

Shaping transdisciplinary, challenge-based education using knowledge creating teams from five European universities: A realist evaluation

Gemma O'Sullivan

Supervisor: Dr Andrew Loxley

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Declaration

I hereby declare that this is entirely my own work and it has not been submitted as an exercise for the award of a degree at this or any other University. I agree that the library may lend or copy this dissertation on request.



Gemma O'Sullivan

2023

Dedication

For Jim O'Sullivan, 1940-2021, who believed in possibility not probability.

Acknowledgments

I was very fortunate that I did not take this journey on my own. I would like to thank all my friends and my sister Marie-Therese for inspiring me, encouraging me and often carrying me along the way. I thank my brother Tony, my husband Joe and my dear friend Dr Yesim Bayar for so kindly reading my thesis. I would like to thank my children, who found the whole endeavour completely uninteresting and mostly bemusing. They grounded me.

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Most of all, I thank Joe, for always believing.

Summary

There are increasing calls both within universities (Gibbons, Limoges, Nowotny, Schwartzman, Scott & Trow, 1994; Sterling, 2004; Stauffacher, Walter, Lang, Wiek & Scholz, 2006; Kueffer, Underwood, Hirsch Hadorn, Holderegger, Lehning, Pohl, ... Wuelser & Edwards, 2012; Cincera, Biberhofer, Binka, Boman, Mindt & Rieckmann, 2018; Fam, Neuhauser & Gibbs, 2018) and external to universities (European Commission, 2017, 2019, 2020) for the academy to innovate to address grand societal challenges. Transdisciplinarity (TD) has emerged both in policy and academia as a framework to purportedly drive this innovation through engaging research with societal needs; breaking down disciplinary 'silos' within the university and developing competencies or transversal skills to make education impactful (Barth, Adomßent, Fischer, Richter & Rieckmann, 2014; Gibbs, 2017). However, despite European policy calls for TD (Horizon Europe Missions – ongoing; European Universities Initiative, 2021) evidence on how to implement TD and its impact educationally is lacking. This diminishes its potential for sectoral change. Added to this, there are multiple definitions, approaches and foci within TD (Fam & O'Rourke, 2021; Klein, 2009).

While there is a growing body of research informing the operation of TD research (Pohl & Hirsch Hadorn, 2007; Klein, 2014; von Wehrden, Guimarães, Bina, Varanda, Lang, John... Lawrence, 2019; Baptista & Rojas-Castro, 2020), to date research on TD education comprises case studies by academics outside the discipline of education (Klein, 2018; Fam, Neuhauser & Gibbs, 2018). Further evidence is needed on how TD curricula are created, how disciplinary knowledge from multiple disciplines is integrated and what pedagogical approaches support and comprise TD education. This thesis sought to contribute to building a body of evidence to support the development of TD education within universities by opening the black box on how TD

curricula are formed and focusing on how Knowledge Creating Teams (KCTs), multi-disciplinary groups of academics, created a TD master's in global challenges for sustainability. The key research question was: How can TD education be successfully created in a university?

To 'open the black box' of TD curriculum design, I adopted a critical realist stance and applied realist evaluation (RE) as an analytical framework to an EC-funded "experiment" wherein a five-university alliance piloted the creation of a TD university through the use of trans-institutional, TD KCTs to design a challenge-driven, TD master's programme. I generated data through two phases of ten semi-structured interviews with KCT members, and, through my role as research associate within the Alliance i.e. a research diary, memos, catalogue of emails, video recordings and Alliance documents. The evaluation tested a program theory and I used a case study to draw a boundary around the components of that program theory as situated within the Alliance.

Through the framework of RE, the findings demonstrate a set of principles that can inform the design of trans-institutional and institutional TD programmes. These demonstrate that KCTs are an effective means to innovate systems and leverage institutional strengths to drive responsive TD educational and research initiatives. However, the findings also confirm existing literature on TD education and research which articulates the need for further research to test and strengthen integration methodologies to create TD curricula. The thesis concludes with a series of system recommendations to inform higher education policy and practice pertaining to TD and challenge-driven education (CDE).

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Abbreviations

CBE	Competency-based education
CBL	Challenge-based learning
CMO	Context-Mechanism-Outcome
EC	European Commission
ECTS	European Credit Transfer and Accumulation System
EHEA	European Higher Education Area
ERA	European Research Area
ESD	Education for Sustainable Development
EUI	European University Initiative
EUA	European University Association
HEI	Higher education institution
ID	Interdisciplinarity
KCT	Knowledge Creating Team
LERU	League of European Research Universities
MD	Multidisciplinarity
MLO	Module learning outcome
OECD	Organisation for Economic Cooperation and Development
PI	Principal investigator
P1CT	Phase One Content Team
PLO	Programme Learning Outcome
PMT	Project management team
SDGs	Sustainable Developments Goals
TD	Transdisciplinarity
UN	United Nations

WP	Work package

Chapter 1 Introduction

There is a story which if it is not true should be – that a certain old lady derived great spiritual comfort from believing that the word "Mesopotamia" had a profoundly pious significance. When in sore straits, she would prayerfully repeat this momentous word to herself and find new courage to go on. (Wohl R., 1955, p. 374)

Curriculum ... is what the older generation chooses to tell the younger generation. Curriculum becomes the site on which the generations struggle to define themselves and the world. (Pinar, Reynolds, Slattery, & Taubman, 1995, p. 847)

1.1 Introduction

Education is a normative exercise (Eisner, 1994) and my motivation to undertake this research was normative. It originated in my experiences in practice. Through a role I held as an academic strategist in an Irish university from 2016 to 2019, I observed considerable grassroots support within all communities of the university for changing how a university engages with education and with society. This is a broad statement, of course, and the university is a complex societal institution, albeit one that has been impressively resilient and resistant to change in the centuries since its inception (de Ridder-Symoens, 1992; Ruegg, 2004; Holmen, Adawi & Holmberg, 2021). It is this perceived resistance to change that was the genesis of this study. A senior leader at the Irish university that hired me in 2016, wished to bring about change, but from the

grassroots. She sought to begin a conversation within the university community about its academic identity, its academic future, its relationship with European policy and the state, and how it would and could move forward to support both society and a renewed academic purpose. What I will explore and describe in detail in this thesis is what that change in engagement with society can mean, what that sense of academic purpose could be and how it can be supported within a university environment.

The change I refer to is transdisciplinarity (TD). Like the Mesopotamia that bestowed spiritual comfort in my opening quote, TD can seem a little understood word that has been imbued with magical powers to answer everyone's prayers. People can think it is brought about by just aspiring to it (Gibbons, Limoges, Nowotny, Schwartzman, Scott & Trow, 1994) but the reality is that what can appear a simple problem-solving disposition to some is a complex epistemological paradigm with ambitions to transform how we perceive, create and use knowledge (Nicolescu, 2007, 2010, 2014).

Within academia, TD has emerged as a movement to address complex challenges (Gibbs, 2015; Fam et al., 2018) to bring about greater 'response-ability' (Sterling, 2004, p. 50) and "overcome the mismatch between knowledge production in academia, on the one hand, and knowledge requests for solving societal problems" (Hoffmann-Riem, Biber-Klemm, Grossenbacher-Mansuy, Hirsch Hadorn, Joye, Wiesmann & Zemp, 2008, p. 3). In this thesis, I examined this change via a case study of the conceptualisation and creation of a TD curriculum within a European University Alliance (hereafter Alliance). The curriculum was the site on which innovation was manifest and TD, an approach that brings multiple disciplines together to work towards solving societal challenges for the common good, was the lever of

innovation. This chapter serves to introduce the research question, research approach, genesis of the study and key concepts.

