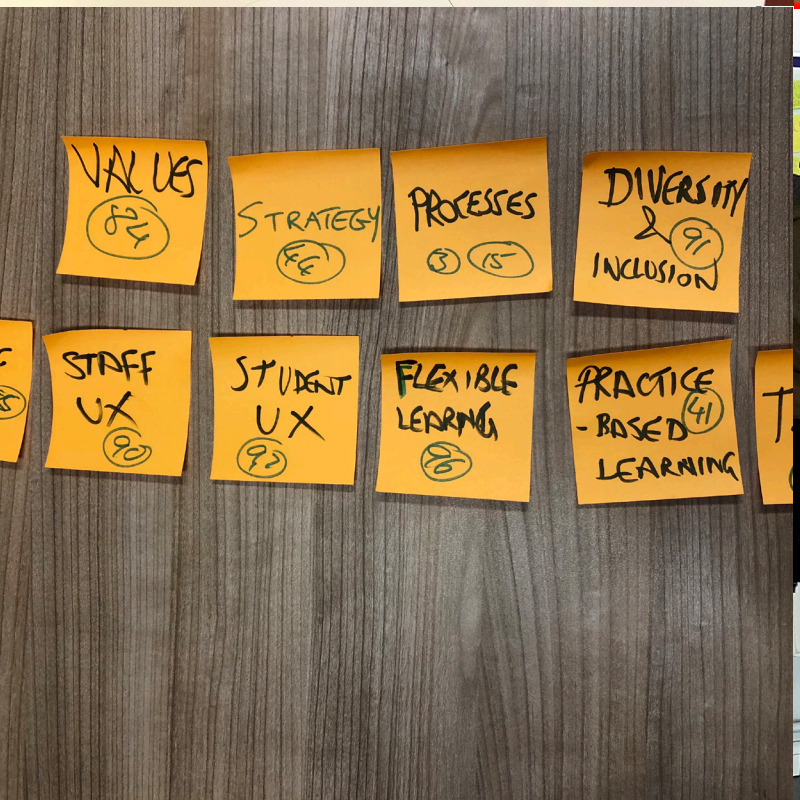
HEA
Supported by TU Dublin and HEA-TransformEDU
Transform - EDU
Co-CREATE
What makes us unique?
What could we do differently?
What will the Technological University Dublin Teaching & Learning experience be like?
We need your input!
It's time for us to design the guiding principles for our curriculum: these will be simple values that steer the way we learn and teach for years to come. They will be shaped through consultation sessions on all three campus
Where: The Courtyard


VALUES
STRATEGY
PROCESSES
DIVERSITY & INCLUSION
STAFF UX
STUDENT UX
FLEXIBLE LEARNING
PRACTICE - BASED LEARNING


we need you !
Co-CREATE
What's surprising?

THE CoCREATE
TEACHING FELLOWS

// Dr Adrienne Fleming

Adrienne is a Lecturer in Science in the School of Science and Computing at the Technological University Dublin. Dr Fleming is a Business Development Partner in the Office of Business and Industry and the coordinator of the National Pharmaceutical Education Centre, TU Dublin Tallaght Campus. Adrienne is the course lead for a number of the part-time undergraduate programmes. Adrienne works closely with many of the leading pharmaceutical and bio-pharmaceutical companies on the development, design and delivery of education programmes. Adrienne is the lead of the membership committee of the International Society of Pharmaceutical Engineers – Irish Affiliate.

// Dr Barry Ryan

Barry is a Biochemistry Lecturer and programme director in TU Dublin City Campus. He is an award-winning and research-active applied scientist with a proven expertise in the practitioner use of, and leadership in, evidenced-based pedagogies in modern higher education settings. He is passionate about the practical implementation of research-informed teaching and in supporting others in their personal development in this area. His teaching and learning philosophy promotes (co-)creation to empower and centralise all students across all levels within undergraduate curricula. He is concurrently a Senior Fellow of the Higher Education Academy, a Chartered Science Teacher and an inaugural National Forum Teaching and Learning Research Fellow.

// Dr Catherine Deegan

Catherine is an Assistant Head in the School of Electrical and Electronic Engineering at TU Dublin City Campus. She has worked in higher education for over 25 years. She has a PhD in Applied Physics from DCU and a Postgraduate Diploma in Clinical Engineering from Trinity College Dublin, and is active in applied research, teaching and learning. Catherine has recently completed an MA in Higher Education at TU Dublin on the impact of assistive technology in Irish higher education, and was shortlisted for AHEAD's John Kelly award for Universal Design for Learning in 2020.

// Dr Claire McAvinia

Claire is a Learning Development Officer at the Learning, Teaching and Technology Centre (LTTC), TU Dublin City Campus. Claire is currently LTTC Programmes Chair, and teaches on the Postgraduate Certificate in University Learning and Teaching and MSc Education. She is a Fellow of the UK Staff and Educational Development Association (SEDA) and the UK Higher Education Academy. Together with Dr Roisin Donnelly and Dr Kevin O'Rourke, Claire is a co-editor of the Irish Journal of Academic Practice (IJAP). Her main interests are in academic professional development, open education, curriculum design, and digital education.

// Dr Claire McDonnell

Claire is Assistant Head at the School of Chemical and Pharmaceutical Sciences in TU Dublin City Campus, where she teaches organic and medicinal chemistry. Her interests include facilitating learner transition to higher education and the application of technology to support student learning and collaboration. She has implemented several approaches to embed professional skills in the curriculum, including context and problem-based learning and community engaged learning. She spent a three-year secondment with the TU Dublin Learning, Teaching and Technology Centre (2013–16) where she was programme coordinator for their MA in Higher Education. She was the recipient of the Royal Society of Chemistry Higher Education Teaching Award in 2009 and is a founding member of the Chemistry Education Research Team at TU Dublin which won a DELTA award in 2018 from the Irish National Forum for the Enhancement of Teaching and Learning.

// Dr Colm O'Kane

Colm is Senior Lecturer at TU Dublin City Campus School of Mechanical and Design Engineering, and Chair of the University's interdisciplinary Product Design programme. He completed his PhD at University College Dublin in 2012 in the area of bioengineering. In the course of this work, he was an ICUF Scholar at the University of British Columbia, Vancouver, Canada. Colm was appointed Teaching Fellow in 2013, for work on the holistic development of curricula in higher education. He has supervised TU Dublin students to success in national and international competitions on over 30 occasions, and received the Enterprise Ireland "Academic Excellence" award in 2019. Colm also serves as Director of the Bolton Trust, a charitable organisation which promotes and facilitates innovation, enterprise and new product development within the Dublin region. His primary areas of research interest and professional practice are innovation in products and systems, human-centred design and bioengineering.

//Dr David Williams

David is a Lecturer in the School of Languages, Law and Social Science at TU Dublin City Campus, where his teaching focusses on the principles of professional practice, working with challenging behaviour and social care practice. His research interests include residential child care, foster care, self-injury and self-harm, the professionalisation of social care work, and the management of challenging behaviour in social care settings. He is a member of the Irish Association of Social Care Workers, Social Care Ireland and the Irish Foster Care Association. His is a previous winner of the Dublin Institute of Technology President's Award for Teaching Excellence (2009) and the College of Arts and Tourism Teaching Excellence Award, Dublin Institute of Technology (2011).

//Mr Edmund Nevin

Edmund is a Lecturer based in the School of Civil and Structural Engineering, TU Dublin City Campus. He holds undergraduate degrees in maths and civil engineering and a postgraduate qualification in engineering computation. Prior to joining academia he worked in both the private and public sector in the UK and Ireland. Edmund is a previous recipient of a Teaching Fellowship from the College of Engineering and Built Environment. Having recently completed a Postgraduate Diploma in Third Level Learning Teaching, he is currently undertaking an MSc in Education as part of his continuing professional development. Edmund's research interests include the first year experience and role of spatial ability in STEM education.

//Mr Eric Bates

Eric is a Lecturer in TU Dublin City Campus, College of Engineering and Built Environment. He lectures on the Irish Standards Based Apprenticeship in the craft of painting and decorating and across trade related undergraduate programmes. He is also an Assistant Examiner in Ireland Skills. He is also a member of the College of Engineering and Built Environment Apprentice Education Committee. Eric was a Teaching Fellow in both 2012 and 2015 where his work focused on the development of graduate attributes in students. He is currently completing a Doctor of Education degree at Queen's University Belfast.

// Dr Fionnuala Darby

Fionnuala is a Senior Lecturer in the School of Business at TU Dublin, Blanchardstown Campus. Projects that Fionnuala is currently engaged with include the Campus Champion for Unconscious Bias, Research Champion for the School of Business at TU Dublin Blanchardstown Campus and the University's Athena Swan application process. Her areas of teaching include diversity in the workplace, HRM and organisational behaviour. Fionnuala has recently completed her EdD at Maynooth University (2016–2020). Her doctorate research focuses on inclusion and belonging in higher education for BME students.

// Dr Jen Harvey

Jen is Head of the Learning, Teaching and Technology Centre (LTTC), TU Dublin City Campus. Jen originally graduated from Aberdeen University, Scotland, with a BSc in Zoology and later completed an MPhil in Immunology while working at Edinburgh University. She then moved to Napier University where she obtained a DipEdTech from Abertay University and, in 1994, a PhD in science education in collaboration with Glasgow University. Jen became Head of Lifelong Learning in the former DIT in 2003, previously she was the Head of Distance Education. Before moving to Dublin she worked as an Implementation Consultant at Heriot Watt University, Edinburgh. Current research interests relate to the use of technology to support learning, student assessment strategies, practitioner-based evaluations and communities of practice.

// Dr Lesley Murphy

Lesley is an experienced lecturer with thirteen years of experience in the higher education. She is an education professional, with a PhD focused in strategic account management. She has a passion for problem-based learning and currently lectures on sales and marketing-related modules with a practical application from undergraduate to MBA level. Her research interests are in the area of sales and understanding how online communities of practice interact and transfer knowledge.

// Dr Maébh Coleman

Maébh has over two decades of international business experience in government, industry and academia, working with innovation-led organisations to implement technological change. She is a Teaching Fellow of TU Dublin, an eLearning specialist and an expert in the areas of virtual communication, technology management and commercialisation processes. Her research interests include operations management, robotics and AI, technology procurement, online service design and technology disruption.

// Ms Miriam O'Donoghue

As Head of Lifelong Learning at TU Dublin Tallaght Campus, Miriam works on maintaining and expanding the part-time and mature-student programmes which are delivered in both face-to-face and online modes, as well as having responsibility for the Tallaght Campus Centre for Teaching and Learning. She previously worked as Head of Academic Programmes with Dublin Business School, and as Head of Programmes, QA and Accreditation at iheed, an online medical education company where she managed the development of programmes in Ireland and internationally. Miriam also worked as QA Manager at (MVIrl) at RCSI on a medical consultant revalidation project for 800 consultant doctors in Qatar. She has lectured in Pharmaceutical Science and has Pharmaceutical industry experience as QC/QA Manager and as a Qualified Person. Miriam has a BSc(Hons) in Industrial Biochemistry, Higher Diploma in Pharmaceutical Manufacturing Technology, a Masters in Pharmaceutical Manufacturing Technology from Trinity College Dublin and is currently working on a Doctorate in Education with Trinity College Dublin.

// Ms Nicola Duffy

Nicola is a full-time lecturer in the TU Dublin Blanchardstown Campus School of Informatics, lecturing on the MA in UX and Interaction Design programme and on the BA (Hons) Creative Digital Media Degree programme, covering modules in UX (user experience), interaction design, web design and development, design thinking, and visual design. She is the co-ordinator of MA in UX and Interaction Design programme; coordinator of MAKE, a yearly design seminar hosted in Dublin; Academic Board member of TU Dublin and a member of Institute of Designers Ireland. Nicola is passionate about education, design, digital media, painting, sculpting. Research areas of interest include UX, inclusive design, design psychology, interaction design.

// Ms Odette Gabaudan

Odette is a Lecturer in French and Lead Tutor for the French section of TU Dublin City Campus. She holds an MSc in Applied eLearning and she is a Certified Examiner for DELF exams (Centre International d'Etudes Pédagogiques). Her research interest is in eLearning and digital literacies, particularly in the context of language teaching and learning. With the support of funding from the Institut Français and local seed-funding, she has co-produced an open education resource (OER) for French grammar (launched in 2016). In parallel, she was the DIT local implementation leader (2015–2017) for a National Forum funded OER aimed at enhancing digital literacies for language learning and teaching in Ireland and beyond (Digilanguages). As Chair of the Applied French Association for several years, she has played an active role in the continuous professional development of teachers of French in the Irish education sector.

// Dr Olivia Freeman

Olivia is a lecturer in the School of Marketing, TU Dublin City Campus. Her teaching areas include communications and consumption studies. Having completed a PhD in the sociology of children's consumer cultures utilising discourse analysis, Olivia's research interests are now focussed on the use of discourse analytical approaches across a broad range of contexts from the wider sphere of business and society. Olivia has particular interests in the areas of media literacy and sustainability. Olivia is programme chair on the Certificate in Volunteering run in partnership with the Simon Community.

// Ms Rachel Freeman

Rachel is a Lecturer in Horticulture at TU Dublin Blanchardstown Campus. She holds a BSc Horticulture (Hons) from University College Writtle, and an MSc in Social and Therapeutic Horticulture from University of Coventry. She is currently a first year PhD student in the area of green infrastructure and health with TU Dublin and University of Limerick. Her early career was spent in industry, later joining the Irish Probation and Welfare Service teaching horticulture to marginalised and youth groups. Nature and the environment are her passion, and she loves to share her skills and those of her students, with local interest groups in Dublin 15 and further afield through collaborative community horticulture projects. Rachel comes from a rural farming and entrepreneurial west of Ireland family and she loves to head west to enjoy the rugged beauty of the Mayo countryside.

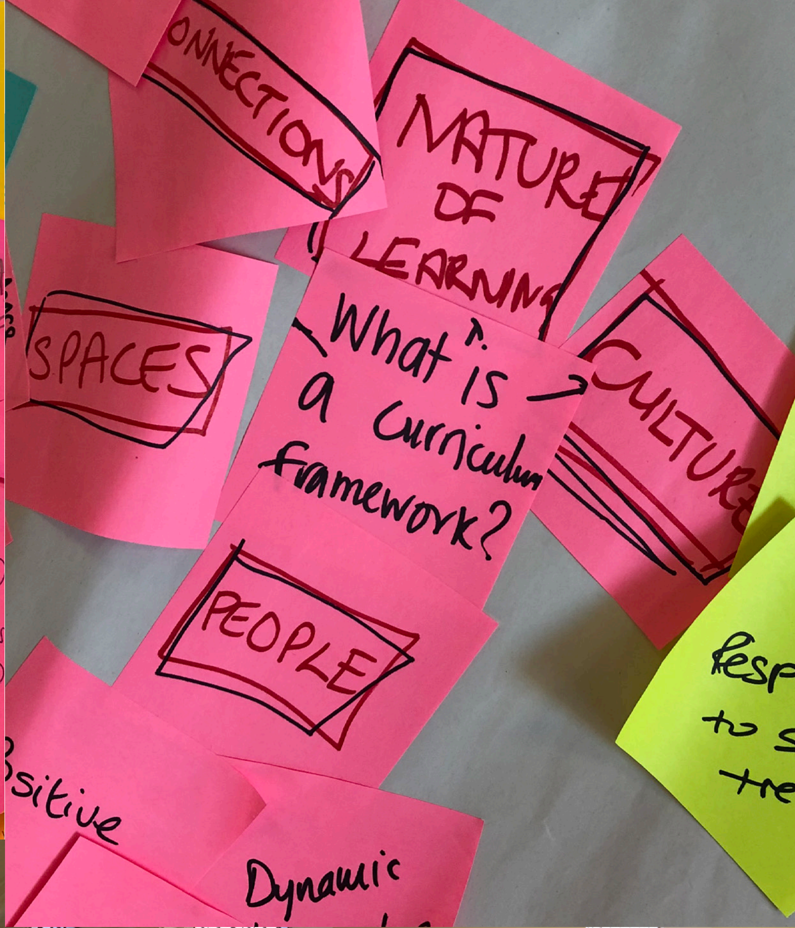
// Mr Robert Tully

Robert is a Senior Lecturer in design at TU Dublin's Dublin School of Creative Arts. He currently works on the BA in Interior Design, the BSc in Product Design and the MSc in Business and Entrepreneurship. His main teaching focus is on creativity and innovation. Robert's early research work focussed on the European furniture industry but more recently he has been involved in a number of European research projects focussed on creative eLearning. Other research interests include creative pedagogies and the development of design thinking and design research. Underpinning many aspects of his research is cross-disciplinarity and interdisciplinarity. Robert's professional experience has been across product design, interior design, furniture design and graphic design, with projects for national and international clients in Ireland, UK, Italy and Finland. Robert has also undertaken consultancy projects for the European Commission, Enterprise Ireland, and Industrial Development Board (NI).

// Mr Shaun Ferns

Shaun is a Lecturer at TU Dublin Blanchardstown Campus. He currently teaches on the BA (Hons) in Creative Digital Media where he is the lead in the delivery of the Multimedia Stream. He is currently exploring serious games for construction-related training as well as the opportunities transmedia provides in improving user experience and engagement in cultural archive artefacts. His educational research is currently driven by his interest in self-determined learning (heutagogy), rhizomatic learning theory, micro-credentialing/ digital badging, and curriculum development.


Let's make the whole world our classroom.
We don't learn about engineering.
Industry Engagement
Fifedoms
Schools


NATURE OF LEARNING
What is a curriculum framework?
SPACES
CULTURE
PEOPLE
Dynamic


How did these work? How can you use them?
Do they go far enough?
Let's step forward to try new things.
Let's make our learning experience active, useful and related to the world of work.
Let's use our talents: everyone has something to teach and something to learn.
Let's create the space and time to do work that matters.
OLLSCOIL TEICNEOLAÍOCHTA BHAILE ÁTHA CLIATH
TU DUBLIN
TECHNOLOGICAL UNIVERSITY DUBLIN
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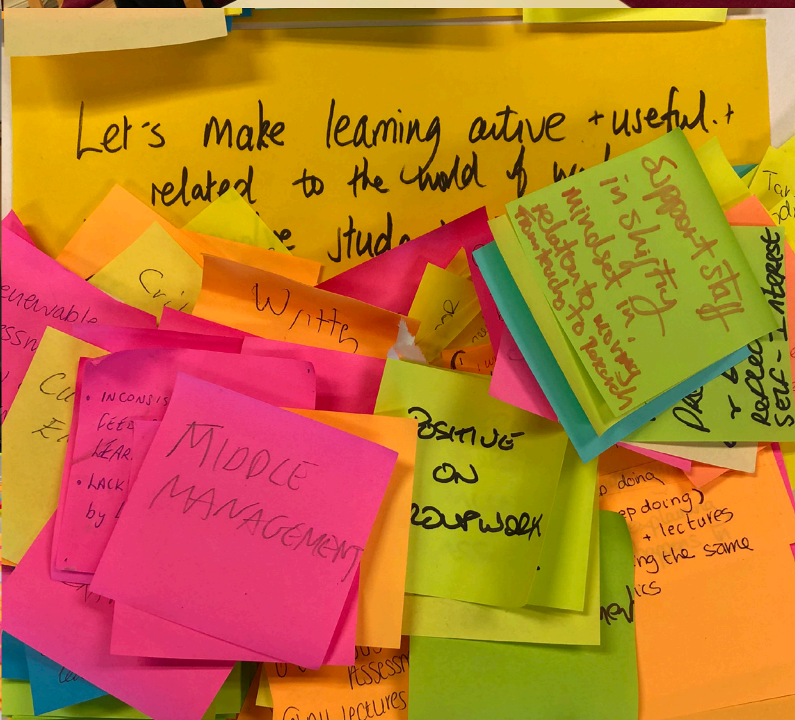

Let's make learning active + useful +
related to the world of w
MIDDLE MANAGEMENT

Co-CREATE

Collaborative Curriculum Reimagining and Enhancement Aiming to Transform Education

THE CO-CREATE LOGO

The project logo embodies the CoCREATE approach, both in what it represents and also how it was created. The logo was designed by one of the Teaching Fellows, Ms Nicola Duffy, a Lecturer in Creative Digital Media in TU Dublin Blanchardstown Campus. Nicola was commissioned to create this logo based on a set of concepts outlined by the CoCREATE Teaching Fellows. The underpinning motif is a honeycomb, chosen to emphasise the interconnectedness of a curriculum and the ability of a framework to be built on, collaboratively, in many new directions. The logo was selected democratically by the Teaching Fellows from a range offered by Nicola. The logo represents the converging, connecting and enabling power of our curriculum framework, the medley of colours representing creativity and collaboration.