1.2 The research question

My central research question was: *How can TD education be successfully created in a university?* This is a broad question and within an institution as complex as a university, answering it is a complex matter. My ambition was through answering this question to explore the emergence of TD as a narrative in European higher education policy but also TD as a decades old narrative in academic communities (Apostel, Berger, Briggs & Michaud, 1972; Piaget, 1972; Jantsch, 1972; Klein, 2013, 2014; Gibbs, 2017; Khoo, Haapakoski, Hellstén & Malone, 2019). I sought then to examine how this could be manifest on the ground, in practice, through an attempted realisation of TD education. My research aim was to produce research outcomes to inform future development of TD curriculum design approaches through system innovation (system in this case referring to the university as a system). The Alliance that was the subject of this research comprised five universities who jointly created multi-disciplinary Knowledge Creating Teams (KCTs), five groups of ten academics from multiple institutions and disciplines, for the inter-institutional, TD design of the master's. The Alliance was formed in response to a 2019 ERASMUS+ funding call for pilot European University Alliances to create innovative pedagogies with a challenged-based TD approach to foster entrepreneurial mind-sets and civic engagement (European Commission, 2019).

1.3 Research approach

This research was motivated by a desire to develop a deeper understanding of how universities can create opportunities for evidence-informed systems' change to support and provide TD challenge-based education. I approached my research from the ontological and epistemological standpoint of critical realism. I sought to look at generative mechanisms or simply "the ways of acting of things" (Bhaskar, 2008, p. 3). I will return to critical realism in greater detail in Chapter 6, but to critical realists, reality can be explained by identifying causal mechanisms, establishing how they work and seeing if they have been activated and in which conditions (Bhaskar, 2008; Sayer, 2000). This standpoint enabled my research approach to arguably transcend the polarity of positivism versus constructivism (or constructionism) (Flick, 2009; Bryman, 2012) by focusing instead on the mechanics of explanation (Pawson & Tilley, 1997). The search for a framework that would help me observe effects or science as process-in-motion (Bhaskar, 2008) and consider emergence, led me to the work of realist evaluators Ray Pawson and Nick Tilley (1997, 2004). Pawson and Tilley suggest we embrace the fact that experimental closure is not possible and rather we design our research approach understanding that the "iterative spiral of theoretical inquiry and philosophical critique can take us a long way to explanatory adequacy" (Pawson, 2013, p. 61).

Realist Evaluation (RE) explores the very basic idea of 'how things change' (Pawson and Tilley, 1997). RE enabled me to reflect the practical complexity of this research. Realist evaluators form a program theory informed by academic literature and "folk wisdom". The program theory is comprised of CMOcs (Context-Mechanism-Outcome configurations). This will be explained in more detail in Chapter 5 but the goal of RE is

to test the program theory. The research sub-questions were constructed therefore to support a RE analytical framework. They were:

RSQ1: What is the 'social problem' – literature, policy chronology and European University Initiative?

RSQ2: What is the program theory (CMOs)?

RSQ3: What mechanisms for change were triggered by this program and what outcomes were observed?

RSQ4: Did the program theory work? What worked for whom in what circumstances?

I used a case study to place a boundary around the program theory¹ within the Alliance structure. I carried out semi-structured interviews to identify and interrogate the range of ways KCT members perceived or experienced the “program” of TD curriculum design and practice. I carried out two phases of 10 semi-structured interviews with KCT members: one towards the initial stages of the process and the second at the completion of the curriculum design process. The interviews examined how KCT members conceptualised TD, what they perceived the implementation of TD to be and what they defined as successful TD educational design, both at the outset and at the completion of a facilitated content creation process. The following section describes how my professional practice was a key driver that led to my motivation to pursue this research question.

¹ In later work, Pawson and Tilley (2004) Pawson and Manzano-Santaella (2012) refer to program theory as programme theory. I use the original spelling (Pawson & Tilley, 1997) throughout this thesis.

1.4 Genesis of the study

1.4.1 Practice-based triggers

My research journey began in 2016 when I was hired by an Irish university to support the creation of an institutional “academic strategy”. The purposes of the strategy were manifold, but the guiding ambition was to place the academic community at the heart of institutional decision-making and to bolster the creation of innovative programmes and in particular interdisciplinarity (ID). The creation of the academic strategy, which was a set of principles guiding academic activities, was representing a weighty if not dominant voice within the academic community that was lobbying for reform to build greater connections between the curriculum and the university’s research centres and institutes; connect the university, its students and staff to societal stakeholders; and create innovative educational experiences that would support for example challenge-driven education (CDE). There was a deep contrast between the bulk of the university’s daily activities – teaching content to students – and its institutional conversations on the same. One could argue that the university consisted of a loose organisation of sole traders. Spaces for the institution to mobilise as a community of academics were limited to Academic Council, whose members comprised only those in leadership roles on committees or with full professorships.

To facilitate the academic community in creating a document to guide the creation of their new educational mission, I carried out approximately 100 semi-structured interviews across the campus with academics, student leaders, academics in management and senior administrators. The purpose of this activity was manifold: to elicit views, to communicate the purposes of the project and to gain a sense if support for the project was shared across the community. Education reform was needed, interviewees suggested, but it needed to be balanced with academic freedom. Based

on these interviews and the recommendations of a working group we created, and thereafter academic council agreed, principles to lead academic strategy. Guided by research policy (both internal and at a European level) ID and TD became guiding principles, voted on by academic council and supported by the incoming university president. One discussion at academic council brought a key issue to light: while ID was welcomed, no-one knew how to implement it educationally at an institutional level. There was a small number of ID programmes in the university but the curricula they produced were multidisciplinary (MD) in content and teaching i.e. more than one discipline was used within the programme in tandem to another but without any deep interconnection e.g. Psychology and Computing. Internationally, there was also a dearth of ID degree programmes i.e. programmes that evidenced disciplinary integration within the programme content. There was a proliferation of ID add-ons for example Georgetown Futures or Toronto One modules but these embodied the quick fix that was available in the university sector when ID was the desired goal, but the institutional structures once more proved an impediment. They were optional extras that sat outside the main curriculum of the universities: they were exceptions rather than rules. The challenge however, I discovered in my role, was there was little if any research to guide these institutional educational decisions. Books like *Strategic Curriculum Change* (Blackmore & Kandiko, 2012), which presents useful case studies of institutional change from around the globe, were rare. This research journey was therefore motivated in the first instance pragmatically. I sought to inform the design of university curricula including ID and TD learning experiences by providing an evidence base for curriculum design and change, to inform policymakers and institutions on the organisational change needed to support curriculum change.

At this point in my practice as an institutional strategist, I began my own research, namely a literature review of ID and TD education within higher education. I complemented this with an Erasmus-funded trip to the University of Helsinki, where I met other institutional strategists: professionals within the university sector who were either practitioner academics without doctoral training, like me, or professionals who had doctoral training but who had opted out of a traditional academic career. Whitchurch (2008, 2015) uses the term *third space professional* to describe these new types of roles created in universities within a space that connects academics to the multitude of constituencies to which the university itself is connected. These professionals can possess academic credentials often to doctoral level; perform policy functions; work in quality, staffing or institutional development and work in teams on funding bids or institutional projects. At the University of Helsinki, I met with third space professionals and educational scientists (academics whose disciplinary expertise was education – in this case higher education) who were working together to spearhead educational change at the university. They were midway through a very large educational reform project called the Big Wheel and working in tandem on its outcomes. Triggered by a change in national policy and an institutional desire to reform, the University of Helsinki was transforming the curriculum. I carried out interviews with educational scientists. From these academics, I got a deeper understanding of some of the effective evidence-based approaches to institutional change.

This led to my decision to apply for the Doctorate in Education at Trinity College Dublin. I carried out my literature review in 2018 and 2019 and discovered that ID was gradually being replaced by TD internationally as a guiding principle for sectoral innovation, driven in large part by the research domain but also to embrace the tenets

of community-engaged and community-based research and challenge-driven research and education. I also discovered that research into ID and TD education had lacunae. The black box of curriculum design was rarely opened and the curriculum ideology (defined by Lyall, Meagher, Bandola Gill & Kettle (2015b), as principles, ideas, beliefs and epistemologies about curricula) of ID and TD was emergent but infrequently researched. These lacunae were making reform susceptible to criticism and were weakening the ability for universities to make meaningful lasting changes in curriculum design. I intended to explore TD at macro (policy), meso (institutional) and micro (individual/groups of individuals) levels. This was made possible through a role change when I became a Research Associate on the pilot Alliance in which an Irish university was partner. This pilot presented me with an opportunity to connect curriculum design with institutional transformation in support of TD. The KCT concept could be a flexible structure that would build on the foundation of the university. TD could be examined at two levels: firstly, within the KCT staffing structure and, secondly, within the programme content developed by that staffing structure in a new model of facilitated, team curriculum creation for challenge-based learning. A further level of TD happens in pedagogic design i.e. in the design of learning activities and teaching modes (for example workshops) but as this segment of the master's design took place after my timeline available for fieldwork, and after my role came to an end, this is outside the scope of this thesis.

1.4.2 Researcher biography

Although the term TD was unknown to me until 2016, I trace my interest in TD back to my time as a postgraduate student at the London School of Economics (LSE) in the mid-nineties. I had completed a BA Joint Honours in English and Sociology at

University College Cork (UCC). Prior to that I had been a medical student for one year at the same university. I brought with me to the LSE the influences of both the Sociology Department and School of English at UCC. The former had introduced me to social theory, the latter to literary theory. During the 1990s, there was considerable controversy surrounding postmodernism. As a student familiar with its central tenets and the growing prevalence of deconstruction, I arrived at the LSE with an arsenal of theoretical tools to tackle the realist tradition of international relations in the Department of International Relations. Workshops could descend into semantics. I grew very concerned that the divide between academia and society was so large that little of what happened in academia linked in any way to society. Likewise, I strongly objected to the ease with which academics used language and concepts that could not be readily understood or utilised outside their niche. It seemed to me that the transfer of our knowledge creation into society seemed tenuous and the academic language in which we wrote became more impenetrable the more advanced our degrees became. I became acutely aware of what Gibbs, Neuhauser and Fam (2018) call “the knowledge–action gap”. Academic language seemed to cement this. The ever-increasing the specialisation, the further away that specialist was from being able to communicate to society at large. The specialisation seemed also to happen in a vacuum, disconnected from any sense of a collective – a shared need. I also feared that it was becoming a non-porous system. Nothing was getting in or out.

Motivated by this, I left the LSE to pursue a career in journalism first in the United States and then in Ireland and the UK. I was hugely motivated by a desire to learn how to communicate in a way that people understood. It was always my ambition to return to do a PhD and to academia, bringing this skillset and these influences with me. I trained as an editor at University California at Berkeley by night while working as

a copy editor by day. Three years later, I returned to Ireland to work for a national broadsheet newspaper as an editor and columnist. I followed this with a year at the Guardian and two years at the Sunday Times as a features writer and interviewer. During this time, I began working as a part-time lecturer for an Irish private third-level college on its BA in Media and Communications and was lead lecturer on eight modules ranging from Feature Writing to Digital Media. The college sponsored us to complete a Level 9 Certificate in Teaching and Learning for Higher Education and this developed a strong interest in curriculum design. I witnessed how content decisions were made in a private college that specialised in professional training and education. All programmes had to be validated by the Quality and Qualifications Ireland (QQI) and this process required engagement with industry. Module titles and learning outcomes were drawn up in a group environment by a range of practitioners but all from professional practice and industry. I also witnessed first-hand how much freedom staff had to tailor modules and programmes to suit their own area of content expertise.

After six years as a part-time lecturer, I was promoted to the head of the faculty in Cork. This involved leading a team of 24 part-time lecturers and managing a wide range of tasks including programme development, outreach and quality. After a year in this role, I moved into the institutional strategy role at an Irish university as part of a three-year project, as described in Section 1.2.1. At this juncture, I made contact with the Irish university who were part of a successful bid to form the Alliance. The challenge-driven nature of the university aligned with TD university models and I secured approval from my supervisor and the project director within the Irish university to use the creation of the master's programme as my fieldwork. In tandem, I was offered a position on the project, working to co-develop a number of strands in

support of TD: governance, curriculum design, staffing and teaching and learning strategies. These strands were part of the project application and sprint planning, the official project planning documentation. The following section describes my role within the project and the interplay between this and my fieldwork.

1.4.3 My role as a practitioner within the research setting

This thesis is an example of “insider research” (Mercer, 2007). When I joined the Alliance, the first action was to create a Curriculum Blueprint to design the master’s programme that would also be disseminated on completion as part of the project toolkit. I had varied roles from the beginning and one of these was to lead a work package on curriculum design. I chaired and set agendas for the twice-weekly meetings, wrote minutes and actions and managed the completion of these actions. In this role, I worked very closely with the university’s project director and Principal Investigator (PI). The PI’s research expertise was technology-enhanced learning and the research group was based in a School of Computer Science and Statistics. My key contribution from the beginning was, with others, to ensure that the output was TD, that it was informed by other educational models of TD and that it built on the successes and challenges of these. One of my first tasks was to create a document explaining the origins, definitions and key elements of TD for the research group.

As a researcher, I was conscious throughout the process that I was not only a participant and a would-be observer but I was also in a privileged position to contribute to framing the narrative of the leading documents. These documents (outlined in Chapter 7) established the principles that not only guided curriculum design and teaching and learning but also the mission, vision and values of the Alliance. While we worked very collaboratively, and in a structure comprising detailed,

interconnected work package teams, as one of the few native English speakers and with my background in institutional strategy and journalism and nascent expertise in TD, I assumed the role of lead author on all documents produced. Additionally, I was nominated as a member of the Alliance's Project Management Team (PMT) and the management team and working group within the Irish university. I was also a co-lead within the Teaching and Learning Strategies work package. My role in this context was to co-create the narrative that would design the project outcomes and objectives. It became apparent that it would also be to co-create the process by which we would realise these principles and meet the deliverables. I worked in a very close team structure and in a highly collaborative manner across the five universities (see Chapter 7), but nonetheless my role in addition to that of another colleague was as TD champion. In the first six months of the project, we repeatedly lobbied for the centrality of TD to the university's mission. At the end of the six-month period, TD became the guiding value of the Alliance.

It is important to note that as Chapter 2 outlines, there are varying definitions of TD and different emphases on key elements depending on which approach is adopted. My colleague and I were proponents of differing approaches i.e. we agreed on the elements of TD but diverged in our support for which elements should receive primary emphasis. This was a benefit to the project as a whole. There was a healthy tension between our approaches that was manifested in a constant dialogue both between us privately and visibly between us in workshops and at management team meetings. There was a relatively flat organisation structure and team members from the Irish university were placed on the Alliance project management team regardless of their seniority in the traditional university structure in which they were based. The organisational structure of the Alliance is described in detail in Chapter 7. As TD is the

spine of this thesis, it is important to locate the meaning employed by this term from the outset. The following section gives a brief outline of the term. Chapters 2 and 3 delve into its history and practice in greater detail.