SECTION 1

TU DUBLIN'S CURRICULUM FRAMEWORK:
AN HISTORICAL PERSPECTIVE

TU DUBLIN'S CURRICULUM FRAMEWORK: AN HISTORICAL PERSPECTIVE

The development of a learning-transformation strategy for the former DIT in 2017 evolved from recommendations approved in the 2016 'The Change Project: Curriculum, Pedagogy and Coherent Modular Provision', one of a number of change-management projects initiated in 2014–15. The Learning, Teaching, Assessment and Strategy (LTAS) Committee of the former DIT advised upon a process to develop a curriculum framework that could underpin this strategy. A proposal to create a Model for a Connected Curriculum Framework was approved by the senior leadership team in November 2017 for wider consultation in the DIT Colleges, and then by DIT Academic Council in January 2018.

The proposed framework was structured around six dimensions that aimed to enhance professional capacity and integrate opportunities for student placement, internships at home and abroad, co-curricular activities, research projects, community and industry engagement within programme learning strategies. It was intended that the framework would build upon, and consolidate, a solid foundation of excellent practices already taking place. These would be supported by a number of 'Connected Curriculum' related initiatives within the colleges as part of the collaborative processes and as a way to inform ongoing framework development. A one-page consultation document was tabled in each DIT College Board during February and March in 2018 for discussion and feedback.

A 'connected and integrated curriculum' was included in the two strategic priorities set out in the HEA/DIT compact 2018–21 as a means to 'ensure a high-quality, enriching successful student experience as part of a community, with a diversity of opportunities for student development to support career and life success and fulfilment'. This DIT legacy work also fed into the work of the Package Definition Report (PDR) produced by the Teaching, Learning, and Curriculum Transformation team established during the TU4Dublin application period with participants from across the three institutions. This group focussed on the development of a TU Dublin educational philosophy, and an underpinning curriculum framework, with an agreed set of graduate attributes.

CONTINUED OVERLEAF //

In May 2018, the LTAS Committee approved the issue of a call for submissions for a Team Teaching Fellowship to design and develop a university-wide curriculum framework and supporting implementation plan. Following successful recognition as a Technological University in July 2018, it was agreed by the three TU4D Institute Registrars that the call be extended to become the first TU Dublin Fellowship, funded by all three institutions. The development of a new framework, through a cross-campus consultation process, was timely in the transition period following designation as a Technological University. Outcomes from this work could strengthen a TU Dublin curriculum in its broadest sense, further enhancing the learning experience for all students and also helping to develop an institutionally shared understanding of what is distinctive, innovative and high quality within our programmes.

The CoCREATE Team Teaching Fellowship project proposal was selected by an external review panel and approved for implementation through all three institutional academic boards in December 2018. The project was subsequently aligned with existing initiatives, such as the HEA funded Transform-EDU project, but still retained autonomy as TU Dublin Team Fellowship.
experience in a timely manner. Thus, students may be more inclined to give valuable feedback through a minute paper activity rather than through student evaluations that take place at the end of the semester, where their responses can only improve the learning experience of the next cohort.

Many variations of the minute paper are possible. Students may be asked to explain the most important thing they learned in class, or to reflect upon any questions they have which remain unanswered. Questions can also be more specific to address certain learning objectives raised in the particular lecture. The minute paper could be completed individually or collaboratively with small, or even large, groups. Students' responses could remain anonymous or not and could even be graded. Additionally, the minute paper could be conducted at the beginning, middle, or end of a class, or could be implemented multiple times throughout the lecture.

CO-CREATE:

TU DUBLIN'S CURRICULUM FRAMEWORK PROJECT OVERVIEW

PROJECT AIM

The overarching aim of the CoCREATE project was to characterise an innovative, responsive and caring learning environment for students of all ages and backgrounds across a diverse range and level of programmes. It also aspired to develop a synergy between staff, students, professional bodies, industry and community partners through a collaborative design and implementation process. Additionally, it sought to be as inspiring, distinctive and pioneering as Ireland's only Technological University.

PROJECT TEAM

The Teaching Fellowship Team was a multidisciplinary one, comprising staff based across all campuses of TU Dublin. The Teaching Fellowship Team was supported by a variety of TU Dublin stakeholders including students, management, industry and community partners, and formed the Project Team. Project Team members clearly understood the unique offering TU Dublin would bring to the higher-education landscape in Ireland, and its potentially significant international impact. Therefore, it was incumbent on the Fellowship Team to model best practice throughout the project lifecycle. The project reviewed best practice within the constituent Institutes, Colleges and Schools of TU Dublin and fused this local practice to curriculum design models developed nationally and internationally to develop a TU Dublin Curriculum Framework for TU Dublin stakeholders by TU Dublin stakeholders.

In adopting a bespoke approach, the Project Team developed a distinctive method to approach curriculum design, one that distinguishes the TU Dublin Curriculum – and therefore the TU Dublin graduate – in what is a crowded national and international higher-education space. The TU Dublin CoCREATED Curriculum Framework will foster the university experience of the future, for staff, students and stakeholders, that inspires and empowers collective learning in an innovative space.

THE CoCREATE PROJECT:
A FOUR-PHASE APPROACH

The TU Dublin CoCREATED Curriculum Framework was delivered through four project phases over the course of eighteen months and, therefore, two academic years (see Figure 3).

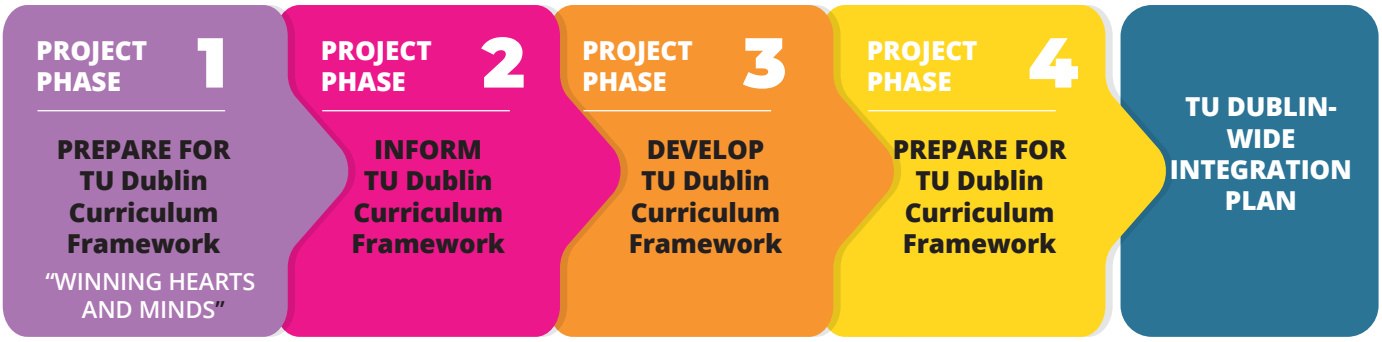


***Figure 3**: The four phases of the CoCREATE project comprising a preparation, an informing, a development and a piloting phase. A university-wide implementation and integration plan was also developed. The execution of this plan is recommended as the next step for CoCREATE.*

The initial six months comprised a phase of 'winning hearts and minds', whereby topics that were likely to be of importance for the TU Dublin Curriculum Framework (e.g. students as partners, co-curricular learning) were explored through interactive workshops and seminars. During this phase, the CoCREATE Project Team, in collaboration with workshop/seminar attendees, began to develop a vision for the new TU Dublin Curriculum Framework. This emergent vision centred on a design-principle-driven curriculum framework that would enable staff, students and stakeholders to focus on the core values that epitomised the TU Dublin curriculum experience.

CONTINUED OVERLEAF //

A clear desire was not to detail how to implement these values, but rather to empower staff to detail how they could enact these values themselves and in partnership with all stakeholders. Most importantly the TU Dublin Curriculum Framework should be useful, usable, active and memorable; it should inspire people to co-design teaching and learning experiences that help all TU Dublin stakeholders achieve our ambitious vision.

To realise this vision, the second phase of framework development was informed by the implementation of four work packages:

- TU Dublin stakeholder consultation
- TU Dublin programmatic data review
- TU Dublin and national policies and strategies exploration
- Research and scholarship evaluation

In phase three of the project, the findings from each of these individual 'informing' work packages were analysed and synthesised, resulting in the identification of ten core themes and, ultimately, four curriculum design values and a prototype TU Dublin CoCREATED Curriculum Framework. Phase four of the project tested and refined the pilot framework and also developed an implementation plan for a rapidly evolving teaching and learning environment brought about by the Covid-19 pandemic.

All of the CoCREATE Project Team (i.e. teaching fellows, design and steering teams) contributed to the 'informing' phase two, and this phase is here examined in more detail.

THE CO-CREATE PROJECT:
PHASE TWO FOCUS (TU DUBLIN STAKEHOLDER CONSULTATION)

WORK PACKAGE AIM

To identify the existing, and expected, curriculum landscape within the emergent TU Dublin.

WORK PACKAGE APPROACH

Design, develop, pilot and execute a systematic consultation review with all relevant stakeholder groups including: president, directors, heads of school, programme chairs, teaching staff, students, library services, careers services, academic writing centre, access and community services, Industry partners and accrediting bodies.

TU DUBLIN STAKEHOLDER CONSULTATION AND DATA COLLECTION

At the start of the 2019–20 academic year the CoCREATE teaching fellowship team were joined by additional staff and students to form the project design team, tasked with collecting stakeholder opinions on the key areas the curriculum framework should consider. Concurrently, a project steering team, comprising senior leaders from across the university, assembled and were tasked with championing the CoCREATE project within their schools, departments and functions across TU Dublin. The design team and the steering team participated in project immersion days to initiate the project data collection.

Subsequently, and over the course of two day-long events, the CoCREATE Teaching Fellows, supported by external partners NoTosh, consulted face-to-face with over 150 TU Dublin stakeholders across the three TU Dublin campuses using a World Café format. The stakeholders included students, academic staff, professional services, management, alumni, industry and community partners.

Before, during and after the on-campus consultations, the design team continued to consult with a wide range of TU Dublin stakeholders using a variety of data-gathering approaches. Project Nests, noticeboards where ideas could be posted by any staff or student using sticky notes, became a fulcrum for the project amongst staff, students and external stakeholders. Each week a new topic was posed, and all TU Dublin stakeholders were encouraged to post their ideas. A digital nest was also open for those were not able to make it to one of the physical nests, and was a particularly productive data source for stakeholders who are in TU Dublin part-time (staff and students), as well as those stakeholders based off-campus (i.e. students/staff on Erasmus/placement), external stakeholders and alumni.

TAKE HOME TWEET

Synchronous (World Café) and asynchronous (Project Nests) consultations were held across campus. Ten key themes emerged: values; educational strategy; educational processes; diversity and inclusivity; staff professional development; student experience; staff experience; flexible learning; practice-based learning; Evidence-based teaching, learning and assessment.

THE CO-CREATE PROJECT:
PHASE TWO FOCUS (TU DUBLIN PROGRAMMATIC DATA REVIEW)

WORK PACKAGE AIM

To review TU Dublin programme-specific data with a view to the production of outputs that inform a new curriculum design process

WORK PACKAGE APPROACH

A systematic and detailed review and reflection of existing programmes. Determine what works and why, as well as what could be modified, adjusted and improved in order to design programmes that are fit for purpose and to create graduates of the future.

TU DUBLIN STAKEHOLDER CONSULTATION AND DATA COLLECTION

In order to fulfil the requirements of this work package, five programmes were selected for manual review as a representative sample from the TU Dublin undergraduate and taught postgraduate provision. This involved the creation of bespoke database wherein the various assessment data spanning each programme were detailed. A systematic coding process was developed for this in order to extract the relevant information and thus inform the recommendations.

THE PROGRAMMES EXAMINED IN DETAIL WERE:

- **Master of Arts in Creative Digital Media** (UX and Interactions Design 60/30) (Blanchardstown Campus)
- **Bachelor of Arts (Honours)in Creative Digital Media** (Blanchardstown Campus)
- **Bachelor of Arts (Honours) in Social Care** (City Campus)
- **Bachelor of Business (Honours) in Accounting & Finance** (Tallaght Campus)
- **Bachelor of Technology (Level 7) in Timber Product Technology** (City Campus)

THE KEY RECOMMENDATIONS THAT EMERGED FROM THIS PROGRAMMATIC DATA EXAMINATION WERE:

01 The removal of high-stake terminal exams in semester 1 of first year. The step up from second-level to third-level can be disorienting for students, and to then face into high stakes terminal exams after thirteen weeks can be daunting.

02 Provide modules that have larger ECTS weightings. The prevalence of 5 ECTS modules across programmes was noted. Modules carrying larger ECTS weightings can help to reduce cognitive overload. Implementing this in first year has the potential to alleviate the disorientation of moving from second to third-level that students faced when dealing with six individual modules and lecturers in each semester.

03 Integrated assignments across modules – an attempt should be made to move away from the siloing of modules to create a more integrated approach to assessments linking module learning outcomes and providing a more cohesive outlook on the learning derived from multiple modules.

04 Many programmes provide a standalone module in the area of academic reporting/research. Rather than focus on such an approach we recommend a more comprehensive and embedded demonstration of academic reporting/referencing and research across all stages of a programme.

05 A more visible connection should be made between programme learning outcomes and module learning outcomes. Programme documents necessarily list programme learning outcomes. These should be more constructively aligned with module learning outcomes with a clear mapping of how the macro relates to the micro.

06 A clear programme assessment strategy should be articulated and this should trickle through the programme at all levels. Such an alignment will provide clarity for students and lecturers alike.

07 Reflective writing practice is currently being utilised across programmes but appears as standalone modules. It should become more embedded in the curriculum rather than as a tacked-on module. A seeping of reflective practice and writing through the programme will benefit the future graduate in the workplace by producing a practitioner that is self-aware and curious.

CONTINUED OVERLEAF //

08

Group work – the future-ready graduate has to integrate into the workplace and be flexible enough to work under their own initiative and also within a group. While group work features, it is our recommendation that it needs to be properly resourced and training provided to both the lectures and the students to maximise the learning potential and contribute towards future-ready graduates.

09

Inclusive assessment methods – it is well understood in the literature that providing students with multiple modes and opportunities to demonstrate their learning provides for a more comprehensive assessment. We recommend that providing students with multiple modes to demonstrate their learning is critical to the proposed new curriculum and will then reflect our diverse student cohort.

10

Assessments and feedback should be timed to allow for feedback in order to utilise it for feed forward. This should be managed at a programme level rather than left to individuals to manage

11

Work placements are effective in producing work-ready graduates. Consideration should be given across all programmes to the integration of properly resourced and managed work placements with commensurate assessments attached.

THIS PROCESS ALSO IDENTIFIED SOME CHALLENGES:

01

It became apparent that this limited exploration could not take cognisance of all assessment factors across all programmes. Any further work in this area needs to closely examine the part-time offerings of TU Dublin

02

Similarly, the apprenticeship offerings within TU Dublin did not enter this review. It should be noted that the traditional SOLAS apprenticeships come with a SOLAS-authored curriculum and assessment methods into which TU Dublin has little or no input. TU Dublin is effectively contracted to deliver the curriculum and assessments for the awarding body.

03

Digital literacies will become an even more critical factor in the ability of our future graduates to navigate the workplace. Digital literacies need to be properly integrated at programme level and utilised with a critical outcome in mind.

TAKE HOME TWEET

Recommendations include removal of high stakes exams, an integrated approach to assessment, embedding reporting, referencing and research skills along with reflective practice and ability to work in a team. Multiple assessment modes and work placement for inclusive learning.

THE CO-CREATE PROJECT:

PHASE TWO FOCUS (TU DUBLIN AND NATIONAL POLICIES AND STRATEGIES EXPLORATION)

WORK PACKAGE AIM

To perform an institutional data review to create an understanding of the ways in which institutional, operational and academic strategies and policies can inform programmatic offerings, and to outline how national and institutional data have formed a shared identity through the process of becoming a Technological University.

WORK PACKAGE APPROACH

An archival research approach, with a focus on discourse analysis around significant phrases and search terms, was used. The research process used an abductive logic to design a shared schema for analysis across structurally disparate documentation and to fully interrogate all documents using this method. In total 25 documents were reviewed, eleven national and international documents, and fourteen institutional documents. The research analysed these documents as data and developed thematic understandings using quantitative and qualitative insights from the outputs.

SIX KEY THEMES AROSE FROM EXPLORATION OF TU DUBLIN AND NATIONAL POLICIES AND STRATEGIES THAT WOULD HELP SHAPE THE TU DUBLIN CURRICULUM FRAMEWORK:

01

Quality of the learner experience: the many pathways and technologies contributing to the overall learner experience were identified, with blended learning and 'praxis' based experiences emerging as two strong themes throughout the documentation.

02

Skills developed as a distinctive graduate: this theme presented a strong indication of how the graduate developed skills, distinguishing themselves as uniquely TU Dublin graduates via curricular and extra or co-curricular experiences. The desired skills were:

- Digitally fluent
- Career/employability
- Innovation
- Problem-solving
- Inter/multidisciplinary
- Enterprise

03

Academic excellence: this theme influences curricular frameworks in the institutional data from both a staff and a student perspective. For staff in particular, the evidence pointed to providing opportunities for professional development. Academic excellence was clearly linked with diversity and inclusion.

04

Internationally recognised profile: in this theme we see the early stages of how TU Dublin can lead internationally by providing opportunities for the curricular framework to move and shape the TU Dublin community toward a global outlook; where being a global citizen is an important attribute.

05

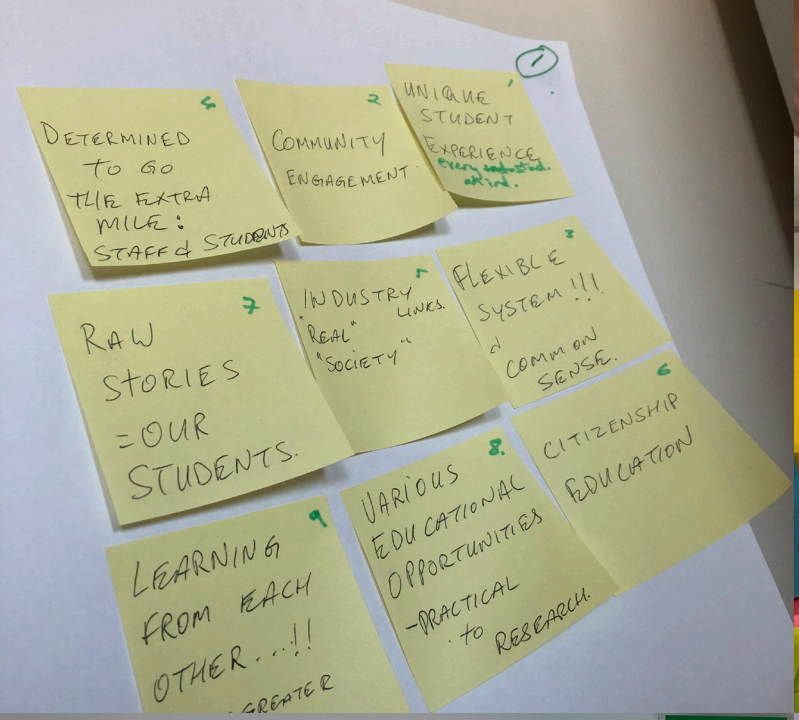
Engagement, partnership and inclusion: TU Dublin must engage with government, community, policy, the media, and businesses in order to develop a partnership approach, ultimately developing the inclusivity of the curriculum.

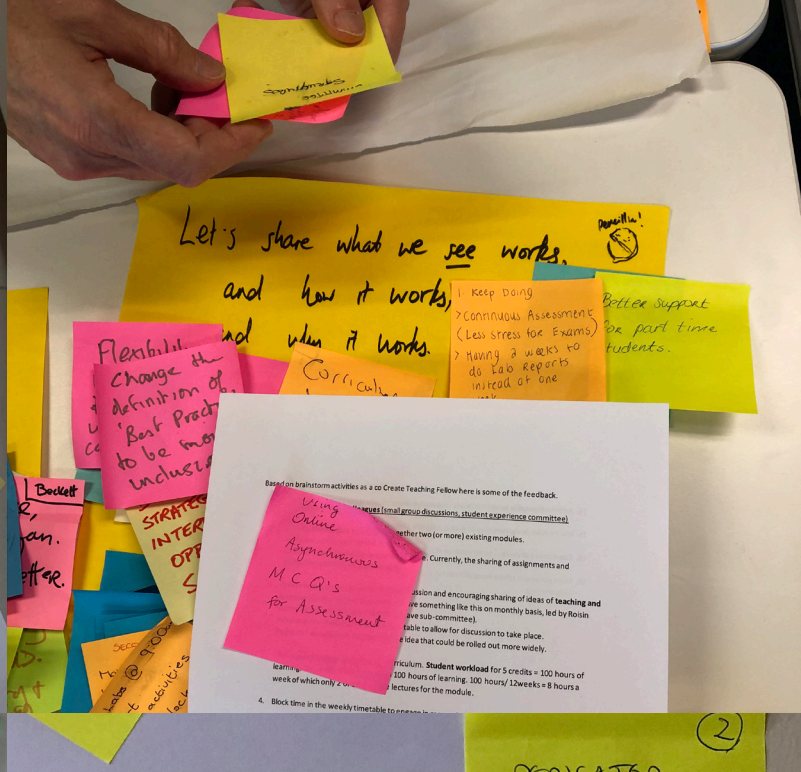
06

Sustainable practices: the institutional data led to two layers of understanding for sustainable practices. The first was environmental sustainability, whereby the curriculum change should lead to curricula more closely aligned with the UN Sustainability Goals. The second, less obvious, principle is the requirement for programmes that maintain and sustain relevance through longevity and authentic assessment.

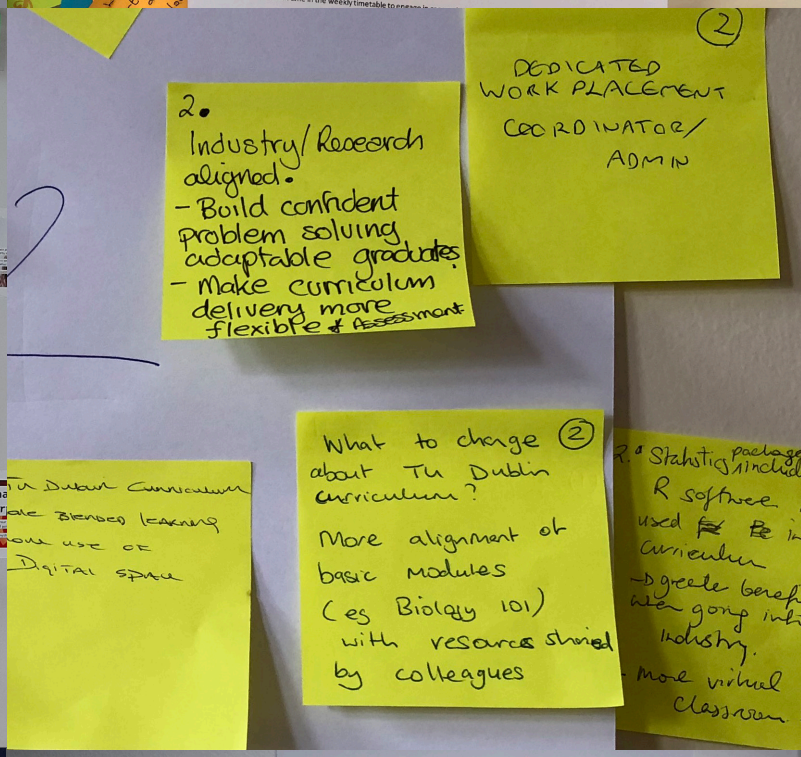
TAKE HOME TWEET

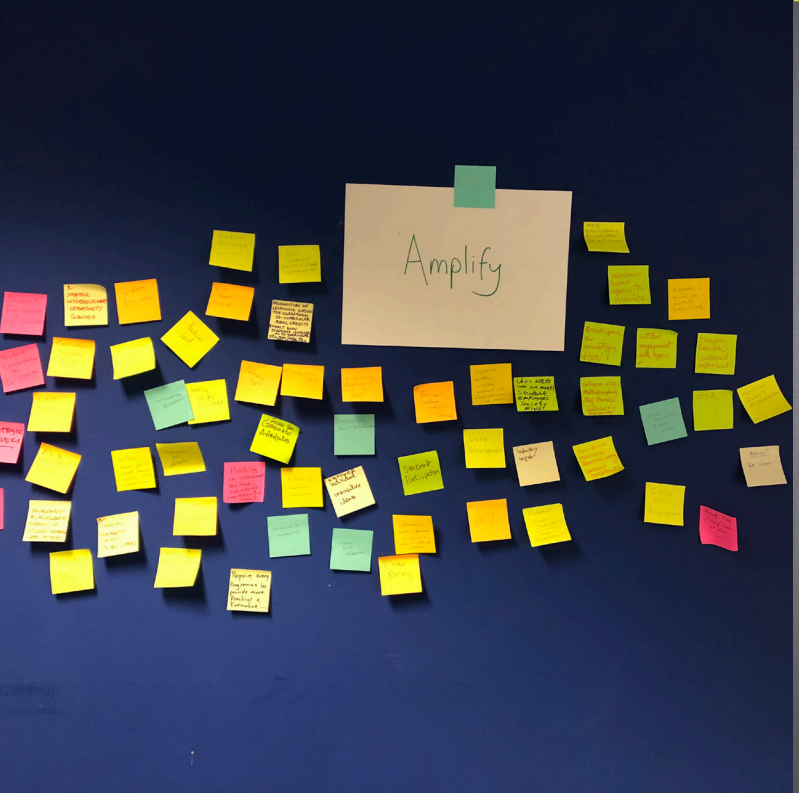
Institutional data shows a clear commitment to six key strategic priorities. Underpinned by the principles of People, Partnerships and Planet, the commitment extends to developing distinctive graduate skills through quality, engagement and sustainability while ensuring academic excellence on an international stage.

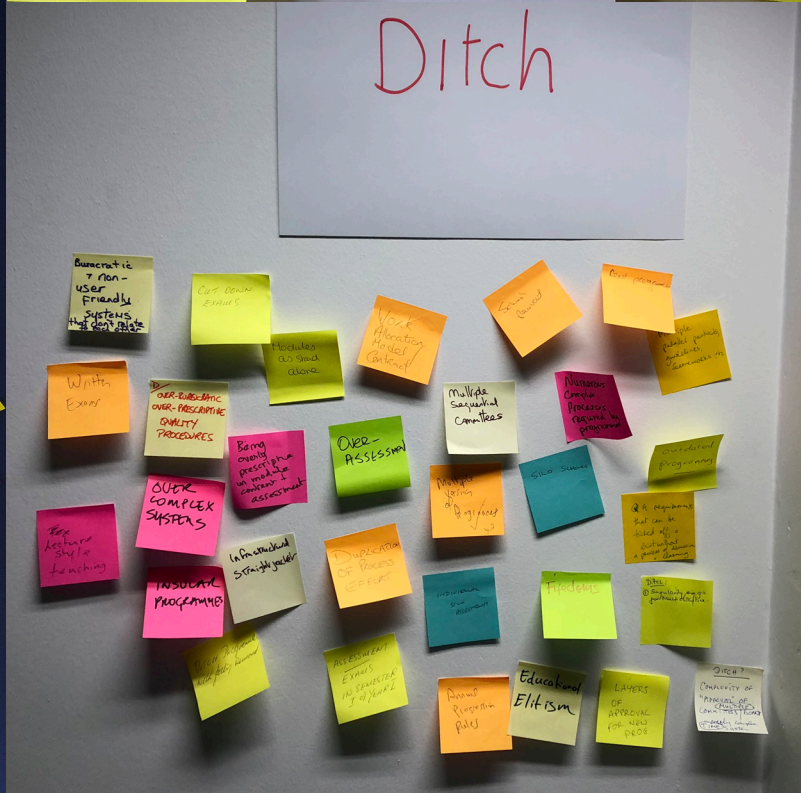

1
4
DETERMINED TO GO THE EXTRA MILE: STAFF & STUDENTS
2
COMMUNITY ENGAGEMENT
UNIQUE STUDENT EXPERIENCE
7
RAW STORIES = OUR STUDENTS.
5
INDUSTRY LINKS "REAL" "SOCIETY"
3
FLEXIBLE SYSTEM!!! & COMMON SENSE.
6
CITIZENSHIP EDUCATION
9
LEARNING FROM EACH OTHER...!!
8.
VARIOUS EDUCATIONAL OPPORTUNITIES -PRACTICAL -TO RESEARCH.


Let's share what we see works, and how it works, and when it works.
1. Keep Doing
2 Continuous Assessment (Less stress for Exams)
3. Having 2 weeks to do Lab Reports instead of one
Better support for part time students.
Flexibility. Change the definition of 'Best Practice' to be more inclusive
Using Online Asynchronous MCQ's for Assessment
Based on brainstorm activities as a co Create Teaching Fellow here is some of the feedback.


Co-CREATE
Staff Students we need you !
Co-CREATE
Amplify
Change
Ditch


2
DEDICATED WORK PLACEMENT COORDINATOR/ ADMIN
2.
Industry/ Research aligned.
- Build confident problem solving adaptable graduates.
- Make curriculum delivery more flexible & assessment
What to change about TU Dublin curriculum? (2)
More alignment of basic modules (eg Biology 101) with resources shared by colleagues


Amplify


Ditch
Bureaucratic & non-user friendly systems
Written Exams
OVER-BUREAUCRATIC OVER-PRESCRIPTIVE QUALITY PROCEDURES
OVER-ASSESSMENT
OVER COMPLEX SYSTEMS
INSULAR PROGRAMMES
Educational Elitism

THE CO-CREATE PROJECT:
PHASE TWO FOCUS (RESEARCH AND SCHOLARSHIP EVALUATION)

WORK PACKAGE AIM

To survey the relevant peer-reviewed and grey literature (including examining other Curricula Frameworks) and practice. Curricula that encompass levels 6, 7 and apprenticeship qualifications will be incorporated.

WORK PACKAGE APPROACH

A comprehensive narrative review strategy to identify, collate and interrogate existing peer-reviewed literature, curricula and practice. ·

RESEARCH AND SCHOLARSHIP EVALUATION

This summary provides an outline of the process and search strategy adopted in this work package, and the key learning points and recommendations emerging. Full references and reference list have been omitted from this summary but can be found in the full text of the report.

We focused on reviewing literature and practice in relation to curriculum design and development in higher education, particularly the frameworks and models which have emerged over the past decade. The scope of the review was initially discussed in detail and this informed the guiding research question:

> What components within the literature are of interest to the CoCREATE group and how can these be distilled and applied to inform a Quality Curriculum Framework (QCF) for TU Dublin?

With expert guidance from Roisin Guilfoyle of the TU Dublin City Campus Library, the review was designed and bounded to focus on English language publications between 2009 and 2019. Some earlier seminal texts in educational literature were also included. Six major themes were determined and approximately 150 sources reviewed. Web searches were also undertaken, focusing on institutions similar to TU Dublin and their published curriculum frameworks or educational strategies

The key themes that emerged, and subsequently structured the review, were: higher education context; curriculum in higher education; sustainability and curriculum; innovation and curriculum; the global citizen and the curriculum; and graduate attributes and the curriculum.

THE KEY LEARNING POINTS AND RECOMMENDATIONS FROM THE NARRATIVE REVIEW ARE DISTILLED AS FOLLOWS:

01

A working definition of curriculum was essential for the CoCREATE project. We proposed a working definition of curriculum as articulating the knowledge, competencies and skills that graduates should attain; establishing a set of academic principles upon which a curriculum is based; defining a set of pedagogic principles which underpin a curriculum; aligning with processes for programme design, approval and review.

02

Our review of research and practice demonstrated that curriculum should be viewed with an orientation towards process rather than product, and a process by which those teaching and those learning within the university would encounter knowledge critically, generating new knowledge towards solving complex challenges in the world.

03

We recommended that the conceptualisation of curriculum in TU Dublin should go beyond individual programmes or their content..

04

The review showed that the student voice is essential in the development of a curriculum framework, and that a students-as-partners approach to curriculum design is critical to forming a meaningful engagement with students in their learning at university.

05

Curriculum reflects and reproduces the values of the institution, its view of its own responsibilities, and how it views its place in the world. A clear articulation of values is needed as part of a curriculum framework and this could in turn be used to guide the development of programmes (TU Dublin Educational Philosophy).

06

The responses of TU Dublin to the global challenges of climate crisis and broader issues of social justice and equality reflected in the UN Sustainable Development Goals should be designed into the university's curriculum framework.

07

The review of existing practice and literature indicated the value of greater interdisciplinarity and transdisciplinarity, and an opportunity for more research and knowledge creation to be done by undergraduate students.

CONTINUED OVERLEAF //

08 There are opportunities to innovate in our curriculum framework. Innovative curricula are also flexible and dynamic, permeable, and keep pace with a changing world and rapidly changing professional contexts in which our graduates will be working.

09 UNESCO has identified the need for forms of education that enable learners to address local and global challenges, as socially responsible, critical and ethical thinking graduates, a disposition consistent with the global citizen. The development of a global mindset has emerged as a way in which to begin to conceptualise the global citizen in the university context and should be reflected within our curriculum framework.

10 Global citizenship can be achieved in higher education through mobility and international exchange-type learning experiences, but can also be fostered locally particularly if it is engrained in the university's curriculum framework.

11 The TU Dublin graduate attributes should continue to be integrated with curricula, and a range of internationally validated models exist demonstrating the value of incremental development of graduate attributes in the curriculum.

12 The design of the campus and physical learning spaces could and should be usefully integrated with curriculum design.

13 Renewed and revitalised connections between research and teaching characterised successful curriculum frameworks at other high-profile institutions and our neighbouring technological universities.

14 Some common features of the curriculum frameworks launched recently include: increased opportunities for undergraduate research; reduction of content without reduction in rigour through structured and holistic review and redesign of programmes; inclusion of capstone projects; portfolios/e-portfolios and mechanisms to capture reflection and learning; sustainability and the development of global citizens.

15 Successful implementation of a curriculum framework calls for continuing professional development and academic professional development, and for staff and senior champions/leaders to be involved in this process

TAKE HOME TWEET

This review of literature and practice showed that a successful curriculum needs to be co-designed/produced with students, underpinned by institutional values; dynamic and innovative, developing graduate attributes/global citizens; while staff need leadership and appropriate professional development to make this happen.

SECTION 2

THE CoCREATED
CURRICULUM FRAMEWORK

THE CREATION OF THE CoCREATED CURRICULUM FRAMEWORK

Throughout the project the CoCREATE project team collaborated with the TU Dublin teaching and learning community and external stakeholders to understand what works, what is challenging, and also what the research and scholarly literature suggests. Other curriculum frameworks, as well as institutional and national policies, were explored and interrogated to see what might be important to consider by TU Dublin.

During the stakeholder consultation phase a truly collaborative approach was used. Thousands of students, staff and external stakeholders engaged in a community exploration of the kinds of teaching and learning experiences that already work well in TU Dublin, as well as defining where it could be different and better. Primary data sources included direct consultations via World Cafés on each campus, project nests with changing themes, curated stories from lunch-and-learn platforms, student diaries, photographs, video clips, and classroom discussions.

The data from stakeholder consultations, the scholarly literature and institutional and national policies were synthesised through a thematic analysis approach to identify patterns which resulted in ten thematic categories: TU Dublin values; TU Dublin educational strategy; TU Dublin educational processes, diversity and inclusivity; TU Dublin staff professional development; staff user experience; student user experience; flexible learning; practice-based learning; evidence-based teaching and learning; and assessment. The fundamental elements of these themes were distilled to form four curriculum design principles, or 'curriculum shapers', of the TU Dublin CoCREATED Curriculum Framework:

1. Step forward and try new things
2. Use all of our talents; everyone has something to learn and something to teach
3. Make our learning experience active, useful and related to the world
4. Create the space and time to do work that matters

CONTINUED OVERLEAF //

***Figure 4**: The four TU Dublin Curriculum Shapers of the TU Dublin CoCREATED Curriculum Framework. Their interconnectivity with and integration of the three core principles of the TU Dublin Strategic Plan is also noted.*

Once the TU Dublin CoCREATED Curriculum Shapers were defined, the CoCREATE Teaching Fellowship team rapidly prototyped a series of support resources for staff, students and stakeholders which might be used to empower them to embed the CoCREATED Curriculum Framework into their TU Dublin experience.

Following stakeholder testing and review, the final suite of resources included a detailed guide that expands each CoCREATED Curriculum Shaper. This guide includes a summary of the scholarly literature underpinning each CoCREATED Curriculum Shaper, a TU Dublin vignette (or case-study) showcasing each CoCREATED Curriculum Shaper in practice in TU Dublin, and a collection of Critical Curriculum-shaping Conversation trigger questions to stimulate discussion during curriculum design and development.

The Covid-19 related university closure occurred as the resource guide and associated face-to-face workshop were being finalised. The change in normal practices brought about by the pandemic, and the more widespread use of remote delivery, required online support and an online implementation strategy for the CoCREATED Curriculum Framework to be developed. A variety of online workshop approaches, and a number of supporting technologies, were trialled as the project implementation pivoted towards a sustainable online delivery method.

THE CoCREATE PROJECT
CONCLUSIONS AND CONSIDERATIONS

The CoCREATE project adopted a visible, stakeholder-centred approach to a university-wide strategic project. The output, the TU Dublin CoCREATED Curriculum Framework, was created for the staff, students and other stakeholders of TU Dublin, by the staff, students and other stakeholders of TU Dublin. The framework is grounded in scholarship, policy and practice; it is informed by local as well as global needs. The CoCREATED Curriculum Framework has great potential to change and enhance what we do and how we do it in TU Dublin. This internal cultural and practice change will, if successful, result in positive impact beyond our university.

However, to turn potential into action, the CoCREATE Project Team recommend the following two key future directions be considered:

SUSTAINABILITY

In order to fully embed the TU Dublin CoCREATED Curriculum Framework into the TU Dublin teaching and learning culture there is a strong need for senior university leadership to both engage with and support the framework. The framework should be integrated into emerging and future university QA/QE processes. To extend the momentum of the project, Teaching Fellows and the Project Team in general should synergise with ongoing and future institutional projects. Ultimately, the CoCREATED Curriculum Framework should underpin the TU Dublin education model.

IMPLEMENTATION

The CoCREATED Curriculum Framework should be formally recognised and endorsed through university approval. As part of an enhancement culture, it is strongly recommended that the CoCREATED Curriculum Framework is resourced sufficiently to permit a partnership approach to a whole-of-university implementation. The use of the Curriculum Shapers does not have to be for Curriculum (re)design; opportunities exist for the use of these Shapers as design principles for all aspects of university (re) design. Resourcing CoCREATE campus facilitators will empower staff and students to use these TU Dublin design principles to creatively, but coherently, (re)design with the TU Dublin ethos at the core. Connecting the framework to future teaching and learning enhancement and development projects, such as the TU Dublin IMPACT project, will further expand the use of the framework through targeted funding opportunities.

SECTION 3

THE CoCREATED FUTURE

CURRICULUM FRAMEWORK :
IMPLEMENTATION PLAN AND BUSINESS CASE

WHAT IS THE CoCREATED CURRICULUM FRAMEWORK?

The CoCREATED Curriculum Framework is an inclusive set of clear guiding principles designed to empower our staff and students to develop diverse and practice-rich curricula unique to TU Dublin.