1.5 Transdisciplinarity

To many, TD is a complex word used to describe a very simple idea: to solve societal problems, you need multiple viewpoints, multiple actors and different expertise (Klein, 2014; Gibbs, 2015; Vienni Baptista & Rojas-Castro, 2020). In this thesis, I use the term academic to refer to those within the academy who have academic expertise. I use the term extra-academic actor to describe those who are connected to transdisciplinary work on challenges but who are external to the academy. I propose this term as opposed to more commonly used terms, such as societal actor or external stakeholder, for a number of reasons. The word external suggests that some are on the outside while others are on the inside. In grand societal challenges, everyone is a stakeholder. Academic actors and extra-academic actors are all actors in society. Knowledge produced outside the university is of no greater or lesser importance than knowledge produced within the university. Research into TD research is increasing (Hirsch Hadorn, Hoffmann-Riem, Biber-Klemm, Grossenbacher-Mansuy, Joye, Pohl... Zemp, 2008; Klein, 2014; Lyall et al., 2015a; von Wehrden et al., 2018; Baptista & Rojas-Castro, 2020). Some would say disparagingly that TD is in vogue. These new educational approaches require knowledge of both system optimisation and system innovation (Sterling, 2004; Kueffer et al., 2012).

TD first originated as part of a call for the reform of the university sector in the 1970s that emerged from the work of Eric Jantsch (1970), the OECD Seminar on Interdisciplinarity in Universities in Nice in September 1970 and the resulting book published in 1972. For the past decade the term has enjoyed a growing popularity within the sector. It is cited within literature representing a view that higher education needs to be reoriented in the face of the challenges of sustainability (Sterling, 2004; Cincera et al., 2018; Fam et al., 2018) in addition to calls for accountability and trust of the sector (Gibbons, Limoges, Nowotny, Schwartzman, Scott & Trow, 1994; Stauffacher, Walter, Lang, Wiek & Scholz, 2006) and a desire for institutional and cultural change and development of the skills of innovation (Kueffer et al., 2012). TD brings with it, for some, the dream of the unity of science when further specialisation and indeed hyper-specialisation are increasingly the norm (Nicolescu, 2007, 2010, 2014). This change-oriented TD paradigm has developed alongside the more epistemologically-focused paradigm. One can see why it is that multiple definitions of TD abound. And a more helpful analytical starting point could be, as Fam et al. (2018) suggest, to consider TD not as a theory or method but as an approach. The following definition from the League of European Research Universities (LERU, 2016) articulates the differences between TD and multi-/interdisciplinarity:

Multidisciplinarity (MD): sequential analysis of a problem by disciplinary experts with few interactions between them.

Interdisciplinarity (ID): growing interactions and efforts to integrate disciplinary insights with a scientific added value for the involved disciplines.

Transdisciplinarity (TD): interactions are extended outside academia to solve problems of societal importance through integration of knowledge from different actors. (p. 12)

Within academia, there is a growing consensus that ID and TD education is necessary to develop the skills of future researchers and sustainability experts to foster their ability to build effective partnerships with many different actors for addressing complex societal and environmental challenges (Sterling, 2004; Kueffer et al., 2012). Equally there is a growing need for empirical research into approaches to fostering these ID and TD educational approaches (British Academy, 2016; Knight, Lattuca, Kimball & Reason, 2013; Lattuca, Voigt & Fath, 2004; Spelt, Biemans, Tobi, Luning & Mulder, 2009). The new educational approach draws our attention to the curriculum yet the term curriculum itself is surrounded by ambiguity (Fraser & Bosanquet, 2006). The following section clarifies the use of the term curriculum within this thesis.

1.6 Curriculum ideology

The curriculum is a political site, a site within the university structure that embodies the delicate, unspoken negotiation between the university as an independent organism; its students as its key constituents; academics and researchers as its central actors; nation states and the “European state” that fund it. The curriculum, in my experience, is the point at which academics identify what needs to be learned. I contend that these are not value-free decisions. The idea of what is included or excluded from the curriculum has been referred to as curricular justice (Connell, 1993). Curricula are informed by curriculum ideologies. These are not only belief

systems that provide the value premises from which decisions about practical educational matters are made (Eisner, 1994), they involve principles, ideas, beliefs and epistemologies about curricula (Lyall et al., 2015b). Curriculum ideology is defined by Eisner as “beliefs about what schools should teach, for what ends, and for what reasons” (Eisner, 1994, p. 47). He proposes that it is a “values matrix” or even in a certain sense “a mind-altering device” (Eisner, 1979, p. 81).

In a review of the literature on curriculum, Dillon (2009) demonstrated more than 120 definitions of the term. Curriculum, to me, is the process of choosing the content to be taught and deciding what should be learned and why. I distinguish between the term curriculum, what is taught, and pedagogy, how something is taught. While there are obviously synergies between the two, this research focuses on the former. In this thesis I would like to focus attention on the curriculum as content that is chosen to impart types of knowledge for certain ends. And I would contend that these choices are made in complex ways. Eisner (1994, p. 48) suggests that curricular ideologies emerge in “religious like views of the world”. But these ways can be subtle. These ideologies, he affirms, are as powerful as those expressed publicly by religions. And because they are not made explicit, they are ingested subliminally as part of “general or professional socialization” (ibid, p. 51). My own experience returning to a university environment mid-career – after a period of time working in the media and private third-level education – was profound. I was introduced for the first time to the principle of academic freedom and to the ethics of research. I witnessed the freedom with which academics decided what would go into their curricula. There seemed to be very little accountability or engagement with society (apart from accredited programmes). I don’t suggest that academic freedom should be compromised but I did query why society monitored and managed as a societal issue the curricula of primary and secondary

education but had almost no input into third level, save for policy that very frequently dissolved when it filtered to the coalface. Curricula, I assert, not only represent a value position but a shared way of life that teaches a certain worldview or set of values through action. If the university is viewed as a system, ideological influence may not be overtly exerted on it but nevertheless ideologies float in this system and some come to dominate. In this thesis, I therefore understand curricula “as much through their contribution to policy agendas that lie on the margins of curricula, as through internal elements that actually work to produce the student’s experience” (Barnett and Coate, 2005, p. 14).

The impetus behind this thesis was to inform curriculum development and design for TD programmes within higher education institutions by investigating the experiences of academics (researchers, researcher-lecturers, lecturers) in creating TD, challenge-driven curricula within a trans-university structure. But it was also to examine TD education at a moment in the history of the university as it is emerging in European policy narrative. I sought to unearth what curriculum ideologies lie within TD curricula and provide evidence for the development of new structures and processes to support TD education within the university environment. This would, I hoped, also contribute to clarity around a new definition of TD education and begin to define the curriculum ideology – principles and beliefs – that underpin it. It would also serve to critically examine the emergence of TD as a narrative in European higher education policy and create some impetus for a conversation about the dynamic between European policy on higher education and the sector.

1.7 Overview of the thesis

This chapter formed an introduction to this thesis. In it, I sought to outline my motivation to undertake this doctorate, the origins of my research question and my research approach. This thesis seeks to capture what I contend is a moment in the evolution of the contemporary university that may have a significant impact on its trajectory. Using the creation of a TD master's programme within an EUI as my fieldwork, I argue that this moment presents as a convergence of two forces of change – policy and academic grassroots – converging within the concept of TD, adopted by both groups of actors but with important distinctions. Chapters 2 and 3 analyse TD – its history, definitions and form – as an educational concept. Chapter 4 provides an overview of the historical and policy context within which TD and the EUI emerged and critiques the narratives therein. The theoretical framework, methodology and methods that underpin the study are detailed in Chapters 5 and 6. Chapter 7 outlines the case study and draws the boundaries around the fieldwork. In Chapter 7, I also present my experiences as an insider researcher to offer an alternative perspective on the experience of the content creation process within the Alliance. Chapters 8 and 9 outline the findings of the data analysis. Chapter 10 discusses these findings in the context of the key issues and literature addressed in the research and presents these key themes as CMOs. Chapter 10 concludes with the implication of these CMOs for policy, institutional innovation and practice. I also offer an overview of my contribution to research in this area, the limitations of this thesis and recommendations for future research. I will also discuss how my professional journey evolved alongside my doctoral studies. Whereas I began this process as a former journalist and practitioner academic working in a senior quasi-administrative role, I finished this thesis as a Senior Research Associate in an academic research position.

Chapter 2 The historical and conceptual foundations of TD

2.1 Introduction

This chapter focuses on the history and evolution of TD and the different conceptualisations of the term. It contrasts TD with MD and ID and describes the predominant approaches to TD. It serves as a foundational chapter for Chapter 3, which examines how the different characteristics of these approaches have been translated into practice in contemporary applications of TD within education in universities.

2.2 My professional journey through the literature on TD

Creswell (2005, p79) notes a distinction between literature reviews for quantitative and qualitative studies. In the case of quantitative research, the literature review is used at the start of the research exercise to justify the study, set out the rationale and to confirm the results. In qualitative research, the literature is used throughout to support or modify the interpretation of the data and this reflects my approach.

Reading into the conceptualisation and practice of TD was a constant thread throughout my research process and this captures the experience of exploring the academic world of TD. TD as a field is enormous, diffuse, ever-increasing and comprises multiple definitions, aspirations, normative stances and practices. Ironically TD itself could now form a discipline. It contains within it, schools of thought and

academic tribes and territories (Becher & Trowler, 2001) that would rival any discipline. Yet at its core are a set of ideas, that I will trace in this chapter.

2.3 Preliminary definitions: MD to TD

Within RE, the literature review is an important phase and indeed the literature informed my practice and vice versa (Pawson & Tilley, 1997). I first came across the terms ID and TD through my role as an academic strategist. As part of my research into the institutional implementation of ID, I was directed towards some key texts by colleagues at the Irish university. Through this reading, I became familiar with the work of, for example, Veronica Boix-Mansilla (2016), William Newell (1983, 1990, 1992, 2010), Robert Frodeman (2010), Sue McGregor (2011) and Julie Klein (2008, 2013, 2014, 2015, 2018). The work of each of these US-based academics encompassed ID/TD research and ID/TD teaching and learning in addition to the epistemological frameworks of ID and TD. These authors provided a focal point from which I began my initial literature review. The literature evidenced that there were varying definitions of both terms and that these varying definitions are utilised widely across higher education. There were also, and separately, differing schools of thought informing these definitions.

As a practitioner supporting and facilitating the realisation of TD across a pilot university, I found myself as frequently highlighting what is not TD as opposed to what is TD. What it is not is an easier concept to explain. Failed TD is MD, when the disciplines are brought to bear on a problem or challenge but their perspectives or expertise remain disconnected – in silos. MD is the study of a research topic from the perspective of several disciplines at the same time (Nicolescu, 2014; Klein, 2010). Disciplines are juxtaposed and their integrity preserved while they learn from other

disciplines. One can imagine the movement from MD to ID and TD as a spectrum of integration. MD is academic expertise sitting side-by-side viewing a common problem. ID involves the transfer of methods from one discipline to another (Nicolescu, 2014). ID does not necessarily focus on a problem but when it does, disciplines view the common problem together and bring some disciplinary tools, methods or expertise from others into their own disciplinary practice. The concept of ID is often confused with TD but ID has earlier roots and has been traced to the 1942–45 Manhattan Project (the American government research project that produced the first atomic bombs). The project employed approximately 150,000 people and included physicists, chemists, and engineers from top-ranked universities (Klein, 1997; Scholz, 2020). TD is a process of collaborative integration. The goal is to bring expertise, experience, tools and methods from both academic and extra-academic perspectives together to tackle a problem. This thesis explores the term TD both in respect of policy and practice (Vienni Baptista & Rojas-Castro, 2020). The two concepts of integration and action describe the predominant conceptualisations of TD since the term was first used in the 1970s. As this chapter will explain, discourse on TD has been active for 50 years and the intellectual agenda is not set within or by a single discipline (Gibbons et al., 1994). In recent years, the use of TD has become more widespread and what it is used to convey, more diverse. It can mean being “very interdisciplinary or involving stakeholders or full post-normal science” (Scholz, 2020).

2.4 History of TD

The term TD has been traced to the OECD Seminar on Interdisciplinarity in Universities in Nice in September 1970, the same year in which Eric Jantsch wrote the article *Inter- and Transdisciplinary University: A Systems Approach to Education*

and Innovation published in the journal Policy Sciences. The seminar resulted in the influential publication by the OECD of *Interdisciplinarity: problems of teaching and research in higher education* (Apostel et al., 1972). The purpose of the publication was to provide a detailed analyses of ID and analyse its impact on teaching and research as it adapted to changes in society. The need for ID was justified, argued the Director of OECD's Centre for Educational Research and Innovation (CERI) J.R. Glass in the preface, due to "the increasing social costs of the over-specialisation of knowledge" (Apostel et al., 1972, p. 10). This did not entail an abolition of disciplines but the need to support their interplay. The discussion was deemed vital to the future of the university. The simultaneous educational question and educational need were seen as residing in the place where disciplines interact with each other necessarily in the context of societal problems. A call for ID and TD in universities was initiated as a call for educational reform. The seminar and resultant publication did not seek to eliminate any of the disciplines but to teach them in the context of their dynamic relationship with other disciplines and in terms of societal problems. At the conference, TD was defined as "a common system of axioms for a set of disciplines" (Klein, 2004, p. 515). There are distinctions between ID and TD, as outlined in the first section above, and the 1972 OECD publication drew these out. Two distinct though overlapping TD pillars emerged from the 1972 publication that demonstrate an early split in emphasis within TD. To some TD experts, TD supposes epistemological restructuring: this first pillar is integration. This is synonymous with the contributions of Jean Piaget to the 1970 OECD conference. The second pillar, actionable knowledge, supposes political restructuring of the university to produce purposive knowledge to solve societal problems. This is synonymous with the work of Eric Jantsch (1970), in particular, as it pertains to the system of a university. These two pillars can be traced through the differing TD camps, as it were, but elements of both are present in

contemporary (twenty-first century) TD approaches. The following figure illustrates these lines of thought.

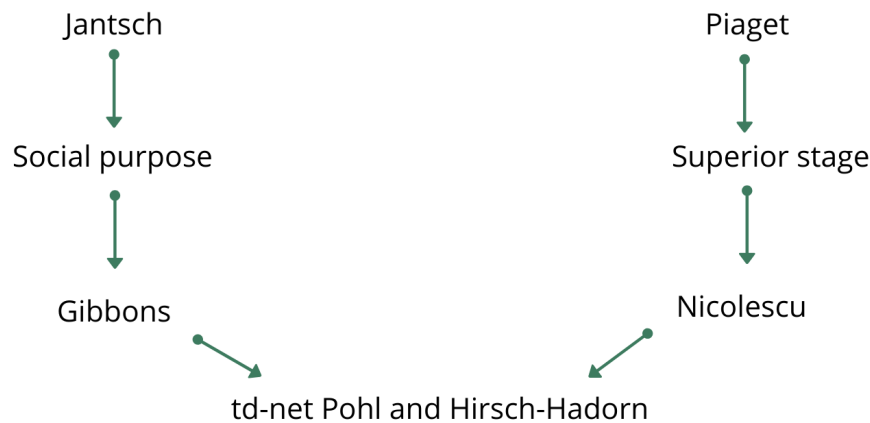


Figure 2.1: Author's illustration of the two pillars of TD combining in the approach of the Swiss School in the 21st century.