THE FOUR GUIDING PRINCIPLES OF THE COCREATED CURRICULUM FRAMEWORK ('CURRICULUM SHAPERS') ARE:

1. Step forward and try new things
2. Make our learning experience active, useful and related to the world
3. Use all of our talents; everyone has something to learn and something to teach
4. Create the space and time to do work that matters

WHAT ARE THE BENEFITS OF THE COCREATED CURRICULUM FRAMEWORK?

THE CoCREATED CURRICULUM FRAMEWORK:

- provides tangible clarity on the unique essence of the teaching and learning experience in TU Dublin (i.e. 'how things are done around here')
- maps onto, and aligns with, the TU Dublin Strategic Plan, the TU Dublin Graduate Attributes and the Principles of the TU Dublin Educational Model
- ensures that all staff and students have a set of robust guiding principles to refer to when developing modules/programmes across the university
- brings the TU Dublin curriculum-guiding principles to life through vignettes sourced from TU Dublin students, staff and other stakeholders

WHAT ARE THE COMPELLING REASONS FOR TU DUBLIN TO WANT TO IMPLEMENT THE COCREATED CURRICULUM FRAMEWORK?

- we need synergy between our teaching and learning principles, our core mission, and our values as a result of the creation of TU Dublin
- we need integration of teaching and learning principles with our core mission and our values as a result of the creation of TU Dublin
- we need to ensure that all students and staff have a clear compass to use when developing modules and programmes in TU Dublin
- we need all students, staff and external stakeholders to understand the essence of the teaching and learning experience in TU Dublin

WHAT MAKES THE COCREATED CURRICULUM FRAMEWORK DIFFERENT?

REPRESENTATION:

CoCREATE was a TU Dublin-wide, eighteen-month long project, led by eighteen Teaching Fellows from all campuses and supported by the LTTC. Each school/department within TU Dublin, as well as the student body and student union, was represented on either the project Design Team or the Steering Team. Senior university and student union leadership comprised the CoCREATE Consultant Group

REACH:

face-to-face consultations resulted in input from over 1,000 stakeholders taking a 'bottom up' approach.

REWARD:

the CoCREATED Curriculum framework provides a guiding compass for TU Dublin curriculum design. It also documents the valued and distinctive aspects of the teaching and learning experience in TU Dublin

RECOGNITION:

the CoCREATED Curriculum framework will be recognisable as the TU Dublin teaching and learning experience. It is uniquely TU Dublin, built by TU Dublin students and staff, for the students and staff of TU Dublin

HOW WILL THE COCREATED CURRICULUM FRAMEWORK BE DELIVERED?

With appropriate support, and in line with health and safety guidelines, training and guidance for staff and student use of the CoCREATED Curriculum framework will be facilitated either face-to-face (F2F) or online. This will be achieved primarily through user-centred workshops with staff and students. Prototype F2F and online workshops have been developed and piloted with TU Dublin staff.

The focus of the 2020–21 Academic Year will be at the programme level.

Additionally, support documentation will be available online including exemplars, TU Dublin vignettes and an interactive website to guide staff and students in the use of the CoCREATED Curriculum framework at teaching session, module, and programme levels.

.

WHAT ARE THE MEASURES OF SUCCESS?

SUCCESS	HOW ACHIEVED/MEASURED
1. Use of The CoCREATED Curriculum Framework at module and programme levels	An analysis of the level of actual CoCREATED Curriculum use following attendance at a Co-CREATED Curriculum workshop. Integration into the TU Dublin Quality Framework.
2. Twenty prototype projects are executed, and their findings disseminated to TU Dublin stakeholders.	All successful prototype project applicants will be required to report back on their project (lessons learned etc.) and to track their dissemination. These will be captured as vignettes for the CoCREATED Curriculum framework website and also for upcoming T+L showcases (e.g. TU Dublin IMPACT Festival of Learning), as well as national and international conferences.
3. Twenty prototype projects are executed, and their findings disseminated to TU Dublin stakeholders.	A pre-implementation, followed by a post-implementation, stakeholder survey will detail the level of awareness of principles before and after among stakeholders.

WHAT ARE THE REQUIREMENTS?

IMPLEMENTATION

An implementation budget is required to:

- run an awareness-raising marketing campaign
- host user-centred implementation workshops
- develop and launch the interactive website
- seed fund 20 x €1,000 prototype projects grants (similar to the successful 2015–6 TU4Dublin First Year Experience approach).
- resource one Project Manager and four facilitators (2 x City, 1 x Blanchardstown, 1 x Tallaght; each at 0.25FTE or student equivalent) to enable full implementation and evaluation

COHERENCE

- The CoCREATED Curriculum framework is represented during the development of the TU Dublin Education Model. The CoCREATED Curriculum framework should be used to embed existing and new TU Dublin graduate attributes.
- The CoCREATE group has expertise and an extensive dataset involving many contributions arising from wide consultation that may be challenging to replicate again, particularly during current social distancing. These should be harnessed in future, strategic teaching and learning developments including the TU Dublin IMPACT project

SUPPORT

- A top-down endorsement of the CoCREATED Curriculum framework is required. The CoCREATED Curriculum framework was built using a bottom-up approach; however, top-down advocacy is essential for effective implementation and integration.


Co-CREATE

APPENDIX A

THE CoCREATE JOURNEY

A COLLECTION OF TEACHING FELLOWS' REFLECTIONS

ADRIENNE FLEMING

'I became involved with CoCREATE as I was interested in participating in a project looking at an integral area of our core function. I felt it was an opportunity to get to know others in the wider university. The consultation workshops in both Aungier Street and Tallaght – both on the same day – was my most memorable moment from CoCREATE. There was a great energy in the rooms and lots of great ideas flowing from the people who were present. I was delighted to see the engagement of both staff and students in the consultation phase. I also found the teaching fellows workshop, along with the wider CoCREATE committee, looking at and evaluating the contributions from the CoCREATE nests interesting. In terms of my learning during the CoCREATE project that surprised me, it was wonderful to gain an insight into the views of the teaching fellows from different disciplines. My main takeaway from my experience as a CoCREATE Teaching Fellow was to get involved and to embrace new ideas and change. To help colleagues who are new to the CoCREATED Curriculum, I would suggest they talk to others with more experience and look for guidance. I am committed to supporting my colleagues to understand the CoCREATED Curriculum Framework. An action for my practice that I will take going forward, having been a teaching fellow in this project, is to maintain connections with the teaching fellows with similar interests to pursue some further research.'

BARRY RYAN

'I chose to lead this project as I felt the establishment of our new Technological University provided a unique, once-in-a-lifetime opportunity to inform and shape how we learn and teach. The coming together of three institutes, each with their individual practice expertise and specialities, meant there was great potential. Working on a 'blank page' (but very strategic) project was an ideal way to bring staff, students and our other stakeholders together as part of TU Dublin. I feel we were focussed on our final goal from the start; however, as a project team we also developed strong connections and collaborations across all campuses and TU Dublin buildings along the CoCREATE journey. As part of the journey my most memorable moment happened several times: it was the 'aha' moment when a group of staff or students 'get' the TU Dublin Curriculum Shapers and they dive into a deep conversation about how they can use these design principles to shape a class, an assessment, a module, a programme etc. Reflecting on my personal CoCREATE journey, I have learnt the power of a motivated community. TU Dublin is a large university, and it can be challenging to change culture and practice; however, a lot can get done by a suitably motivated team and a supportive community of practice. For those new to the TU Dublin CoCREATED Curriculum Framework I would suggest you write out the four Curriculum Shapers initially and think about them from the broadest perspective; don't worry about the "how can I do that? Instead, think of the opportunities first and then worry about the logistics. Where there is a will, there is a way!

Finally, my actions for practice following my time as lead teaching fellow are:

- Take more time to chat informally with colleagues, students, community and industry partners. You never know who your next collaborative partner will be!
- Be more comfortable with being uncomfortable. Allowing time to "compost" ideas and to discuss with a critical friend or working group lets you see things from multiple perspectives; however, this was (is!) challenging for me to do.
- Continue to "see" opportunities to use the Curriculum Shapers, both for curriculum (re)design and beyond. Once these opportunities are "seen", make a conscious effort to action the idea inspired by the Curriculum Shaper(s).'

CATHERINE DEEGAN

'The primary appeal of this project was to opportunity to work on a cornerstone learning and teaching project in the new university, together with colleagues from a wide range of disciplines. There are so many options and opportunities to learn via the curriculum-design process. There are several memorable moments from the CoCREATE project. Writing the application for funding was a collaborative process that helped form a cohesive team from the start. It also helped generate a deep sense of ownership of the project and its aims and objectives. Organisation and participation in the data-collection processes and consultation workshops with stakeholders from autumn to winter 2019 was such an engaging and fun aspect of the project: it encouraged direct engagement with our own student cohorts, as well as to reach out further to a wide range of colleagues, including management, industry collaborators and community stakeholders. The vast amount of valuable data collected here will provide food for thought for some time to come. The main surprise during this project was how quickly and efficiently the large dataset that was collected during the consultation phase could be synthesised to a concise framework. The main learning point (and what I would emphasise to colleagues who might consider engaging in future teaching fellow projects) is to be open to learning about as wide a range of experiences and perspectives as possible. Stepping out from one's own specific role to actively participate in a team fellowship serves to enrich your own perspective and practice. To a colleague to was new to the CoCREATED curriculum, I would explain the rationale for why and how, it came about, as this would help with context and in understanding the curriculum shapers.

'My actions for practice as a teaching fellow would be:

- work with my colleagues to disseminate further the outcomes of the CoCREATE project, particularly the outcomes of the national and institutional publication review
- develop, as part of a working group, a CoCREATE curriculum development workshop. This work was started in this cycle of the project
- apply the curriculum shapers in various contexts.'

CLAIRE MCAVINIA

'Three main reasons prompted me to get involved in the CoCREATE project: the chance to work with colleagues I had not met before; the opportunity to work on something that would include our students in designing their future curricula; and the possibility that together we could contribute to the new university in its formative stages. The most memorable moment from CoCREATE were impromptu conversations with students outside Kevin Street (on a very chilly day!) when we asked them about why they had decided to come to TU Dublin. It struck me that we are prone to assuming we know what students think – we don't. We need to include them, ideally at all stages of this process. Something I learned from the CoCREATE project, which surprised me, was during the review of literature. This review showed me that most practitioners and researchers would say we really do need to move on from using our valuable time exclusively for the transmission of content in class. There are so many alternative interesting and exciting ways of learning in the twenty-first century without diminishing the expertise of the person teaching.

'The main learning point from my experiences as a CoCREATE teaching fellow is an understanding of curriculum as something co-constructed, inclusive of our values and ethos, which can respond to the urgent challenges we face as a society. In sharing my learning with a colleague who is new to the CoCREATED Curriculum, I would explain how it will give them scope to do new and exciting things in teaching, learning and assessment, responding to change while respecting their discipline, their expertise, and everything they contribute to their students' experiences at TU Dublin. Three actions for practice I will now take, having been a teaching fellow in this project:

1. I will always talk to a librarian before undertaking any future study of this kind – this was invaluable;
2. I would examine and re-examine ways of including students in future projects as this brought so much value;
3. keeping sight of the goal and staying positive when we are very busy is what makes a project succeed and I would thank all colleagues involved for that.

CLAIRE MCDONNELL

'The focus on a reimagined curriculum framework that would define our new university really appealed to me about the CoCREATE project and prompted me to join in. Also the opportunity to work with people from across TU Dublin. Our group of teaching fellows designing our logo and deciding on our name was one of the most memorable moments of the project. The process showed that the group was more than a sum of its parts, and creativity and synergy came to the fore. There was a lot more that followed, but I think this was when I realised the group had something special and was the first time we all worked together very effectively. I was quite surprised at the level of agreement there was from the stakeholder consultations on what was important and what would define TU Dublin, across the stakeholder groups and across the three locations. My main learning point from my experiences as a CoCREATE teaching fellow is that the process reaffirmed for me that working within a team and sub-teams is enjoyable and productive – and we had an excellent coordinator / leader.

'When speaking with colleagues who are new to the CoCREATED Curriculum I noted that the process we used to develop the framework and guiding principles was very robust, and the timing was critical as we captured thoughts and perspectives from stakeholders within the first year of the establishment of TU Dublin. What we have is a genuine representation of what is important to staff, students, community partners, graduates and their employers and the four guiding principles and vignettes provide a clear pathway towards embedding this into all of our programmes. Going forward I hope to continue to work on incorporating the CoCREATED curriculum framework within TU Dublin programmes, by hopefully getting involved in a prototype/pilot project. I also hope to build on the connections developed across TU Dublin, particularly with other teaching fellows, as a result of this project.'

ERIC BATES

'I was recruited into this project as a representative from the apprenticeship strand of TU Dublin. Following contact with the project leader, I felt it was an exciting project to get involved in and subsequently signed up. My most memorable moment is the initial planning stages when anything seemed possible and there was great excitement and expectation at the meetings. I would advise anyone considering getting involved to think carefully and ensure they can manage their time appropriately in order to be fully invested in the project. The sheer scope of the project and then engaging with the everyday requirements of teaching meant that many times I could not attend meetings that in hindsight would have been very useful. I would say that on balance the process was enjoyable as it gave me a chance to meet new colleagues from our newly formed university that otherwise I would not have met. Meetings in both Tallaght and Blanchardstown gave me the chance to see other campuses and engage with like-minded colleagues.'

FIONNUALA DARBY

'The diverse disciplinary backgrounds of the teaching fellows, the ground-up approach to the fieldwork and being part of one of the first TU Dublin projects since the university's establishment, appealed to me most about CoCREATE. Most memorable and rewarding were the engagement levels with project nests completed on the Blanchardstown campus. What surprised me most came from the fieldwork and was the strong emphasis on the role of higher education in enhancing employability prospects for students above all else. New learning that I will take with me to future projects is to seek out organisational allies, gather collectively and consult widely to achieve the outcome. Anyone who is new to the CoCREATE Curriculum Framework could road test the curriculum shapers on a module or programme.'

NICOLA DUFFY

MAÉBH COLEMAN

‘Certainly the most memorable moments from CoCREATE were built from a sense of shared purpose between the teaching fellows. It was inspirational to hear the combined skills and talents of the group at each of our meetings and to work closely with our work package team. It surprised me to find the depth and breadth of educational practice across our new university, yet to also find that essentially the tenets of a TU Dublin student experience remained the same across all campuses and courses, we are all humans learning. If a colleague were new to the CoCREATED curriculum, I would tell them to reach out, to talk and discuss their thinking with their colleagues and the CoCREATE fellowship team. It all starts with communication; it is almost certain that in this CoCREATED curriculum they will find innovation, support, collaboration, and the educational tools and techniques needed to find confidence in their practice. Having undertaken the fellowship, my top three practices are: to reach out and collaborate; to thoughtfully design student experiences based on solid learning outcomes; and, finally, to enjoy teaching!”

MIRIAM O'DONOGHUE

'The appeal of the CoCREATE project was the opportunity to look at the curriculum and see what could be changed and improved to make it more connected and relevant to the students, full-time, part-time, undergraduates, postgrads and mature students. Through the various meetings and events, I have seen the practice that is in place across the university and the wealth of variety which exists in that practice. While there are things that can be changed and improved there are also many really good and innovative practices across learning, teaching and assessment. To anyone about to look into the CoCREATE curriculum I would say look at the opportunity and diversity which it encompasses and the potential for what can be done, not all in one go but over time. Look at the benefits this curriculum will have for our students. Being a teaching fellow on the CoCREATE project was an experience in opening to the potential of this CoCreated Curriculum and learning from the community of practice across all the campuses.'

ODETTE GABAUDAN

'Joining CoCREATE was an exciting project that was going to give me a renewed opportunity to work with colleagues across TU Dublin. I particularly enjoyed participating in the online CoCREATE first-year workshop that was organised with the School of Electronic and Electrical engineering. As an observer of a team of people that I had no prior knowledge of and who had limited knowledge of the CoCREATE project, I learned a lot about organising a CoCREATE workshop and managing group dynamics in an online environment. The use of Post-it Notes in the context of CoCREATE was quite effective. When I used them in my role as programme chair, I was surprised to see that students in particular engaged well with them and their responses yielded interesting results. The process of asking them what they should ditch/keep/amplify was quick and effective in allowing everyone to contribute.

'My main learning point from my experiences as a CoCREATE teaching fellow was getting to know more about the ABC learning design method. This approach aligns with the CoCREATED Shapers, they are part of a straightforward framework with four key design principles, each of which can be further explored with the various vignettes we have developed. In developing a new module with a colleague, I'm using the shapers combined with the ABC learning cards. We are hoping to involve local communities in our delivery of the module (shaper 3), which will be a new departure for us. I'm now even more acutely aware of students' potential contribution as collaborators in our decision-making processes (second shaper). Dissemination both within TU Dublin and beyond is a key action that I hope to find time and space to undertake in the next academic year (fourth shaper).'

OLIVIA FREEMAN

'The CoCREATE project was a fantastic opportunity to be part of a dynamic and engaging team that worked together to build a curriculum framework at a hugely significant moment in the emergence of TU Dublin. I thoroughly enjoyed meeting colleagues from across the university and finding the space to build new professional relationships and discuss our approaches to teaching and learning. My involvement in the project included a deep dive into existing literature on the theme of curriculum development, with a particular focus on the curriculum frameworks being implemented both nationally and internationally. I was delighted to have the chance to discuss how the CoCREATE shapers support the development of authentic assessment methodology in a paper delivered to the HEAd'20 conference, Valencia (held virtually in June 2020).

'We engaged in widespread consultation with colleagues and students from across the university as we tapped into what university life and work means to the TU Dublin community and what makes TU Dublin's values and practices distinct. As is evident from this document, we conducted a significant amount of primary research and, together with pre-existing secondary research, this was all interpreted and ultimately distilled into the four Shapers of the Framework which are outlined in this report. It is hoped that these shapers will provide direction and encouragement for programme teams across the university to be bold and innovative in building on our combined strengths as we work towards our common goal of developing a strong sense of collegiality which is built around our university's core pillars of People, Planet and Partnerships.'

RACHEL FREEMAN

'CoCREATE appealed to me as I saw an opportunity to shape the future of our new university; coming from horticulture, a relatively small discipline in the organisation, I felt there was a need to bring the voice of horticulture lecturing staff and students to the research. In addition, I viewed it as an opportunity to collaborate, learn and meet colleagues from other disciplines. The most memorable moment was at the end of the data-collection phase – the sheer volume of responses! During the data-collection phase, discovering the variety of students' experiences in learning, their innovative ideas on assessment, their passion for learning (often against the odds) was the main learning point for me. They really wanted to be part of the research, to be part of co creating the curriculum, to have a voice in this. To anyone embarking on something similar, I'd say go for it, there is so much to be learnt by getting involved.

'My practice actions, after my experience of being a teaching fellow are:

1. Be brave; take small steps and build on them
2. Embrace change and reflect on outcomes
3. Collaborate, collaborate, collaborate·

ROBERT TULLY

'The main appeal for me was the opportunity to engage with colleagues and collaborate across a variety of discipline areas. Having been involved in curriculum development both within DIT and on EU projects, this project also presented an opportunity to shape and influence curriculum development within the newly formed university. Given the scale of TU Dublin, one of the stand-out aspects of the project for me was attending meetings and workshops across the entire university, which provided an opportunity to experience the context within which colleagues operate and deliver every day. The project highlighted that many of the issues and challenges we face around curriculum development are surprisingly similar across very diverse disciplines. Finding a shared vocabulary to engage in a constructive discourse was one of the valuable consequences of the project. Perhaps more than anything this project has demonstrated the phenomenal commitment and passion of the teaching fellows to develop the means and methods we use to shape our delivery to and with students. The CoCREATE project provided a vehicle to focus that commitment and passion as a

collective and formally and informally disseminate it across the university and beyond. More than anything else the project reinforces my commitment to boundary crossing with a renewed respect for the value of knowledge carried within disciplines. It provides numerous exemplars and insights that are valuable to both novice and veteran academics.'