2.5 Knowledge integration

The concept of integration is central to TD but it can be conceptualised at different levels: integration at an epistemological level and integration of knowledge gained from lived experiences into academic discourse. In the *Interdisciplinarity: Problems of Teaching and Research in Higher Education*, Jean Piaget (1972) explored the epistemology of ID relationships and TD. He defined the meaning of knowledge in terms of its method of construction. He described his search for underlying transformational systems that would convey interconnectedness rather than causality (Piaget, 1972). This ambition was to capture reality as a whole (unity of knowledge) and not as parts. It continues in the work of Basarab Nicolescu (2007). Piaget used the concept of interaction between disciplines to distinguish between MD, ID and TD. MD, he wrote, “occurs when the solution to a problem makes it necessary to obtain

information from two or more sciences or sectors of knowledge without the disciplines drawn on thereby being changed or enriched” (Piaget, 1972, p. 133). ID comprised “actual interactions, to a certain reciprocity of exchanges resulting in mutual enrichment” (ibid). He referred to TD as a “higher stage” “which would not only cover interactions or reciprocities between specialised research projects, but would place these relationships within a total system without any firm boundaries between disciplines. While this is still a dream, it does not seem to be unattainable...” (ibid p.135). Full TD would be a “general theory of systems or structures including operative structures, regulatory structures and probabilist systems, and linking these various possibilities by means of regulated and definite transformations” (ibid p. 136). This is also referred to as a transcendence of disciplines (Klein, 2015).

Nicolescu (2007), now a prominent figure in international discourse on TD, critiqued Piaget’s proposed higher stage. Nicolescu argued that Piaget used only part of the meaning of the Latin prefix *trans* and focused on, across and between disciplines rather than beyond. Nicolescu critiqued both Piaget and Jantsch (see below) for “falling into the trap” of proposing TD as a “hyperdiscipline” or a “science of sciences” (Nicolescu, 2014, p. 19). In the 1980s, Nicolescu developed the methodology of TD in a series of articles published in the French review *3rd Millennium* by merging what he described as the soft sciences and hard sciences through bringing the excluded ‘subject’ (human beings) into the domain of knowledge (De Alvarenga, 2008).

Nicolescu’s methodology of TD was published in his first book in France *Nous, la particule et le monde* (1985). The short summary that I present here is inadequate to explain the complex substance of Nicolescu’s texts, which draw on his own expertise in theoretical physics, but for the purposes of this thesis, his three pillars of a TD methodology are:

- Ontology – multiple Levels of Reality
- The Logic of the Included Middle
- Epistemology – knowledge as an emergent complexity

Nicolescu (2010) proposed a TD version of reality. His definition of Reality, which he presented with a capital 'R', is both pragmatic, he argued, and ontological. This 'Reality' is not just socially constructed he contended or subjective or collectively agreed. Reality is what resists our experience. Levels of Reality, to Nicolescu, refer to sets of systems: those that are invariant under certain sets of general laws, for example, natural systems, and those that are variant under certain sets of general laws, for example, social systems. These levels of Reality, Nicolescu said, offer the possibility of a new taxonomy of contemporary disciplines (which he numbered at almost 8,000). This short synopsis reveals a narrative that is underplayed in contemporary accounts of TD (Klein, 2014; Lang et al., 2012; Pohl & Hirsch Hadorn, 2007; Scholz, 2020; Scholz et al., 2006) but that is acknowledged, nonetheless.

While integration within TD can be viewed within academia as epistemological integration concerning disciplines, it is also dependent on integrating epistemologies from inside and outside academia, from different cultures and gender standpoints. The centrality of working with extra-academic actors is seen as central to TD (Pohl & Hirsch Hadorn, 2007). TD is a process that brings together individuals from different fields to work together over an extended period. Their aim is to develop new overarching conceptual and methodological frameworks. This process supports mutual learning between and among science and society (Scholz, 2020). Practitioners are considered as experts because they cope with real-world challenges. Scientists

are considered experts because they develop evidence-based assumptions of dynamics underlying real-world systems (Scholz, 2017). The goal is to create knowledge that is “solution-oriented, socially robust and transferable to both scientific and societal practice” (Lang et al., 2012). The following section traces the development of this solution-orienting strand of TD.

2.6 Actionable knowledge (problem-solving)

“There is not a single system of science, there are as many systems as there are purposes.” Eric Jantsch (1972, p. 99)

The idea of TD as problem-solving and creating knowledge purposively can be seen to originate in the work of Eric Jantsch (1970) who argued that universities and knowledge should be organised for a purpose and the university should take an active role in societal planning and service to society. Jantsch argued that universities needed to be designed for “flexible change in accordance with the dynamically evolving situation” (Jantsch, 1972. p. 99) and his approach has been described as problem solving (Klein, 2015). He proposed a multi-level university system to accomplish this, as illustrated in Figure 2.2.

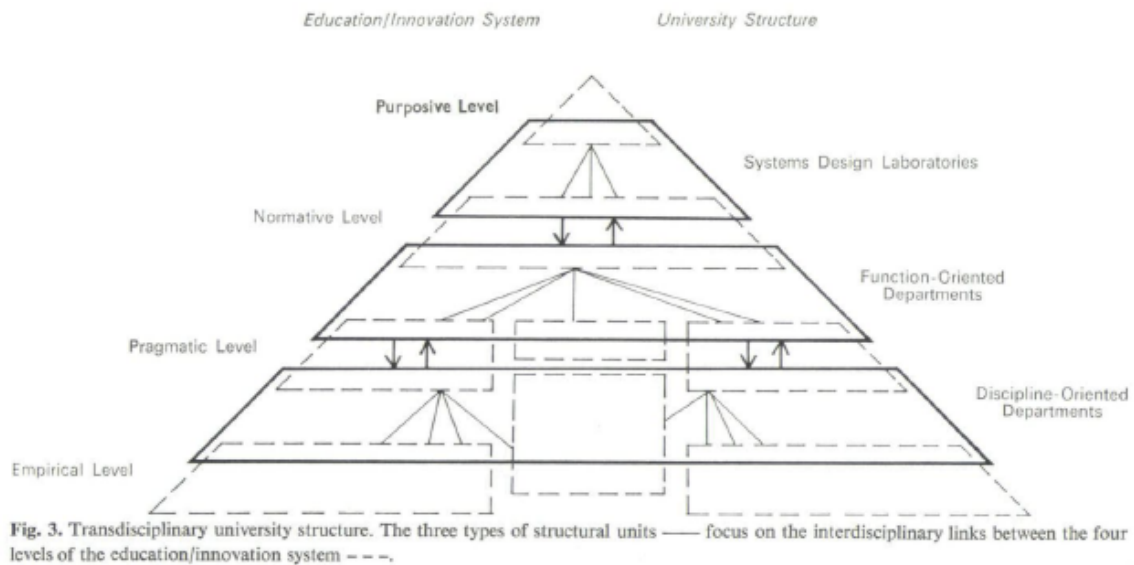


Figure 2.2 Jantsch's illustration of the TD university structure (Jantsch, 1970).

To Jantsch, a mechanistic explanation of the world, which he described as “the traditional dissection of knowledge and knowledge-transfer” (Jantsch, 1972, p. 103), was insufficient. In its place, Jantsch promoted a purposive system and a non-linear systems approach. He saw purpose as leading to a mutual enhancement of epistemologies. To Jantsch, the choice was not binary, or between structure and individual, the focus was on the dynamic between the two and he saw knowledge as *Bildung*, in the tradition of Humboldt (Scholz, 2020), developing the ability to judge complex, dynamically changing situations. Jantsch shifted the analysis from the elements within a system to how they interact.

Another methodology seen as connected to this actionable principle of TD is post-normal science (PNS) (Funtowicz & Ravetz, 1993). Funtowicz and Ravetz describe normal science as apt in policy relevant fields of science when “simple puzzle-solving is effective” (Funtowicz & Ravetz in Hirsch-Hadorn et al., 2008, p. 362). PNS is needed when high levels of one or both of the following is present: systems

uncertainties and decision stakes. Scientific input in these circumstances especially to the policy process needs an extended peer community. This extended peer community is all those with a stake in the dialogue. PNS has parallels with early work identifying “wicked problems” which are “difficult or impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to recognize” (Rittel & Webber, 1973) and complements TD in creating a new understanding of science (Funtowicz & Ravetz, 2008) which is expressed by Gibbons et al. (1994) as a shift from Mode 1 to Mode 2 science. Gibbons et al. (1994) argued that Mode 2 seeks to expand the use of science from just describing and explaining phenomena (Mode 1), to also clarifying societal goals (target knowledge) and how to get to those goals (transformation knowledge) (Mode 2). In simple terms, Mode 2 is focused on the use of knowledge to society. It is an outgrowth of and stands next to Mode 1, rather than replacing it.

The term Mode 2 originated in the seminal 1994 publication *The New Production of Knowledge* (Gibbons et al., 1994). The book builds on the ideas of Eric Jantsch, who the authors paraphrase in their articulation of the defining characteristics of TD. TD as defined by Gibbons et al. (1994) is a “transdisciplinary mode of knowledge production” (ibid p. 29). They emphasise the difference between MD, ID and TD as a spectrum of change in theory and methodology. MD does not lead to changes in theoretical structures; ID consists of the formation of a common methodology while working on different themes. In TD the methodology and theory takes its shape from the problem formulation. This is highly specific and local and is based on a common theoretical understanding and epistemological interpenetration. In simplest terms, in TD the problem comes first. This consists of “a continuous linking and relinking, in specific clusterings and configurations of knowledge which is brought together on a temporary

basis in specific contexts of application” (ibid p. 29). A TD mode of knowledge production is geared towards and driven by problem-solving. Mode 2 can be described as “the ever closer interaction of knowledge production with a succession of problem contexts” (ibid p. 5). Mode 2 knowledge production is a rich concept which Figure 2.3 illustrates. The central facets are heterogeneity; organisational diversity; the context of application and TD.



Figure 2.3 Author's graphic illustration of the Mode 2 Knowledge Loop.

As Figure 2.3 illustrates, people and how they interact in “socially organised forms” are central aspects to Mode 2 (Gibbons et al., 1994, p. 17) as they come together to work “in the context of application” (ibid, p.6). Mode 2 seeks to bring tacit rather than explicit knowledge into the problem-solving process. This is something that is

constantly negotiated rather than being led by the “cognitive and social norms of academic science” (ibid, p. 4). The problem-solving process takes place with an understanding that implementation is part of the solution. It is within contexts of application that challenging intellectual problems can often take place.

2.7 Contemporary TD

A new discourse of TD has emerged that appears to build on these two pillars (knowledge integration and actionable knowledge). Crucially this narrative is aligned with sustainability and a new discourse of problem-solving (Klein, 2014). This builds on the concept of PNS and Mode 2 and represents a transparently values-driven science. It is most prominently associated with the Swiss/German school of TD, which is connected to environmental research and has been described as a European TD movement for trans-sector, problem-oriented research involving the participation of stakeholders in society (Klein, 2008; Augsburg, 2014). In this Swiss/German school, TD is a process that is problem oriented; process oriented; participatory; practice-oriented and beyond disciplinary (Klein, 2018). This seeks both to reflect the era of complexity in which we now live (the age of the Anthropocene and human-environment systems) and marks a turn from “a science for society to a science with society” (Scholz & Steiner, 2015). The approach is highly normative – these are societally relevant problems (not economically driven).

The Swiss and German environmental research that developed this methodology began in the 1980s but acquired impetus when the Swiss National Science Foundation (SNF) began the Swiss Environmental Priority Programme (SPPU) in 1991. The projects were required to include TD research, for example, joint problem

definitions and valuation of research outcomes by practitioners and scientists (Scholz, 2020). In the 1990s the Department of Environmental Systems Science of ETH Zurich also became active in TD. At ETH Zurich, TD processes became part of sustainability learning in the environmental sciences. The Zurich 2000 conference brought together the heads of NSF and ETH Zurich with industry and civil organisations under the banner of *Transdisciplinarity: Joint problem-solving among science, technology, and society: An effective way for managing complexity*. The conference yielded a wealth of material on how to do TD and proposed a definition of TD as aspiring “to the efficient use of knowledge by relating different epistemics (i.e. ways of knowing) when dealing with a complex, societally relevant real-world problem” (Scholz & Steiner, 2015). The challenge of TD was to ensure that practice-derived expertise is combined with academic rigour (Scholz, 2020). The Swiss school has developed TD in hugely significant ways to support academic rigour, practical implementation and usability. These can be transferred to educational contexts (see Chapter 7 for how this was used in the Alliance case) for example creating frameworks for TD research processes (Pohl, Krütli & Stauffacher, 2017). The approach is that TD has its own distinct theoretical structures, research methods and modes of practice that pertain to a specific problem, arise in that context and may not necessarily be transferrable to any other. Swiss researchers developed distinct frameworks to guide problem solving in the context of problem. These support the goal of creating theoretical consensus that is strengthened by suitable empirical components. The Swiss approach aims at identifying, structuring, analysing and handling issues in problem fields with the aspiration (Pohl & Hirsch Hadorn, 2008):

(a) to grasp the relevant complexity of a problem, (b) to take into account the diversity of life-world and scientific perceptions of

problems, (c) to link abstract and case-specific knowledge, and (d) develop knowledge and practices that promote what is perceived to be the common good. (p. 36).

In 1997, Swiss researchers produced a report *Research on sustainability and global change – visions in science policy*, that articulated the need for science to submit three types of knowledge to public debate: Systems knowledge about structures, processes, variabilities, etc.; Target knowledge about the targets of future development and scenarios; Transformation knowledge about the transition from the current to a future target situation (ProClim, 1997). These were further explained as:

- 1. Knowledge of the current status: Systems knowledge of structures and processes, variabilities, etc.*
- 2. Knowledge concerning that which may and may not be: Target knowledge, i.e. the evaluation of current situations, prognoses and scenarios; providing critical levels, "guiding ideas", ethical boundary conditions, visions.*
- 3. Knowledge on how to make the transition from the current to the target situation: Transformation knowledge, i.e. gaining knowledge on how to shape and implement the transition from the existing to the target situation. (p.15)*

The Swiss approach emphasises the TD team and what Klein (2008) refers to as democratic discourse. TD group identity is cultivated by team management and needs to be continually managed throughout the project. Heterogeneity is seen as a

necessary element of success but also a challenge (Augsburg, 2014). Democratic discourse means integrating groups and individuals from across diverse sectors of society in the problem-defining, problem-exploring, research and knowledge production and implementation cycle (Augsburg, 2014; Hirsch Hadorn et al., 2008).

2.8 Conclusion

This chapter sought to trace the development of TD through the twentieth century to the present. It organised this depiction by identifying two pillars of TD thought: knowledge integration and actionable knowledge. TD practice and theory have emanated from the research domain, most notably the Swiss/German environmental science domain in the late twentieth and early twenty-first century. There is a growing consensus that TD competencies must be cultivated (Klein, 2008; Augsburg, 2014) within the research community and to develop new generations of researchers. This is increasingly reflected in European policy (see Chapter 4). The foundational TD pillars can be seen to diffuse and disperse into different educational approaches. TD in practice – and the variants that connect to TD education – will therefore be examined in Chapter 3.