SHAUN FERNS

'My involvement in the CoCREATE project has provided an excellent opportunity to help frame and develop the new TU Dublin curriculum framework as well as engage with a community of educators with a passion for teaching and learning, a real opportunity for sharing and shaping the future of TU Dublin. During the development of the CoCREATE curriculum framework, participants had an opportunity to discuss the elements of the curriculum with a variety of stakeholders and of those I found the discussion with students most enlightening: they helped to create a curriculum that reflected their values and expectations of higher education. Many of those discussions with students reminded me of the importance that students place on open communication, their desire to help design, develop, and direct their curriculum and their demand for a fair, open, transparent, and rigorous curriculum that incorporates issues of social justice and sustainable development. In essence they wanted to be treated as equal partners in their education. To those who are new to the CoCREATE curriculum framework I recommend that they employ the Curriculum Shapers while developing their own approach to the delivery of the curriculum. The Curriculum Shapers are open and wide enough to allow for a diverse view yet still place the students at the centre of the work we do. Finally, I am thankful for the opportunity to have further developed my approach to teaching and learning throughout this process. In particular, the affirmation that the use of open practices benefits all involved in curriculum design and development. I am particularly delighted the project afforded time to make meaningful connections across the three campuses. I thank all the participants of the CoCREATE project team for this: their influence continues to have an impact on my teaching practice.'

APPENDIX B

EXTENDED HIGHER EDUCATION CURRICULUM DESIGN

LITERATURE AND PRACTICE REVIEW

INTRODUCTION

This review of literature and practice has been designed to provide context and background for the CoCREATE project, examining existing theory and practice in the field of curriculum for higher education. We include outline details of the CoCREATE project, our approach to the review, and a summary of our search strategy. We have examined the curriculum frameworks and models which have been most widely disseminated and used in the past ten years, and looked at practice in other technological universities. Findings are organised thematically, followed by common headlines and learning points which inform the CoCREATE project.

CoCREATE – Overview

TU Dublin provides a unique opportunity to create a curriculum framework for students and staff, by the students and staff. A teaching fellowship team, comprising teaching academics from across the three TU Dublin campuses collaboratively developed TU Dublin's Curriculum Framework. The teaching fellows worked under the collaborative name CoCREATE: Collaborative Curriculum Reimagining and Enhancement Aiming to Transform Education.

The curriculum framework will empower the creation of rich and diverse curricula across all disciplines and levels of TU Dublin, from apprenticeship through to structured PhD. The design and development of the framework was informed by examination of local, national and international best practice and policy, as well as the scholarly literature and consultation with all key stakeholders.

The framework is underpinned by the core values and mission of TU Dublin and provides a distinctive, but tangible, learning philosophy for all at TU Dublin. The framework is considered and flexible, so as to adapt to the diversity within TU Dublin, including accredited programmes, and inclusive of all learners across all Dublin campuses.

At the outset of the CoCREATE Project, a curriculum framework was defined as articulating the knowledge, competencies and skills that graduates should attain; establishing a set of academic principles upon which a curriculum is based; defining a set of pedagogic principles which underpin a curriculum; aligning with processes for programme design, approval and review (Ryan, 2019).

A curriculum framework is not set of rules that each staff member/programme team must adhere to during module/programme design, and it does not require revalidation of programmes. Rather, it is designed to inform modules and programmes at the next point of validation and the design of new programmes. As this review will demonstrate, curriculum in higher education is also concerned with the connections between modules, programmes, and disciplines.

LITERATURE AND PRACTICE REVIEW

RESEARCH QUESTION, AIM AND OBJECTIVES

To guide this review of literature and practice, the team developed the following research question:

> What components within the literature are of interest to the CoCREATE group and how can these be distilled and applied to inform a Quality Curriculum Framework (QCF) for TU Dublin?

The aim of this workpackage was to compile a comprehensive understanding of curriculum frameworks in higher education, with a view to informing the CoCREATE project team in developing the TU Dublin Curriculum Framework.

The objective of this workpackage in the CoCREATE Project Plan was to review the relevant peer reviewed, and grey literature (including examining other Curricula Frameworks) and practice and to include in this review curricula encompassing Levels 6–9.

The sub-objectives of this workpackage were:

- investigate the historical background of and drivers towards the use of curriculum frameworks in higher education;
- identify current best practice and trends in curriculum frameworks in higher education;
- develop a position on how these elements can be applied to inform TU Dublin's new curriculum framework·

The output of this workpackage is a synoptic, narrative review of the peer reviewed literature and grey literature in relation to curriculum design and development, combined with a condensed summary of existing practice (both national and international) in consideration of TU Dublin's vision, mission and graduate attributes.

CONTEXT – TU DUBLIN

Initial phases of work on a curriculum framework for the new TU Dublin were carried out before technological university designation was achieved. It is important to review these briefly here to show that we have taken account of this work, and to contextualise the CoCREATE project.

In 2017–18 a Project Definition Report (PDR) was completed for the new Technological University, encompassing its educational philosophy, curriculum framework, and graduate attributes. As part of this work, it was agreed that the term curriculum framework would be used to describe the over-arching principles for curriculum design in the new university, but that many other curriculum models and elements would be used across the different disciplines. The view was taken that the term 'models' related to the process of developing the curriculum. We recognised this diversity and sought to maintain it within the new structures in order to accommodate disciplinary differences, and also to avoid urgent need for newly designed or revalidated programmes to be changed once again. In discussion of the learning and teaching strategy for the new university, there are integrated initiatives on themes such as support for programme teams, first-year experience, assessment and feedback. Other strategies of the university (for example, research strategy) were also previously recognised as complementary to a curriculum framework and should be considered once again as we move through the CoCREATE project and beyond.

Discussions informing the PDR reflected the views that curriculum should be developed collaboratively with all stakeholders, including students, potential employers, and the wider community. There should be a focus on flexibility and knowledge creation but with the student–staff relationship at the centre of the engagement. Elements of choice should be designed in, for example community engagement, industry engagement or research at some level within every programme, and project-based assessment. There was a desire for person-centred curricula, where each student might have a personal development plan reviewed at intervals with a mentor or tutor and leading into career development and planning. Co-curricular activities would form part of this plan, including work with societies, associations and clubs. The individual plan would be informed by the TU Dublin educational philosophy. A focus on portfolio-oriented assessment was discussed to bring the years of study together across a programme, and allow students to demonstrate how they had developed particular skills. A curriculum framework should include examples to support schools operationalising it, and support from the LTTC for staff and programme teams designing curricula. A curriculum framework would need to be supported by the learning environment: learning spaces, library spaces, learning commons, recreational spaces, student accommodation, industry partnership, networks and clusters of activity, community partners.

The new TU Dublin was viewed as providing, overall, a unique tailored experience for each learner through a quality curriculum framework, student-centred methods, quality assessment and feedback, and graduate employability. The first step in creating this framework was the instigation of CoCREATE as a Team Teaching Fellowship project.

CoCREATE is a means of consulting across TU Dublin, gathering evidence of best practice nationally and internationally, and proposing a framework that will enable the design of innovative and sustainable programmes into the future.

The TU Dublin 2030 Vision, Direction and Goals (TU Dublin, 2019) calls on us to examine the first ten years of TU Dublin through the lens of the UN Sustainable Development Goals (SDGs). The mission of TU Dublin is:

- **Excellence** in student-centred learning supporting the growth of enterprising and socially responsible citizens with a global perspective;
- **Practice-led** impact-focused research and deep discipline engagement that excites our students and staff, and benefits our communities, society and the economy
- **Co-creation** of teaching, learning and research through dynamic collaboration and open engagement between our students, the university and our partners from industry, the professions, and civic society.

Stakeholder consultation for TU Dublin emphasised Planet, People and Partnership within the UN SDGs. Achieving impact in relation to these goals is envisaged through TU Dublin being a 'global player, flexible in delivery and attainment' and 'open knowledge without borders'.

SEARCH STRATEGY

A search of peer-reviewed literature and grey literature was undertaken during spring and summer 2019 in preparation for the formal phases of the CoCREATE project commencing in September 2019. It is important here to acknowledge warmly the expert assistance of Roisin Guilfoyle at the TU Dublin City Campus Library in supporting us with the construction of a search strategy.

A phase of brainstorming terms was undertaken, along with initial searches to validate these terms and alert us to other synonyms and related terms that should be considered.

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This is a synoptic review, that is, a condensed summary of existing curricula and practice nationally and internationally. Global parameters were set for the search: literature in the English language from the period 2009–19 was included. Six major themes were identified for the main search emerging from the brainstorming process, corresponding to the major headings in this document. Sub-themes were identified within each, and here some overlap occurred which led to adjustment of the themes before the main review was undertaken.

The original design of the CoCREATE project allowed for the literature review to continue until the end of February 2020. Some refinement of the project plans led to a revised date of early December 2019 for completion of this work and the search was scaled back in light of this. Once the initial search had been completed, some further rationalisation of themes was undertaken to refine the major sections of the review and the sub-themes to be explored. Seminal and key references for each major theme were reviewed, with a range of other literature being included where appropriate. We have also drawn upon existing materials produced for curriculum-design workshops offered by the LTTC as part of its accredited academic development programmes, and here acknowledge the work of past and current LTTC members.

Some boundaries have also been set for this review of literature and practice with respect to other areas of work already ongoing or recently completed within TU Dublin:

- Assessment and feedback are essential pillars of programme design, and the discussion presented here assumes these to be integral to curriculum design too. However, we have not reviewed literature on assessment and feedback as an extensive review was undertaken as part of the LEAF Team Teaching Fellowship project (LEAF, 2019).

- We acknowledge the importance of e-learning and blended learning in programme design, and the discussion presented here assumes this to be an integral element of curriculum planning and a curriculum framework. Again, we have not reviewed this literature specifically as there is significant work currently being undertaken in relation to the Digital Campus and the provision of learning technologies across TU Dublin. We have included some examples of curriculum design projects which explicitly encourage the design of blended learning elements in programmes.

- Curriculum is enacted within the physical campus and the digital campus, and the design of our physical learning spaces can contribute to the realisation of important elements of our eventual curriculum framework. This review does not address the design of physical spaces, but we refer the reader to the concurrent project Enabling pedagogic opportunities in the design of learning spaces (EPOL) which is exploring the effective design and use of physical learning spaces across the TU Dublin campuses.

In addition, the broader policy context and quality assurance infrastructure of higher education in Ireland will influence the development of a curriculum framework for TU Dublin. We have not provided a discussion of policy within this document, since national policy informs the mission, vision and values of TU Dublin as well as its commitments (for example under the HEA compacts and other initiatives. We note a recent publication in the policy space, Understanding and Enabling Student Success in Higher Education (2019), which relates research into the nature of student engagement and success at third-level to policy and strategy. This Report makes recommendations in relation to curricula which we note later (Sections 6 and 7). Our findings are consistent with the recommendations of many recent policy statements and initiatives which will be highlighted as appropriate in this document.

The next sections of this document present our analysis of relevant literature by major theme. We have taken the global to local approach here, starting with a consideration of the broad higher-education context, and focusing on the subsequent themes contributing to curriculum frameworks, as discussed in the literature. The themes are:

1. Higher education context
2. Curriculum in higher education
3. Curriculum and the sustainable development goals
4. Innovation and curriculum
5. The global citizen and curriculum
6. Graduate attributes and curriculum

CONTINUED OVERLEAF //

LITERATURE AND PRACTICE REVIEW

THEME 1: HIGHER EDUCATION CONTEXT

Any project in which we are thinking about curriculum in higher education prompts us to think in the first instance about the nature of higher education itself, and its purposes in the twenty-first century. Numerous scholarly works and studies have documented changes in higher education nationally and internationally over recent decades. This material will not be rehearsed here, but it is important nonetheless to identify headline changes and trends influencing definitions and conceptualisations of curriculum, and in turn, curriculum design in universities.

In Ireland, higher education has enjoyed strong levels of participation and a positive reputation internationally for the quality of its graduates. The third-level sector, inclusive of universities, institutes of technology and private providers, has expanded from the 1980s onwards, reflecting global trends towards higher participation and the massification of higher education (Henkel, 2000; Palmer, 2018). In the mid-1980s, economic recession and a lack of employment opportunities for many in society drove greater participation in education at all levels, meaning larger and more plentiful groups of students. Computerisation and the advent of the internet and world wide web also brought change, opening up institutions at the administrative level (for example with online registration) and at the academic level with access to online library resources, and online and blended learning (Weller, 2014). Successive governments in Ireland and internationally have focused on how higher education contributes to their national economies. This may be directly, through research outputs, patents, spin-off companies, and employment, but also through the development of skilled and effective graduates. Landmark reports such as Dearing (NCIHE, 1997) in the UK and Hunt (DES, 2011) in Ireland have established objectives and goals for higher education, with funding attached to the achievement of these. Policy, at the national level in Ireland, has required institutions to address inclusion and access, to increase participation by mature students and international students, and to develop graduate attributes and digital literacies. National frameworks of qualifications have been developed in Ireland and internationally, allowing for recognition of qualifications and credits achieved across different jurisdictions. Through the Bologna Process, programmes in Europe have been aligned to facilitate student and graduate mobility[6]. Semesterisation and modularisation have seen restructuring of the academic year and traditional 'courses' into programmes and modules. New professional services and fields of expertise have emerged in the third level sector to support these wide-ranging changes, including internationalisation, academic professional development, e-learning, access and inclusion, and community-based learning.

This brief outline of the wider context of higher education is provided to open our discussion of how curriculum is conceived of and defined in universities, and how we might define it in the context of the CoCREATE project.

6 http://www.ehea.info/

WHAT DOES 'CURRICULUM' MEAN IN HIGHER EDUCATION ?

Since the word 'curriculum' is used throughout this document and is the focus of the CoCREATE project, it is necessary to define the term. However, the challenge of defining the word curriculum in higher education has been well-documented in educational literature (Hicks, 2018; Bovill & Woolmer, 2019), and the issue remains unresolved. Discussion of curriculum, and curriculum reform, have also been recognised as contested and sometimes challenging issues (Shay, 2011; 2015). In this section we review these discussions, the available definitions, and propose a working definition for our purposes.

Discussion of curriculum in higher education raises the question of the relationship between knowledge and how that knowledge is disseminated and used – the relationship between teaching and research. Originally universities were viewed as places to develop learning, but not research; however, the teaching-research nexus has become increasingly influential in curriculum development and the underpinning values within. The joining of research and teaching under one university umbrella is challenging, with no clear consensus on how this can be sustainably achieved. If a university is concerned with 'stimulat[ing] critical questioning and inquiring into problems not yet completely solved' then perhaps learning and scholarship, in its broadest sense, can be the bridge that connects research and teaching in Higher Education (Annala & Mäkinen, p. 4). To achieve this, curricula should be inclusive of both research and teaching, based on values and principles that define a higher education experience. It is not just the documented requirements for a qualification, the types of assessments or even the order of the lectures within a module (Coate, 2009). Curricula are more than the sum of these parts, and a symbiotic research and teaching experience can be achieved by building curricula around values that support both teaching and research and, therefore, developing learning and scholarship across all those in the university. This compares with Brew's (2010) analogy of a split community where those within the university learn in isolation, in different physical and social spaces. To avoid this dichotomous reality, curriculum design needs to be a dialogic and inclusive endeavour, one in which all stakeholders have an equal voice and input (Pinar, 1994).

The seminal works on curriculum in higher education call for connections between teaching and research, and reflection on values and educational philosophy. However, the day-to-day reality for many academics is that curriculum is an ambiguous term (Fraser & Bosanquet, 2006; Hicks, 2018; Toohey, 1999) meaning any or all of the following:

- the outline of a programme or module
- the full programme or 'course'
- the syllabus
- programme
- module content
- the learning plan or learning outcomes
- assessment strategy
- competences and requirements (particularly with respect to professional bodies).

Academics will often be surprised to find discussion of the term curriculum in academic development programmes, considering it either a given, or as something for other parts of the education sector (schools in particular) to deal with. Curriculum was not discussed in the UK's landmark Report of the National Committee of Inquiry into Higher Education (NCIHE) in 1997. Neither did it receive dedicated space in the National Strategy for Higher Education to 2030 (Hunt Report) in Ireland in 2011. Munro and Hughes (2012) identify this dearth of literature about curriculum, while Barnett and Coate (2005) previously discussed the challenge of setting boundaries around the term once all of the factors influencing programmes are considered. Literature has tended to focus on programme design and the mechanics of this process, rather than the underpinning theories and values influencing curriculum. O'Neill (2015) proposes a cyclical approach to curriculum design that starts with the values of educators, their chosen curriculum models, and only then proceeds to the business of programme learning outcomes and module descriptors. McNutt (2012) asks who owns curriculum in our institutions, and whose interests are being served by curriculum change.

These discussions highlight the contested and unclear nature of definitions of curriculum in higher education. Having a poor definition or even no definition of curriculum means that groups of colleagues may be making very different assumptions in their curriculum design work. This in turn generates challenges and difficulties in programme design and implementation. Lecturers in higher education institutions have reported that they 'experience curriculum development as a difficult, ambiguous and poorly defined process' (Moore, Walsh & Risquez, 2007, p.28). If one person intends curriculum to be the syllabus for their module, while his/her colleague intends it to be the full programme inclusive of placements and final year projects, design problems will arise. Therefore, agreeing a working definition of curriculum will enhance the chances of working effectively and consistently with a curriculum framework supportive of programme design.

Jackson (2011, 2016) offers the broadest definition we have seen in this review – curriculum as 'all a student's experiences while they are studying at university – since most experiences have some potential for learning'. This definition forms part of his Holistic Curriculum Paradigm/Lifewide Curriculum (2016, p.3):

1. **Academic curriculum**, which may by designed to integrate real-world work or community-based experiences.
2. **Work-related curriculum** which is linked to a programme but does not receive academic credit.
3. **Co-curriculum;** experiences provided by the university that may or may not be credit-bearing and for which learners may or may not receive formal recognition.
4. **Extra-curriculum;** experiences that are determined by the learners themselves and constitute all the spaces that they inhabit outside the other domains[6].

Academics participating in curriculum development and in academic development programmes at TU Dublin have tended to find this definition too broad for their purposes but acknowledge that the academic curriculum is not all that students encounter or engage with at university. While a very broad definition of curriculum may not be practical, Jackson's work calls attention to how conceptualisations of curriculum have broadened in tandem with the changes taking place in universities over recent decades. Savin-Baden (2011) suggests that we need to reconsider notions of curriculum as being fixed on disciplinary knowledge, what she calls 'the myth of the body of knowledge' (BOK; p.131). Rather than focusing on the BOK, she references Barnett (2000) on supercomplexity and comments that we need 'the development of curricula that equip students for an unknowable world' (p.132). Brew (2013) highlights that others expect higher education to address a range of complex challenges: 'about the speed of change; about increasing complexity and ambiguity; about globalisation and global interdependency; about the ways in which technology is changing how people communicate with each other; and about the huge physical and social problems requiring multi-disciplinary, global solutions'. Also that graduates work in 'a postcolonial, pluralistic context in which people are required to deal with constantly changing knowledge, where every day people come across ideas that are not only different but radically different to their own' (p.603).). Brew's response to this challenge is to open up the curriculum specifically to undergraduate research, an approach reflected by the work of Healey (2014) and the Connected Curriculum (Fung, 2017). Brew (2013) additionally comments that such research needs to be authentic – making new knowledge rather than uncovering what exists already. This is in the context that 'universities should become scholarly knowledge-building communities where academics and students work together to learn and solve problems of the world' (p.609).

6 We note that CoCREATE project consultations have revealed a preference for the term 'co-curricular' rather than Extra-Curricular and adopt that term in this literature review.

Priestley and Philippou (2019) trace a similar shift in curriculum towards 'a new focus on the centrality of the learner, accompanied by the development of active forms of pedagogy and a view of teachers as facilitators of learning' (p.2).

Others have taken this stance further to address issues of power, control and politics in university curricula. Annala and Mäkinen (2012) define curriculum as 'the intentional and dynamic process, which reveals the values and principles in relation to learning, knowledge and disciplines, and the cultural and political purposes of HE' (2012, p.4). Critical pedagogy challenges institutions to review curriculum in terms of whether and how it reproduces existing power structures and privileges or challenges them (Freire, 1996). Johnston, MacNeill and Smyth (2019) draw on critical pedagogy to discuss curriculum as praxis 'positioning the curriculum – and formal education – as a means to improve society and the human condition' (p. 153), contrasting this with a 'bounded curriculum' (p. 154) focused on delivery of a product. These explorations highlight the more abstract dimensions of curriculum alongside the process of curriculum design in universities. The argument being made throughout these works, frameworks, and models is that students need not to acquire a body of knowledge but to be able to 'critically evaluate both the world in which they live and received knowledge' (Brew, 2013, p. 604). Savin-Baden (2011) suggests that by 'seeing curricula anew as learning spaces, it may be possible to offer curricula that shift beyond performativity and are liminal in nature' (p.132). Priestley and Philippou (2019) summarise this by saying 'Curriculum is – or should be – at the heart of educational practice' (p.1) and highlight the climate crisis as a major current challenge in society. They argue that, while education cannot be the 'magic bullet' for these problems, it 'is a vital component in efforts to both create better and more cohesive societies, and to address the economic, social and environmental conditions that potentially destabilise modern societies' (p.1). They cite OECD research calling on education to address the challenges of climate change, economic uncertainty and mass migration. In light of this, they conclude that 'systematic and nuanced thinking about the curriculum has never been more important' (p.2).

This leads us to thinking about curriculum not at the level of prescribed modules and contents, but curriculum design as an articulation of values, and perhaps then subsequently as 'a high-level process defining the learning to take place within a specific programme of study, leading to specific unit(s) of credit or qualification' (JISC, 2014, p.2). These perspectives must be balanced alongside the mechanics of a National Framework of Qualifications, and also the individual beliefs and values of each educator within the institution.

Curriculum here is envisaged as informing programme design, but also separate to programme -specification documentation, which captures programme and module intended learning outcomes and reflects national standards with regards to these [6]Jackson (2016) discusses curriculum in terms of his 'learning ecologies' model and traces the history of the term through the literature. He comments, '[h]ow we define and perceive the curriculum has important consequences for how we approach the task of promoting students' learning and development, including the way they perceive their affordances for learning'. Donnelly and Fitzmaurice (2005), and later O'Neill, Donnelly and Fitzmaurice (2013), balance these differing viewpoints by proposing the importance of sequence and a sequential approach to curriculum development. Starting with values and theoretical stance, we can progress to

'the overall education design and intent that guides students through a set of learning, teaching and assessment experiences towards the achievement of explicit learning outcomes and graduate attributes' (University of Bradford, 2016, p.6). This includes valuable learning that happens alongside the formal, often more structured, virtual or face to face learning within the classroom.

In summary, our review of the literature has revealed that conceptualisations of curriculum show it moving from representing a syllabus or course content, towards a process which is socially constructed and value-laden. Drawing particularly on Annala and Mäkinen (2012) and other key texts reviewed, we suggest a working definition of curriculum as the articulation of the university's values and principles with regards to teaching, learning and assessment, knowledge and the disciplines, and the cultural and political purposes of HE.

6 A programme learning outcome is a statement of what the learner is expected to know, understand or be able to do on successful completion of the entire programme. A module learning outcomes is a statement of what the learner is expected to be able to do on successful completion of the module in order to demonstrate their knowledge, understanding, skills or competencies

CURRICULUM DESIGN

A curriculum framework is not a set of rules or a prescription for programme design. That being said, our review of literature and practice has demonstrated the co-dependence of curriculum and curriculum design, conceived of more broadly. Curriculum design and development is as old as curriculum itself, one cannot exist without the other. External factors, such as social, cultural and environmental agendas can, and should, influence curriculum design.

The process of designing curricula in higher education is under-researched (Bovill & Woolmer, 2019). A key contribution in this space has been made by colleagues in TU Dublin and UCD, emphasising the importance of sequence and an iterative approach to design (O'Farrell, 2015; O'Neill, 2015). These contributions are welcome and provide a structure for our consideration of design processes in the following sections. O'Neill's (2015, p.1) visualisation of the phases of curriculum design is particularly useful. This visualisation encourages us to think about curriculum design in a sequence from philosophy and values, consideration of appropriate curriculum models, programme learning outcomes and structure, teaching, learning and assessment strategies, and only then the design of specific modules. We have briefly considered each of these phases here in terms of how they might be reflected in a broader curriculum framework for TU Dublin.

PHILOSOPHY AND VALUES

TU Dublin has a long-standing commitment to the professional development of academic staff in relation to teaching, learning and assessment, inclusive of curriculum design.

An important facet of this work has been the development of teaching philosophies, with staff teaching and facilitating the learning of students in wide-ranging contexts. This is reflective of global trends over the past 30 years, which have seen the growth in academic development initiatives, and the opening up of teaching practice in higher education both in Ireland and internationally (Sorcinelli, 2016). The development of reflective practice in higher education has been transformative in the work of many lecturers, and the articulation of philosophy and values is a cornerstone of reflective practice. Values inform practice and our approaches to teaching as well as supporting learning amongst our students (National Forum, 2016).

A teaching philosophy statement is an important means by which we express our values and principles as educators. An early activity in many academic professional development programmes will be the drafting of a teaching philosophy statement to articulate our values and purposes as educators. McNutt (2012), citing Goodman (2003), comments that our beliefs and values should be the primary context in which material interests and social practices occur. This means reflecting on what is the purpose of higher education, and what is important to us as educators in this space. Our educational philosophy reflects our values which will be reflected in our curriculum design decisions. O'Neill's (2015) cycle of curriculum development starts with self-reflection on one's own philosophy of teaching and learning and the development of an educational philosophy statement by the programme team. This has been reflected in the drafting of an educational philosophy statement for the new technological university TU Dublin in 2018, and should in turn be reflected in the Curriculum Framework.

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LEARNING THEORIES AND CURRICULUM

The relationship between learning theories and curriculum has also been discussed in the literature. As reflective practitioners, we may have our own theories of how people learn or we may have engaged with educational theory in a more formal way. Whichever is the case, it is important that we address theory here. As Donnelly and Fitzmaurice (2005) point out:

> [W]hy is it important to be aware of the theories that underpin learning? We would argue that a theory should make explicit the underlying psychological dynamics of events related to learning. Each one is based on different assumptions about the nature of learning and we are suggesting that you identify your own theory of learning because the strategies one might use to enhance learning will directly follow from one's orientation. (2005, p.101)

Educational theory has followed three broad directions since the 1950s: behaviourism, cognitivism and constructivism: a useful summary is provided by Carlile and Jordan (2005) and Jordan, Carlile and Stack (2008). We see for example the influence of behaviourism in curricula which have a strong focus on the delivery of content and testing using examination-like assessment strategies. We also see the influence of behaviourism in what has been called the 'outcomes culture' (Gosling, 2009) with programme and module learning outcomes demonstrating what the learner can do by the end of their studies. We see the influence of cognitivism in curricula which focus on problem-solving, and which include a range of media and activities by which to stimulate learning. Constructivism and social constructivism are evidenced in curricula which include student research and discovery, peer teaching, authentic activities related to the real-world professions of graduates, and various forms of group work and group assessment. We see each of these theories influencing the use of new technologies in higher education too (Laurillard, 1993, 2002). It is important for us to consciously recognise the influences of theory on curriculum design, and where possible to articulate our own understandings of how learning happens so that we may be aware of this in reviewing and changing curricula.

FROM CONTENT TO PROCESS

Researchers have sought to develop understandings of how academics conceptualise curriculum. Influential work by Toohey (1999) and Fraser and Bosanquet (2006) using interviews with academics demonstrated a range of categories (Table 1).

Toohey (1999)	**Fraser and Bosanquet (2006)**
Traditional or discipline based: content delivery based on subject, not guided by learner	**Category A:** structure and content of a unit (subject), subject content, unit outline, how it is delivered
Performance or system-based: focus on meeting system or technical objectives	**Category B:** the structure and content of a programme of study, units, course
Cognitive approach: focus on development of learner's mind e.g. problem solving	**Category C**: the students' experience of learning, a process that enabled students' learning, disciplinary
Personal relevance/experiential: self-directed learning, participatory	**Category D:** a dynamic and interactive process of teaching and learning, collaborative, co-constructive, participatory
Socially critical: social context and political effects of subject taken into account	

***Table 1**: Academics' conceptualisations of curriculum*

Roberts (2015), interviewing academics in a research-intensive university, identified a range of orientations towards curriculum (p.544):

- Discipline-based orientation, which aims to induct students into the discipline.
- Professional and academic orientation, where students are prepared for a range of future pathways that include professional practice, research and learning at university.
- Personal relevance orientation, which aims to help students make sense of their everyday experiences for the purposes of self-understanding and personal growth.
- Social relevance and reform orientation, which aims to develop students' understanding of social issues and structures, with a view to social reform.
- Systems design orientation, which aims to design an effective system for learning.

Smith's (2000) Infed blog post addresses curriculum in four ways:

- 'syllabus to be transmitted'
- 'product'
- 'process'
- 'Praxis' (education into action)

Our review shows that much recent research around curriculum has focused on this distinction between process and product (Neary, 2003; Knight, 2001). Is the purpose of higher education to relay or deliver a product to the student, or to engage in a process of co-constructing learning? O'Neill (2015, p.28) captures this in her analysis of approaches to curriculum design, but notes also that this is not a case of absolutes and that many programmes will blend elements of both approaches.

We see here process and product orientations, reflecting greater and lesser participation by the student in the design of curricula and learning experiences. This links with our values as educators and our theories of how learning happens. A product orientation will tend to focus strongly on disciplines, disciplinary norms and culture (Toohey, 1999), threshold concepts (Meyer & Land, 2005), subject knowledge, and learning outcomes (Gosling, 2009). A process orientation will tend to focus more on dialogue, experience, reflection, participation by students (Carlile & Jordan, 2008) and, potentially, a critical stance on education (Freire, 1996). However, it is rarely the case that people commit absolutely to one orientation or the other: we see some elements of process and product in curriculum design which may be influenced by the nature of the programme, subject area, links with professional bodies, student profile and demographics, and a range of other factors.

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In relation to frameworks for curriculum, Bovill and Woolmer (2019) identify four frameworks that have informed research and theorising in relation to curriculum in higher education, and from which a range of models has been developed. Their analysis is useful, although it is important to note that here (as elsewhere) the terms framework and model tend to be used interchangeably: 'Biggs (1996) constructive alignment model; Fraser and Bosanquet's (2006) academic staff definitions of higher education curriculum; Barnett and Coate's (2005) Knowing, acting and being framework; and Bernstein's (1975, 2000) work on "what counts as valid knowledge" and "framing"' (p.410)[6]. Bovill and Woolmer (2019) go on to analyse the extent to which meaningful co-creation of the curriculum is possible by students in each of these frameworks, concluding that this exists in each but may be limited in outcomes-focused work and it is dependent on how discussion and collaboration take place. They call for "further dialogue" (p.419) about curriculum to reflect on beliefs and examine the true scope for students to co-create the curriculum and co-create learning within the curriculum.

This discussion has shown the complexity of dealing with curriculum in higher education, but also recognised changing views of curriculum influenced by our philosophy, values and theories of how people learn.

CURRICULUM MODELS

From the broader orientations towards curriculum described in the previous section, research and practice have led to the development of a number of models for curriculum design that can sit within the institutional curriculum framework. O'Neill (2010, p.2) points out that 'curriculum models help designers to systematically and transparently map out the rationale for the use of particular teaching, learning and assessment approaches' but that 'they are not a recipe and should not be a substitute for using your professional and personal judgement on what is a good approach to enhancing student learning'. Other researchers have identified the need for careful consideration of how to use curriculum models, and the different interpretations of each that can lead to qualitative differences in the programmes designed (Ali, 2018; Akerlind, McKenzie & Lupton, 2014; Trigwell & Prosser, 2014). Curriculum models facilitate discussion and decision-making in relation to the details of programme and module design – what will be learned and how; how will we know if it has been learned? – in other words, the key detailed planning of our teaching, learning and assessment strategies. For these discussions to happen, staff also need well-functioning programme teams and may also wish to involve academic developers or avail of continuing professional development (Engin & Atkinson, 2015).

6 We include a selection of other curriculum frameworks developed at institutions close by or similar to TU Dublin later.

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The most widely documented and discussed models we have seen in the literature are summarised in Table 2. As the primary task in the CoCREATE project was to design the over-arching framework in which models might sit or be adapted for use by programme teams, we have not dedicated space to discussion of all of these. We, instead, refer the reader to the key sources cited.

Model	**Key References**
Outcomes-based	Bloom et al. (1956)
Constructive Alignment	Biggs (1996), Biggs & Tang (2003)
Threshold Concepts	Meyer & Land (2005)
Problem and enquiry-based learning	Savin-Baden & Howell Major (2004)
Learning Design	Conole (n.d.)
Dialogic approaches	Salmon (2000), Laurillard (1993, 2002)
Subject-Centred Design, Learner-Centred Design	Ornstein & Hunkins (2004
Naturalistic Model	Walker (1971)
Universal Design	Rao, Ok & Bryant (2014)
Lean Six Sigma	Thomas et al. (2017)
Technical Scientific	Tyler (1949)
Backward Design Model	Wiggins & McTighe (2010)
Negotiated Curriculum	Ornstein & Hunkins (2009)

Table 2: Example Curriculum Models (adapted from O'Neill, 2015; Bovill & Woolmer, 2019)

FROM CONTENT TO PROCESS

Researchers have sought to develop understandings of how academics conceptualise curriculum. Influential work by Toohey (1999) and Fraser and Bosanquet (2006) using interviews with academics demonstrated a range of categories (Table 1).

STUDENTS AS PARTNERS

The literature shows that the design of curricula will often reside with individual lecturers and their programme teams (Bovill, Bulley & Morss, 2011), and will tend to include consultation with employers and professional bodies where appropriate (Lawson & Wood, 2019).

Students are consulted less often, and both researchers and policymakers have argued for a much stronger student role in curriculum design (European Commission, 2013; Bovill et al., 2011). Bovill, Cook-Sather and Felten (2011) argue for students to be involved in the design of teaching events and activities, courses, and curricula. Increasingly, the inclusion of the student voice has been seen as critical in developing curricula that are both appropriate and engaging. Integrating the student voice promotes a discussion around staff assumptions around the learning and teaching process and it moves the curriculum design process from a staff centric activity to a more inclusive endeavour (Brooman, Darwent & Pimor, 2015). Engaging students through involving them in the design of their own learning increases their commitment and leads to deeper learning with stronger outcomes (Bovill et al., 2011). Critical thinking and responsibility for their own learning are developed through these approaches. However, it is important that the inclusion of the student voice is not simply a 'tick box' consultative exercise; students should be equal, participative partners in all aspects of the process, not just the final approval stage (Seale, 2009). It is also important that academic staff and academic developers address resistance to students as partners in learning design (Bovill et al., 2011).

Students are the only stakeholders that experience a curriculum; their learning is shaped as much by the curriculum values as the actual syllabus. Understanding the student lived experience of a curriculum will uncover misconceptions and should reduce repeating curriculum design mistakes of the past (Mihans, Long & Felten, 2008). An approach to curriculum design inclusive of students' voices could enhance diversity and inclusion in programmes too (Jessop & Williams, 2009). Including students as equal results in a co-created curriculum; one that all stakeholders, including students, have ownership of and responsibility for (Bovill et al., 2011). Johnston, MacNeill and Smyth (2019, p.156), modelling a digitally distributed curriculum and 'porous' university argue for a 'co-produced' curriculum in which students are producers of the curriculum as well as within it. Marshall (2014) takes the Māori concept of Ako – education as collaborative learning and teaching between teacher and student – to argue for more open and co-created curricula and experiences.

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Examples of successful partnerships with students as designers of their own educational experiences have expanded in number in recent years. The UK HE Academy captures a range of case studies in its Students as Partners in the Curriculum (SAP) report (2015). The work of Healey, Flint and Harrington (2014) in Engagement through partnership: students as partners in learning and teaching in higher education reports on the development of students' roles in learning and teaching and has also informed the development of the CoCREATE project more broadly. Healey and colleagues discuss student 'engagement through partnership' (p.7) and the challenges of this work: the need for partnership to be part of the institutional ethos, to develop shared understandings and values (recognising tensions), working ethically with students in this space, and considering appropriate contexts for such work. However, they also highlight the pedagogical benefits of rich and meaningful partnerships with students and 'the possibility for genuinely transformative learning experiences for all involved'.

A number of recent influential curriculum-design projects undertaken in Ireland and the UK, all of which have included a students-as-partners approach, reflected strongly in the outcomes and recommendations of each (see section below on Notable Recent Curriculum Projects).

THEME 3: CURRICULUM AND THE SUSTAINABLE DEVELOPMENT GOALS

We have considered the place of higher education in the twenty-first century, and curriculum as part of higher education in that context. Equally important is consideration of higher education and curriculum in the context of sustainability, as we are confronted with a climate crisis and rapidly fluctuating political context in the global north. Currently, the world as we know it faces huge environmental changes; these changes will have knock-on effects on our social and cultural norms. In an attempt to prepare for the future, the United Nations (UN) published the Sustainable Development Goals (SDGs) with the aim 'to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030' (UN, 2015). We consider the SDGs and the broader issue of sustainability in this section.

UN Sustainable Development Goals

In 2015, the United Nations member states adopted its seventeen Sustainable Development Goals (SDGs) to provide 'a shared blueprint for peace and prosperity for people and the planet, now and into the future', with the SDGs being 'an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests'.[6]

6 https://sustainabledevelopment.un.org/sdgs

The SDGs relate to education in diverse ways. For example, SDG5 focuses on gender equality but includes reference to equal access to digital technologies and literacies for women, particularly in the global south. The SDGs have already been cited as central to the development of institutional structures and strategies at TU Dublin (2019). SDG4, quality education, calls on educators and policymakers to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all'. SDG4 focuses on early years and compulsory education, for clear reasons: more than 200 million children between the ages of six and seventeen were not at school in 2017. A further 617 million children and adolescents were 'not achieving minimum proficiency levels in reading and mathematics' in 2015. Certain groups are more disadvantaged than others, notably girls and marginalised people, and those living in areas of conflict or extreme poverty. The UN's data indicate high numbers of illiterate adults globally, and a continuing lack of educational infrastructure in the global south. Teacher education, and particularly the continuing professional development of teachers using new technologies, have been highlighted as ongoing challenges in education around the world. These figures are stark but do not mean that higher education is omitted from SDG4 in the interests of addressing more immediate priorities.

Rather, the SDG4 targets and indicators highlight the place of post-compulsory education and university in tackling the broader issues identified. Further and higher education can support those young people and adults who have missed out on earlier education or had an impoverished experience. Higher education also has a role in educating teachers (a further priority indicated) and in addressing open educational practices which have the potential to improve access to higher education.

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AN EDITED LIST OF THE TARGETS AND INDICATORS OF PARTICULAR RELEVANCE TO COCREATE ARE LISTED HERE:

4.3	*By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university*
4.3.1	*Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex*
4.4	*By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship*
4.4.1	*Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill*
4.5	*By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations*
4.5.1	*Parity indices (female/male, rural/urban, bottom/top wealth quintile and others such as disability status, indigenous peoples and conflict-affected, as data become available) for all education indicators on this list that can be disaggregated*
4.7	*By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development*
4.7.1	*Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment*
4.b	*By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries*
4.b.1	*Volume of official development assistance flows for scholarships by sector and type of study*

The full implications of SDG4 need to be addressed carefully in our curriculum framework in terms of our provisions as a higher education institution in the digital age, responsive to the local and global community.

Global issues, such as those addressed in the UN SDGs, require considered and widespread engagement. As a highly influential component, education can change thinking and practice, leading to a new normal. But what can education do to empower the changes needed for UN SDG success? Initially, embedding sustainability into the curriculum was based on specialised content addition, or the creation of bespoke sustainability courses (Tilbury, 2019). However, this in itself was not sustainable, and a more holistic approach was required, one that focussed on true integration and permanent changes in people's patterns of living.

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There is an increasing literature base in this area; approaches include Education for Sustainable Development (Mula et al., 2017) and Systems Thinking (Reynolds et al, 2018). The higher-education sector has sought solace and support, through networks such as Global University Network for Innovation, to allow it to be a contributing and driving force behind a truly sustainable future (Leal Filho et al. 2017). Overton (2019) reports that Leeds University in the UK has designed sustainability into the curriculum through programmes and modules, and established a Sustainability Service to work directly with schools. The curriculum is a mechanism to introduce sustainability issues, leading to opportunities for students to undertake related research and projects. Higher education can act as a sustainability model with students and staff integrating transdisciplinary teaching and learning to allow the complex problems that underpin our current sustainability shortcomings to be answered. A tangible and direct approach to achieving this level of integration can only come from a designed and concerted curriculum which places the learner in the centre of the sustainability space.

SUSTAINABILITY AND HIGHER EDUCATION

More broadly, our review of the literature has identified a range of discussions over the past ten years in relation to sustainability and higher education. This is characterised by reflection on, and critique of, the record of universities in relation to sustainability, and the need to change how we teach and learn in order to work towards a more sustainable model in the future. Bartlett and Stewart (2009, p.361) outline a stark positionality, arguing that '[A]s participants in privileged institutions, employees and students in higher education are members of cultures that are more or less embedded in a pattern of massive carbon dependency and waste. If the climate crisis is to be solved, correspondingly massive shifts in these cultures will need to take place.' The discourse on sustainable development and the principles of sustainability are becoming increasingly important as citizens become more aware of the consequences of climate change. integration can only come from a designed and concerted curriculum which places the learner in the centre of the sustainability space.

Albareda-Tiana et al. (2018) indicate that from the 1990s onwards, the Declarations on Sustainability in Higher Education started to encourage sustainability in universities (Leal Filho, 2010; Lozano et al., 2013; Michelsen, 2016). Lukman and Glavič (2007, p.103) questioned what the key elements of a sustainable university are within this discourse. They suggest that universities are acting as agents in promoting these principles within society. The paper discusses definitions of education for sustainable development and draws attention to important documents that inform the domain, suggesting that 'in the future, universities will inevitably play crucial role in propagating these principles'. However, the paper also draws attention to the challenges that sustainability presents to the universities as they navigate the dual roles of acting sustainably but working

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with industry where innovations by their nature are not necessarily sustainable. Lukman and Glavič (2007) outline a four-stage approach to underpin a sustainable university and draw on an extensive body of supporting documentation on policy from the EU and UN, in addition to outlining a case study from Slovenia.

In the Routledge Handbook of Higher Education for Sustainable Development (Barth & Rieckmann, 2015), the editors attempt, through a series of chapters on the subject, to present an overview of where research on higher education for sustainable development (HESD) informs the developing discourse. The authors survey current research on HESD and propose where it may be going in the future. The handbook brings together a variety of voices on the subject with different research perspectives, insights and experiences. Thomas (2016) suggests that significant effort has been made by universities in the reorientation of learning and teaching practices in sustainability. He outlines the literature associated with change in HEI's curriculum demands in relation to education for sustainable development and provides guidance on how these changes can be facilitated into the future.

Albareda-Tiana et al. (2018, p.488) also argue that 'The University (..) should promote a culture of sustainability, which contributes to integral human development. To make this commitment more robust, it is necessary to incorporate ESD and the SDGs into the curriculum of the University degrees.' Referencing Wiek, Withycombe and Redman (2011), they argue that educators have a key role in transforming teaching and learning models for future professionals to be able to address and solve the sustainability problems. The study undertaken and outlined by Albareda-Tiana et al. (2018) provides evidence of the real challenges and opportunities that exist around the concept of sustainability and confirm the need to transform teaching and learning practices related to the SDGs.

New kinds of connections between the disciplines are important in this context. Nicolescu (1997, p.2) argues that 'If the universities intend to be valid actors in sustainable development they have first to recognize the emergence of a new type of knowledge—transdisciplinarity knowledge—that is complementary to traditional, disciplinary knowledge.' He goes on to suggest that 'the emergence of a new culture capable of contributing to the elimination of the tensions menacing life on our planet, will be impossible without a new type of education which takes account of all the dimensions of the human being' (ibid, p. 5). The paper suggests a need to redefine the values that govern the university and to open the university up to civil society and to the other places of production of new knowledge.

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This need for greater interdisciplinary and transdisciplinary work is underlined by Millar (2016) in relation to the Australian experience in assessing factors that affect curriculum in the context of climate change issues. Millar (2015, p.46) cites the University of Tasmania's curriculum principles which state that 'adherence to traditional disciplinary boundaries has potential limitations insofar as understanding contemporary economic, social and political problems. To address these issues, we encourage multi-disciplinary study to enhance students' capacity to draw upon other norms and models of understanding.' The paper argues that we need courses designed to teach students about society's complex problems. This is reiterated by Hess and Collins (2018, p.1451) who outline the need for changes in the higher education curriculum to combat the 'pervasive misinformation' around the subject of climate change. They draw on case studies in the US and discuss strategies that could ensure a higher likelihood that the core curriculum includes education on climate science and climate change. Their study 'advances the broader research literature on sustainability in higher education programs by bringing it into conversation with research on the college core curriculum and by focusing both on the specific issue of climate-change education' (p.1451).

In addition to the literature on education for sustainable development and climate change issues, there is also a relevant literature on Universal Design for Learning (UDL) (Black et al 2015; Al-Azawei, et al. 2016; Seok et al., 2018; Bracken & Novak, 2019; Grimes et al., 2019) and on the development of Community Based Learning (CBL) (Tinto, 2003; Melaville et al., 2006; McIlrath et al., 2014; Saltmarsh, 2017); which informs the transdisciplinary discourse under the SDGs. It is beyond the scope of this review to interrogate these areas in greater detail than has been done under Theme 3, but they are noted here.

Curriculum innovation has been defined as 'creative initiatives in curriculum planning and implementation processes by learners, teachers and curriculum specialists' (Makewa & Ngussa, 2015, p. 257). White (1993), when discussing innovation in curriculum planning, distinguished between innovation as a deliberate effort, perceived as new and intended to bring about improvement, and change which is any difference which occurs over a time period. The distinguishing factor is human agency. White further observed that much innovation in teaching has been solely concerned with pedagogical change – innovation in teaching methods must take account of and respond to many other considerations; individual, social, organizational, political, technological and historical.

As an example, the formation of TU Dublin comes at a time of great technological change. Online and blended learning have gained in popularity rapidly in recent years, with authors studying the implications in terms of pedagogy (Bonk et al., 2005), accessibility (Marginson, 2016) and cost (Deming et al., 2015). In this section, we examine the theme of innovation in curriculum development through several lenses.

Why do HE providers innovate in curriculum?

O'Malley (2016) studied the drivers for innovation in learning and teaching in a HE context, through focus group discussion with representatives from ten HE providers. The dominant driver was found to be students, with a number of aspects considered important: innovation as a mechanism for delivering student choice; reflecting student feedback; exceeding student needs and expectations; enhancing outcomes and employability; and fulfilling an ethical or moral duty to do the best for students.

Design-thinking tools in curriculum innovation

In a professional higher education context, Leonard, Fitzgerald and Riordan (2015) made a case for 'developmental' evaluation as a design thinking-based research tool for sustainable curriculum innovation. One of the issues with professional education is the variety of stakeholders involved from a variety of sectors including research, practitioners, and employers. In developmental evaluation, the focus is not simply on evaluation of a final design, but on processes of rapid reconnaissance, territory mapping and emergent modelling.

Design-thinking tools in curriculum innovation

De Vries (2018), considering teacher education, defined the idea of the semi-permeable curriculum as 'an open-ended core curriculum with a firm base in evergreen content around which flexible elements about new content can evolve'. As a starting point, they identified the fact that almost all professions these days deal with 'rapidly evolving new theories, practices, techniques and strategies'. Faculties of higher vocational education are engaged with the design problem of raising professionals for an as yet undefined future. Therefore, a flexible approach to curriculum is essential in order to be able to adapt just-in-time and continuously. This is echoed by Hughes and Tan (2012), who coined the phrase 'dynamic curriculum' to describe school-level flexibility and adaptability at school level. The aim of this flexibility is to make higher-education future-sensitive and adaptable to changes, on the one hand, in the work field and society and on the other, the needs of diverse cohorts of learners and stakeholders. Similar concepts have been described using the terms 'living curriculum' (Churchill, Bowser & Preece, 2016) and 'modularisation' (Lucena, 2003; Snyder, Hrer & Moore, 2011). These findings from the literature demonstrate the value of designing in opportunities for evaluation and adaptation in our curriculum framework, allowing for innovation to flourish particularly in the context of professional programmes and our connections with community and industry.

DEFINING THE GLOBAL CITIZEN IN THE UNIVERSITY CONTEXT

Literature in the area of global citizenship demonstrates broad agreement on how to define the global citizen in the context of higher education. Lilley et al. (2017a, p.6) cite the United Nations Educational, Scientific and Cultural Organization (UNESCO; 2015) report which identified the need for forms of education that enable learners to address local and global challenges, as socially responsible, critical and ethical thinking graduates, a disposition consistent with the global citizen. Two conceptual lenses dominate the discussion around the global citizen: (1) the neoliberal lens which places an emphasis on the development of individual professional skills and employability in an international context; and (2) the cosmopolitan lens which promotes the development of an intellectual mind-set which sees the individual develop the ability to understand and grapple with the economic, social, technical, environmental and cultural aspects of society (2017a, p. 7). The cosmopolitan view of the 'global citizen' resonates with Barnett's (2011, p.451) ideas around the 'ecological university' described as 'a university that takes seriously both the world's interconnectedness and the university's interconnectedness with the world'. For Barnett, students develop as 'global citizens' when they demonstrate concern for the world, and an understanding of their own possibilities in the world and towards the world. In a similar vein Killick (2012, p. 373) argues global citizenship education is the 'legitimate business of the university'. The notion of global citizenship has been described as a disposition incorporating ethical, social and professional understandings (Lilley et al., 2015a). Tarrant (2010) supports Dobson's (2003) view of citizenship citing issues of justice, the environment, and civic obligations as key determinants of what it means to be a global citizen.

Morais and Ogden (2011, p.447) argue that while there is no particular definition of 'global citizenship' three overarching dimensions of global citizenship are consistently noted in the literature: social responsibility, global competence, and global civic engagement. Within each dimension are multiple sub-dimensions that further reflect the complexity of the construct.

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THE GLOBAL MINDSET

According to Green (2012, cited in Lilley et al. 2015b), fostering a student's moral compass is an essential component of the global citizen disposition. However, there is a dearth of research on what the process of 'becoming' a global citizen actually entails. Lilley and co-workers' (2015a, 2015b, 2017) empirical work has shed some light on questions of meaning and learning processes around the development of global citizens in the university context. Key to their conceptualisation is the development of the global mindset, 'the generating center of global citizen learning' (2015b, p.235). Their research focuses on the experiences of international 'mobility' students. They propose that global citizen learning occurs when students are taken out of their 'comfort zone'. The development of a global mindset was evidenced as students described being able to consider other perspectives, engage more with emotions, assumptions, imaginations and 'make interconnections of knowledge across complex contexts' (2015b, p.236). While most participants agreed that the global citizen is a fluid concept and there is no 'one size fits all' (2017, p.13), Lilley et al. (2015b) developed an 'identikit' or set of recognisable markers which offers an insight into what a global citizen might look like as a curricula outcome. This identikit is reproduced in Table 3 in the following page.

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Leaves comfort zone	■ Shows courage to go on a mobility experience ■ Shows courage by taking on challenges locally ■ Mixes beyond social peers ■ Engages and works with different "others" ■ Engages in learning activities "out of the comfort zone"
Thinks differently	■ Questions assumptions ■ Imagines other perspectives and possibilities ■ Shows awareness of self and others ■ Makes the interconnections of knowledge across complex local /global constructs ■ Recognises common humanity and environmental sustainability"
Engages beyond immediate circle of peers, family, and friends	■ Engages with social and cultural others
	■ Shows language pain tolerance' (patience, empathy, and willingness to understand different accents and limited language skills)
Shows a mature attitude and initiative	■ Volunteers in service and participates in community activities
Considers self, life, others, and career, and the world beyond narrow expectations	■ Assists others (cosmopolitan hospitality)

Table 3: *The broad markers of a global citizen (adapted from Lilley et al, 2015b, p. 241)*

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As it stands, the development of global citizenship in students in higher education contexts is for the most part encapsulated in the Internationalisation of Curricula (IoC), which is particularly the case in Australia and the European Union. Evidence of the development of global citizenship in students in higher education is for the most part associated with mobility and international exchange. While this is a positive development in terms of bringing global citizenship to the curriculum framework agenda, Salter and Halbert (2017) argue that an intense focus on 'outbound discourses' leads to a failure in recognising opportunities for the development of global citizenship 'within parochial contexts' (p. 703). They argue further that curriculum frameworks that 'facilitate cosmopolitan ways of thinking and being, such as critical service-learning, present opportunities for a fourth wave of globalisation in higher education'.

GLOBAL CITIZENSHIP AS A CURRICULUM OUTCOME

Lilley (2014) argues we are experiencing an unprecedented change in relation to the creation of and access to knowledge, and that this presents universities with a challenge in meeting aims for educating socially responsible citizens and work-ready graduates. Further Lilley (2014) points to the fact that while the term 'global citizen' is widely used in universities it tends to attract a great deal of scepticism. She highlights organisational challenges that can hinder the effective enactment of the 'global citizen' as an educational principle in universities. These challenges include issues around the measurement of the transformative benefits of mobility, a challenge she proposes can be overcome using qualitative approaches which emphasise global citizenship as a learning process or, in Rizvi's (2009) terms ,an ongoing process of 'becoming'. Another challenge highlighted by Lilley is the pressure university leaders are subject to in relation to balancing corporate responsibilities with those defined in UNESCO (2009) as social responsibilities and 'public good'. However, Lilley also points to a range of enablers with respect to incorporating global citizenship within curricula frameworks. She argues that 'thought leaders' are important here in promoting a 'reflexive cosmopolitan leadership'. The global citizen construct needs to become more recognisable and tangible for students. Tarrant's (2010) 'global citizen type' continuum, ranging from a 'personally responsible global citizen' to a 'participatory global citizen' to a 'justice-oriented global citizen', provides a very useful way for universities to articulate their expectations for the global citizen as a learning outcome. Lilley (2014) cites the University of Bournemouth, UK, as one of the few universities that has taken a 'whole of institution' approach towards educating global citizens and promoting sustainability across the entire university organisation.

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This 'social embeddedness' sees all 'university actors' made accountable for their contribution to the university ethos of social responsibility and global citizenship. Lilley (2014) cites the University of Bournemouth, UK, as one of the few universities that has taken a 'whole of institution' approach towards educating global citizens and promoting sustainability across the entire university organisation. This 'social embeddedness' sees all 'university actors' made accountable for their contribution to the university ethos of social responsibility and global citizenship.

A shift in thinking about global citizenship from being encapsulated primarily in mobility and international exchange aspects of the curriculum and, instead, as a learning capacity that can be developed in a range of teaching and learning pedagogies across the curriculum, serves to constructively broaden the discourse. Killick (2012) argues that global citizen learning sees a student engage in an ongoing process of identity self-formation. Table 4 depicts some of the tools that can be utilised to foster a sense of global citizenship in teaching and learning contexts.

Thinking Tools	Explanation
Social imaginary	Way to mentally deal with intercultural challenges ambiguity and complexity. Encourage students to imagine what it is like to be the 'other'. Be able to imagine and consider other possibilities and perspectives beyond the way things have always been socially, locally and globally.
Criticality	Critically reflecting on our own perspectives and reflecting on the assumptions of others. Learn to critically understand difference. Be comfortable challenging the 'known'. Be able to ask 'why', 'what for' and the 'what if' of change.
Reflexivity	Be able to challenge our own assumptions. Be able to embrace and learn from engagement with different others. Be open to critically explore the thoughts and actions of different others and diverse contexts in learning.
Relationality	Think about others in relation to ourselves rather than completely separate. Be able to walk in their shoes. Think about how they may see us. How does this new line of thinking challenge our understanding of the 'known'?

Table 4: Thinking tools to aid the integration of global citizen capacities into teaching and learning, adapted from Lilley (2014), citing Rizvi (2009) and Sawir (2011).

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Embracing the global citizenship construct as integral to a university curriculum presents an opportunity for the university to foster a transformative experience in students, educators and a broad range of stakeholders. Encouraging diversity on campus through internationalisation of programmes and student experiences generally will not, as Killick (2013, p.13) argues, in and of itself create 'border crossings and inclusive communities of practice'. Similarly, innovative practices at the module level while often highly impactful if experienced in 'isolated pockets of the formal curriculum' are unlikely to be transformative (Leask, 2009 cited in Killick, 2013, p. 731).

Designing in a global citizenship ethos at the level of the university curriculum framework enables 'the formulation of a more globally situated sense of self-in-the-world' (Killick, 2013, p. 731). This outward-looking and inclusive outlook aligns well with enhancement of employability as well as the development of skills essential for the development of engaged global citizens more generally. Killick argues that students themselves are seeking this ethos. It resonates with their perceived needs and what they want to achieve as a result of engaging with higher education.

THEME 6: GRADUATE ATTRIBUTES AND CURRICULUM

An important dimension of much curriculum development work in recent years has been the integration of graduate attributes with programmes. A very widely cited definition of graduate attributes from Bowden et al. (2000) holds that graduate attributes are 'the qualities, skills and understandings a university community agrees its students should develop during their time with the institution'. These attributes include, but also go beyond, the disciplinary expertise or technical knowledge that has traditionally formed the core of most university courses. They are qualities that also prepare graduates as agents for social good in an unknown future.

In taking cognizance of prior work undertaken by the newly formed TU Dublin, it is important to note that a set of graduate attributes was agreed in 2013 by a cross-institute group of the former Dublin Institute of Technology. An integral part of the work on graduate attributes was the development of a useful and concise toolkit, which serves as a set of guidelines for programme committees that seek to consider embedding graduate attributes in their curriculum[6].

6 See at https://www.dit.ie/teaching/graduateattributes/

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Graduate attributes initially emerged around the time of the Bologna process as a means of responding to the requirements of the workplace. Producing employable graduates that meet employer expectations has been criticised for complying with the neoliberal agenda, particularly in the context of university education (Kalfa & Taska, 2015). The broader potential of work on global citizenship in countering this argument has been broached above. Furthermore, despite this criticism, graduate attributes increasingly underpin the preparation of graduates for employability, life-long learning and active citizenship (Oliver & Jorre de St Jorre, 2018). As a result, graduate attributes serve as a useful framework to inform curriculum design, curriculum content, co-curricular activities, pedagogies and even the design of learning spaces (Hill, Walkington & France, 2016).

Of relevance to the design of a new Curriculum Framework are the systemic factors to the achievement of graduate attributes. These were identified by Hughes and Barrie (2010) through a large-scale Australian project. They used a pyramid for their visual representation (not been reproduced here for copyright reasons, but visible in their paper). Graduate attributes need to be conceptualised through a discussion around what their meaning might be, their importance and whose responsibility it is to implement them. The second tier of the pyramid concerns stakeholders' involvement while the next level is the implementation phase. Key points here include staff development around graduate attributes, an engagement with the teaching and learning process and a whole-programme approach to the embedding of graduate attributes in the curriculum and in assessment. Other factors of relevance for CoCREATE are those identified by Sparrow (2002), namely customisation of graduate attributes within disciplines; change embedded in course review and development processes; and implementation to focus on a few graduate attributes rather than all at once. The final stage of Barrie and Hughes's pyramid focuses on students as active participants in the development and assessment of graduate attributes. More recent investigations corroborate the importance of appropriate strategies for student engagement in the achievement of graduate attributes (Oliver & Jorre de St Jorre, 2018).

The recognition that graduate attributes should be contextualised, communicated and embedded throughout the curriculum has led a number of authors to report on the processes and challenges of mapping and embedding graduate attributes into the curriculum (Atrens, Truss, Dahle, Schaffer & St John, 2004; Bath, Smith, Stein & Swann, 2004; Bellew & Gabaudan,

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2017; Jones & Killick, 2013; Mager & Spronken-Smith, 2014). Portfolio/e-portfolio approaches and capstone projects have been highlighted as means to support reflection on learning, graduate attributes and transitions to the workplace (Fung, 2017; Shircore, Galloway, Corbett-Jarvis & Ryan, 2013).

Other studies consider the challenges and opportunities around the attainment of specific graduate attributes and the importance of explicitly assessing graduate attributes that are embedded in the curriculum (Oliver & Jorre de St Jorre, 2018). Some authors point to the difficulty of assessing and measuring affective values (Green et al., 2009; Haigh & Clifford, 2011) even though such soft skills are core to employability. Attributes that are more tangible and therefore easier to assess tend to be referred to as graduate outcomes, particularly in the UK (Hill et al., 2016). Also of importance is the progressive development of attributes within an undergraduate programme and from undergraduate to taught postgraduate level. Integrated frameworks across these levels have begun to emerge (e.g. Oxford Brookes University, n.d.).

A number of authors have conducted research in relation to the level of engagement with graduate attributes. The unit of analysis varies from a country (Spronken-Smith et al., 2015; Lee, Barker & Mouasher, 2013) to an institution or a faculty (Jones & Killick, 2013). For instance, as part of an endeavour to internationalise the curriculum, Jones and Killick (2013) focused on embedding one graduate attribute (Global Outlook) into the curriculum, first at programme level and then throughout the university. On the other hand, Lee et al. (2013) focused on the central theme of sustainability and explored the extent to which sustainability permeates graduate attributes within Australian's universities, both at the top level of the vision and mission and at the level of a particular school or faculty.

In a rapidly changing environment, continuously reviewing the attributes to ensure alignment between an institution's chosen set of attributes and its range of stakeholders is of paramount importance. Oliver and Jorre de St Jorre (2018) identify global citizenship, teamwork and communication, independence and critical thinking as key attributes for the graduate of 2020 and beyond.

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CURRICULUM FRAMEWORKS AT OTHER TECHNOLOGICAL UNIVERSITIES

We have undertaken a web search of other technological universities to locate information about their curriculum frameworks, learning and teaching strategies, or other strategic documents and initiatives in the public domain which can inform the CoCREATE project.

The web search was focused on those institutions most closely informing the development of TU Dublin, cited in Project Definition Reports, branding exercises and other relevant activities in which members of the team have been involved over the past number of years. Table 5 summarises our findings.

University Name	Relevant Links	Key Findings
University of Technology Sydney	• **Learning futures -** https://www.uts.edu.au/research-and-teaching/learning-and-teaching/learningfutures/how-our-students-learn • https://futures.uts.edu.au/ • https://sr.ithaka.org/publications/making-a-place-for-curricular-transformation-at-the-university-of-technology-sydney/ • https://www.uts.edu.au/research-and-teaching/learning-and-teaching/uts-model-learning-what-students-learn/what-students	• relates to the design of the campus and learning spaces as well as the curriculum • includes blog/website where people have posted articles about various aspects of curriculum change under the Futures banner - https://futures.uts.edu.au/ - highlights on sustainability in curriculum and students as partners - https://futures.uts.edu.au/?s=curriculum • separate news article about curriculum change and transformation of physical campus, could be relevant re Grangegorman – this is very detailed with a good few useful links https://sr.ithaka.org/publications/making-a-place-for-curricular-transformation-at-the-university-of-technology-sydney/ • what students learn/the UTS model of learning - https://www.uts.edu.au/research-and-teaching/learning-and-teaching/uts-model-learning-what-students-learn/what-students

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University Name	Relevant Links	Key Findings
TU Delft	• https://www.tudelft.nl/en/about-tu-delft/strategy/strategy-documents-tu-delft/ • Vision on Education - https://d1rkab7tlqy5f1.cloudfront.net/TUDelft/Over_TU_Delft/Strategie/Towards%20a%20new%20strategy/Vision%20on%20Education_web.pdf	
Chalmers University of Technology Sweden	• https://www.chalmers.se/en/about-chalmers/Chalmers-for-a-sustainable-future/Pages/default.aspx • https://www.chalmers.se/en/about-chalmers/Chalmers-for-a-sustainable-future/initiative-for-learning-environment/Pages/default.aspx • https://www.chalmers.se/en/news/Pages/Tracks-prepares-students-for-the-future.aspx	• Chalmers for a Sustainable Future– driving other strategies – Tracks – Learning and Learning Environment part of Chalmers for a Sustainable Future – Emphasises flexibility, some elements of personalisation of learning, cross-disciplinary learning • this is also combined with changes to the physical learning environment
Eindhoven University of Technology	• **Strategy to 2030** https://www.strategy2030tue.nl/	• emphasises research-based teaching • organised around cross-disciplinary research themes
RMIT University Australia	• https://www.rmit.edu.au/about/our-education/supporting-learning-and-teaching	• focus on sustainability in curriculum

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University Name	Relevant Links	Key Findings
Warsaw University of Technology	• https://www.pw.edu.pl/engpw	• did not turn up any direct statements on curriculum but does refer to development of an Educational Offer
MIT	• **Education section** http://www.mit.edu/education/	• emphasis on open learning and open courseware as they pioneered this in 2000s • their Research page links back to the Education page via 'learning by doing', suggests connected-curriculum type approach
Queensland University of Technology	• https://www.qut.edu.au/about/real-world-learning-2020-vision	• more T&L strategy than curriculum framework but does refer to curriculum design and renewal
ETH Zurich	• https://www.ethz.ch/en/the-eth-zurich/education/policy.html • https://www.ethz.ch/content/dam/ethz/main/eth-zurich/education/policy/policies-curriculum-development-and-curricula-of-degree-programmes.pdf	• education page and policies • specific guidance on curriculum development which seems to mix QA and curriculum design
Technical University of Denmark - DTU	• https://www.dtu.dk/english/about/organization/strategy	• strategy refers to education but not specifically to curriculum design
TalTech Estonia	• **Strategy to 2030** https://www.ttu.ee/public/e/en/University/Strategic_Plan_of_Tallinn_University_of_Technology_2020.pdf • https://www.ttu.ee/university/structure/strategy/teaching-8/	• limited detail on curriculum design

Table 5: *: A summary of curriculum frameworks from technological universities around the world.*

THE KEY POINTS IDENTIFIED FROM THIS SEARCH ARE:

1. The design of the campus and physical learning spaces could and should be usefully integrated with curriculum design. This is already in evidence at the TU Dublin City Campus in the Enhancing Pedagogical Opportunities in Learning Spaces (EPOL) project which is piloting a range of learning space designs and room configurations as part of the move of some Schools to the Grangegorman site.

2. Close competitors of TU Dublin in Europe have focused curriculum frameworks and education strategies on sustainability. Sustainability may also be linked with open education in relation to social justice issues and the mission of higher education, but also in relation to the sustainability of provision and staff effort in teaching and learning.

3. Connections between research and teaching are being renewed and revitalised, again through strategies and with leadership at senior level.

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NOTABLE RECENT
CURRICULUM PROJECTS

NEAR FUTURE TEACHING (UNIVERSITY OF EDINBURGH)

HTTPS://WWW.NEARFUTURETEACHING.ED.AC.UK/

We note this project as recently completed and because of the similar size and scale of the higher education sector in Scotland compared to Ireland. The project has some parallels with CoCREATE, in particular the collaborative approach taken with 'codesign' by staff and students. However, the focus was more clearly on digital education. The design process resulted in four 'plausible future worlds' being developed, and a process to consider what the 'preferable future for digital education' would be. The preferred future was tested with staff and students and also with school students and employers. This led to finalised vision and actions for consideration by the university's committees in March 2019. The key elements of the vision and aims developed are:

- **Community-focused:** note that here, community is being used to mean the university community and alumni rather than local/regional community, and that digital education is designed with the university community most prominently in mind.
- **Post-digital:** this refers to technology as being fully integrated with education rather than being different/special, for example in relation to contact time, campus boundaries, presence/absence from campus, and flexibility.
- **Data fluent:** this refers to digital education based on research and data, with a critical stance on data in education and an 'academic-led' approach to how artificial intelligence can 'assist and support human-driven teaching'.
- **Assessment oriented:** this refers to improving the range of assessment types and choices about assessment, focusing on feedback in new formats/media, and enhancing peer assessment as well as automated forms of feedback.
- **Playful and experimental:** this refers to having confidence and a positive approach towards educational change and digital education, and the development of 'new forms of digital education', with support for staff and students.
- **Boundary challenging:** this refers to lifelong learning and cross-disciplinary learning, openness and responsiveness to the city and region, with digital education allowing greater access to the university.

Short-medium term actions have been designed around each of these elements. Near Future Teaching offers a vision with actions rather than a prescriptive or rigid plan. The project website can be found at www.nearfutureteaching.ed.ac.uk.

CONNECTED CURRICULUM
(UNIVERSITY COLLEGE LONDON, LONDON SCHOOL OF ECONOMICS)

HTTPS://DISCOVERY.UCL.AC.UK/ID/EPRINT/1558776/1/A-CONNECTED-CURRICULUM-FOR-HIGHER-EDUCATION.PDF

The Connected Curriculum developed by Fung and colleagues (2017) at UCL has received much attention in the third level sectors in both Ireland and the UK. The Connected Curriculum has been adopted in a number of institutions in the UK with case studies of their work being published (Carnell & Fung, 2018). NUI Galway, UCC and Trinity College Dublin have also adapted the Connected Curriculum in the past two years. The Connected Curriculum approach aims to reconcile some of the distinctions and differences in curriculum and curriculum design, and to reconnect teaching and research. The key features of the Connected Curriculum include connecting programmes of study with research and allowing students to learn within a research culture. Many institutes of technology and technological universities would recognise these strands of activity as being already central to their curricula. As part of this review, we have examined the websites of eleven technological universities internationally, and also MIT in the US, to analyse their curriculum frameworks and strategies where available. Following our examination, the close links between teaching and research in these universities were clear. However, the Connected Curriculum is valuable in demonstrating how research might be undertaken by students at all levels of an undergraduate programme, and how overall programme structure and coherence can be achieved.

BRISTOL FUTURES CURRICULUM FRAMEWORK
(UNIVERSITY OF BRISTOL)

HTTPS://WWW.BRISTOL.AC.UK/BRISTOL-FUTURES/

The Bristol Futures Curriculum Framework is focused on ‘making a difference’ (University of Bristol, 2019) working across six dimensions to encourage students to think and work critically across their disciplines, and as individuals. The dimensions were designed in partnership with academic staff and students to capture the distinct features of educational experiences at Bristol. The team reports benefits of using the curriculum framework including: consistency in approaches to curriculum design, team approaches to programme design, articulating own values, innovating in programmes and teaching, reducing content and duplication of content across modules, building the academic challenge to students over the years of the degree, and a more rewarding teaching experience.

REAL WORLD CURRICULUM
(SOUTHAMPTON SOLENT UNIVERSITY

HTTPS://WWW.SOLENT.AC.UK/STUDYING-AT-SOLENT/LEARNING-AT-SOLENT/THE-SOLENT-CURRICULUM

This curriculum framework from Solent University (Jessop, 2019) was presented at a CoCREATE event at TU Dublin in Autumn 2019. This project has engaged 86 course and 26 departments at Bristol in reviewing curricula and programme design. Six dimensions function in pairs (visual available at the link above). Personal Knowing, at the centre of this framework, relates to students' understanding of how knowledge is generated and how it fits in their discipline areas. The intention is that the student moves beyond the knowledge of facts and information to making links, and critically analysing what has been learned.

TRINITY EDUCATION PROJECT
(TRINITY COLLEGE DUBLIN)

HTTPS://WWW.TCD.IE/TEP/

Trinity College Dublin (TCD) launched its new curriculum framework in autumn 2019. Under this framework each programme will have seven characteristics:

- **Co-curriculum** – this recognises and supports learning outside of the classroom, extra-curricular activities and engagement activities. It is managed and recorded through a 'Guided Reflection Tool', which is simply an interactive pdf file that is owned by the student. There are three levels of certificate of completion: novice, intermediate and advanced. There are other incentives such as awards, and career planning and readiness.
- **Partners in Learning** – this refers to greater interaction between lecturers and students in assessment and learning/teaching activities.
- **Trinity Electives** – in second year, students can choose 20 ECTS of Elective or Open Modules. Elective modules are standalone modules that are not part of any programme. They must be multidisciplinary and many are aligned to Trinity's key research themes. They also include modules addressing culture, languages and topics such as sustainability.
- **Open Modules** – these are modules from other complementary programmes, i.e. in a related discipline.
- **Employability** – this refers to a focus on the development of professional skills, with a focus on leadership.
- **Global Mobility** – this refers to students travelling abroad to study, working on global projects and/or working with international students.
- **Completion of a Capstone Project**.

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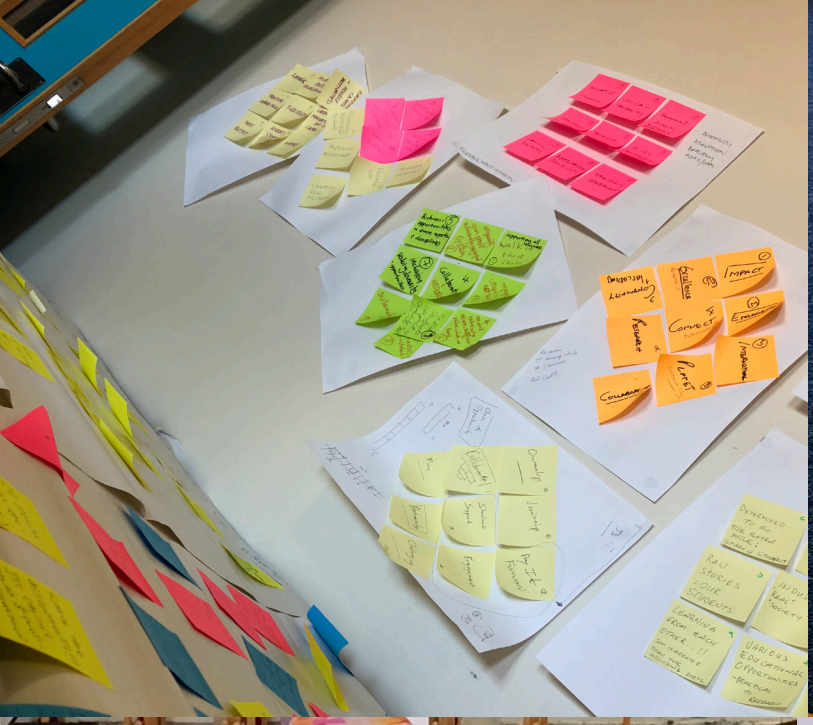
INTEGRATED CURRICULUM DESIGN FRAMEWORK
(UNIVERSITY OF ULSTER)

HTTPS://WWW.ULSTER.AC.UK/CHERP/ACADEMIC-DEVELOPMENT/ICDF

This project led to the development of an Integrated Curriculum focusing on Health and Wellbeing, Staff-Student Partnerships, Employability and Enterprise, Information Literacy Skills, Digital Capabilities and Sustainability. The adopted Barnett and Coate's (2005) work on knowing, acting and being to structure the development of the Framework: What does the student need to know? What does the student need to be able to do? What does the student need to be? Curriculum Design is framed in terms of the holistic design of the course, enquiry-based teaching approaches to designing modules, and active learning activities within modules. Holistic Programme Design is captured in their visual (see link above) and the Integrated Curriculum Design Framework. The project is also notable as it coincided with the construction of a new physical campus for UU in Belfast.






LEARNING POINTS
AND RECOMMENDATIONS

Learning Points and Recommendations

The key learning points and recommendations from this review of literature and practice are:

01

The need for a working definition of curriculum emerges clearly from the literature, even if this is for the purposes of local work at an individual institution. We have proposed this working definition of curriculum in the context of the CoCREATE project as the articulation of the university's values and principles with regards to teaching, learning and assessment, knowledge and the disciplines, and the cultural and political purposes of HE.

02

There is a need for a conceptualisation of curriculum going beyond individual programmes or their content. The literature is consistent on this point while recognising the many different understandings of curriculum that may exist amongst the staff of a university. Curriculum should be viewed with an orientation towards process rather than product, and a process by which those teaching and those learning within the university encounter knowledge critically, and generate new knowledge towards solving complex challenges in the world.

03

The literature, and recent projects at neighbouring institutions, demonstrate that inclusion of the student voice in the development of a curriculum framework and a students-as-partners approach to curriculum design is valuable, even essential, to forming a meaningful engagement with students in their learning at university.

Learning Points and Recommendations

The key learning points and recommendations from this review of literature and practice are:

04 It is important for us to acknowledge that curriculum reflects and reproduces the values of the institution, its view of its own responsibilities, and how it views its place in the world. Therefore, a clear articulation of values is needed as part of a curriculum framework and this can in turn be used to guide the development of programmes. Some of this work has been done in the articulation of an educational philosophy for TU Dublin pre-designation.

05 The climate crisis and broader issues of social justice and equality have been articulated through the UN Sustainable Development Goals (SDGs). Our responses to these global challenges and the SDGs should be designed into the Curriculum Framework, as well as being part of what is taught.

06 A process orientation towards curriculum and responding to the global challenges identified in much of the literature, may also imply greater interdisciplinarity and transdisciplinarity, and an opportunity for more research and knowledge creation to be done by undergraduate students. This offers an opportunity to innovate in our Curriculum Framework.

07 Innovative Curricula are also flexible and dynamic, permeable and keeping pace with a changing world and rapidly changing professional contexts in which our graduates will be working.

Learning Points and Recommendations

The key learning points and recommendations from this review of literature and practice are:

08 UNESCO (2015) identified the need for forms of education that enable learners to address local and global challenges, as socially responsible, critical and ethical thinking graduates, a disposition consistent with the global citizen. This report should inform our curriculum framework.

09 Three overarching dimensions of global citizenship are consistently noted in the literature: social responsibility, global competence, and global civic engagement. The development of a global mind-set has emerged as a way in which to begin to conceptualise the global citizen in the university context and should be reflected by our curriculum framework.

10 Global citizenship can be achieved in higher education through mobility and international exchange type learning experiences but also fostered locally particularly if it is engrained in the ethos of the university at an institutional level made manifest through the university's curriculum framework.

11 Graduate attributes are skills and qualities that should take cognisance of four key dimensions: academia, work and career, lifelong learning, society and community.

Learning Points and Recommendations

The key learning points and recommendations from this review of literature and practice are:

12 The TU Dublin graduate attributes have been, and can continue to be, integrated with curricula and a range of internationally validated models exist demonstration the value of incremental development of graduate attributes in the curriculum. The attributes should be reviewed and developed on an on-going basis particularly in light of the wider curriculum framework for TU Dublin.

13 The design of the campus and physical learning spaces could and should be usefully integrated with curriculum design. This is already in evidence at the TU Dublin City Campus in the Enhancing Pedagogical Opportunities in Learning Spaces (EPOL) project which is piloting a range of learning space designs and room configurations as part of the move of some schools to the Grangegorman site.

14 Our neighbouring technological universities in Europe have renewed and revitalised connections between research and teaching and this is visible also in a number of high profile research intensive institutions in Ireland and the UK. Our curriculum framework should seek to renew and energise the connections between teaching and research.

Learning Points and Recommendations

The key learning points and recommendations from this review of literature and practice are:

15 Some common features of the curriculum frameworks launched recently and reviewed here include: increased opportunities for undergraduate research; reduction of content without reduction in rigour through structured and holistic review and redesign of programmes; inclusion of capstone projects to address learning across a programme; portfolios/e-portfolios and mechanisms to capture reflection and learning including co-curricular learning across the years of the undergraduate degree; sustainability and the development of global citizens.

16 Continuing professional development for staff in the university, and support from leaders and champions at senior level, are discussed in a number of studies relating to the development and adoption of curriculum frameworks. These elements need to be supported in any process whereby a new curriculum framework is to be adopted.


DUBLIN
Co-CREATE
Collaborative Curriculum Reimagining and Enhancement Aiming to Transform Education

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