Chapter 3 TD in educational practice

3.1 Introduction

Although growth in TD practice and methodology was driven by the research domain in the twenty-first century, the first comprehensive promotion of TD began with a critical examination of the university (Apostel et al., 1972). This chapter returns to TD education and its place within the university. In it, I critically evaluate current TD educational practice and present a literature review of both ID and TD educational research. There is a dearth of literature within academic discourse on TD education but the case studies that are evident provide an understanding of the interconnection between TD and competency-based education (CBE), which I will also explore in this chapter.

3.2 TD practice: A literature review

The first review

Literature on TD in practice is divided between TD research and TD education, with considerably more publications in the former (for example Hirsch Hadorn et al., 2008; Klein, 2014; von Wehrden et al., 2018; Baptista & Rojas-Castro, 2020) than the latter. I completed a comprehensive literature review of ID and TD education and research in 2017/18 (prior to beginning the doctorate). In 2018/19, I further developed this review and continued iteratively reviewing literature until early 2022. My initial literature review demonstrated that literature on ID and TD education overlaps with literature on ID and TD research. There is a quantifiable difference in the amount of research carried out on ID (research and education combined) and TD (research and

education combined). I performed a Scopus title search in April 2019 with an open date range for the term “interdisc*”. This produced 20,507 results, while a search for “transdisc*” produced 2,293 results. As a result, in the initial literature review I focused exclusively on ID educational practice and what the goals and components of ID education were. Practitioners acknowledge that the pedagogy of ID is an area that requires further study and the multiplicity of learning outcomes – communication, collaboration, evaluation, synthesis – make a single standard for evaluation of student learning and assessment difficult to identify (Lattuca et al., 2017). Advocates of ID argue that although there is a dearth of studies evidencing the effects of ID programs on learning, there is evidence that ID supports specific learning outcomes (Knight et al., 2013; Spelt et al., 2009). Lattuca et al. (2004, 2017) chronicle a number of single-institution studies of ID courses that demonstrate changes in a variety of measurements of learning: an improvement in independent judgment; decreased scores in dogmatism; improvement in critical thinking, knowledge and preparation for graduate or professional life. ID also leads to greater student motivation, skills for communication (dialogue) and integration and the ability to synthesise and evaluate the testimony of experts. It also gives students the opportunity to connect new knowledge to existing knowledge and prepares students for success in the workplace and participating in civic communities. Both ID and TD develop the skills of problem-solving and critical thinking and emphasise the act of witnessing and integrating a variety of responses to an issue (Miles & Rainbird, 2014; Park & Son, 2010; Newell, 1990). However critics of ID query whether ID is the only route to the development of these skills and say ID lacks rigour and amounts to little more than dilettantism (Benson, 1982). Indeed the interviewees in this fieldwork were conscious of the need to ensure that students were able to learn disciplinary knowledge or TD knowledge that protects depth of learning.

The literature also featured common thematic calls for further research. These included the need for the development of integration techniques, theories and concepts to support student learning across disciplines (Frodeman et al., 2014; Klein & Newell, 1997; Klein, 2010); the development of ID/TD curriculum ideology (Lyall et al., 2015a); rigorous criteria for ID evaluation (Boix-Mansilla, 2015); theoretical frameworks for ID and TD pedagogy as well as practical tools to aid the practice of ID and TD within both the research domain and the domain of teaching and learning (Lattuca, 2017; Lyall et al., 2015b). Through this initial literature review I identified a gap in research relating to the analysis of educational policy at European level relating to ID and TD education or the synonym of teaching related to ‘grand societal challenges’ or ‘active citizenship’. This policy will be explored in Chapter 4.

The second review

I carried out the second literature review in late 2019 and throughout 2020 as part of my research but also to inform the curriculum design work that I was engaged in as part of the Alliance. This literature review focused on TD: the history of the terms, the varied schools, the implications for implementation (as outlined in Chapter 2). It was informed by the first literature review but was also carried out iteratively to augment the first literature review by examining the work of leading practitioners in TD practice more deeply. In particular, this second literature review was guided by the work of the Swiss Academies of Arts and Sciences’ Network for Transdisciplinary Research (td-net). Td-net produces a list annually of all publications that contribute to the field of TD education and research. This network is the centre of the contemporary European tradition of TD and is closely connected to environmental science researchers at ETH Zurich. I attended a workshop organised by td-net in 2020 and carried out an online

interview with Christian Pohl who teaches on and was involved with the design of the ETH Zurich TD Bachelor in Environmental Sciences, which has a significant and longstanding TD module. This allowed me to understand their TD curriculum design and implementation approach in detail and also directed me towards further reading. The second literature review and my role in the Alliance also led me to the literature on challenge-based learning (CBL) and Education for Sustainable Development (ESD).

As my thesis and practice as a strategist and then research associate on ID and TD evolved alongside the iterative literature review, I focused the literature review and search terms to directly answer my research question: *How can TD education be successfully created in a university?* I considered it vital to understand what TD education was and what practitioners considered success to look like. But I was also aware that this is a nascent field. As outlined in Chapter 2, there are varied definitions and schools of thought within TD. It is only in recent years (since 2010 approximately) that educators are using the term TD to describe their educational ambitions. Rather than asking ‘What do students learn?’, my question was ‘How are these curricula formed?’ My particular question related to how TD educational experiences are created within institutions rather than how they are experienced by students.

To support my research, I refined my literature search to focus on TD and curriculum, to examine if the process of creating TD curricula within universities had been researched. I carried out a search for the terms “transdisc*” and “curriculum” and “design” within article title, abstract and keywords in Scopus and Web of Science between 1970 and 2020. 151 articles were returned from Scopus and 65 from Web of Science. I reviewed each abstract to narrow inclusion to literature that addressed how

TD curricula were designed or what TD curricula were designed. The list was limited to educational programmes for students in higher education institutions (HEIs). The results included conference proceedings, book chapters and journal articles. I further filtered these results by reading through abstracts and this reduced the number of relevant articles to approximately 100. I complemented this dataset with articles listed by td-net's annual report *A Tour d'horizon of literature related to transdisciplinarity*.

From the review, I could confirm that there is a clear dearth of literature on the process of designing TD programmes from the academic perspective i.e. opening the black box on the process of curriculum design and disciplinary content integration. Much of the literature comprises case studies of practice by academic practitioners without input from or evaluation by educational scientists (Klein, 2018; Fam et al., 2018). While this is a rich source of information and practice, the focus is on the final design of programmes and courses rather than how academics worked together and experienced the design process.

Additionally, it was clear from the results of the search that TD is predominantly associated with environmental science and sustainability education across all disciplines (Gaard et al., 2017; Dlouhá & Burandt, 2015; Fam et al., 2018). TD is perceived as a new paradigm that can systematise sustainability education. The transition to sustainability is seen to necessitate collaboration among disciplines and fields of practice towards tackling large societal problems (Charli-Joseph et al., 2016) and universities are motivated to do TD to develop TD research capabilities. In the literature, it is particularly prevalent in engineering given its connection to sustainability issues (for example Byrne et al., 2013; Tejedor et al., 2018). Second to sustainability, TD curricula are evident when disciplinary areas articulate a desire to

give students an understanding of how their disciplinary area is affected by and interconnected with complex societal challenges, for example, social work (Nurius et al., 2017), arts and design (Haley et al., 2017) or accounting (McGuigan & Kern, 2016). TD curricula are also created as foundational programmes in disciplinary areas that are directly connected to complex societal challenges e.g. gerontology and global ageing (Lu & Hsu, 2014). The practice of TD has not evolved considerably since Klein (2008) produced a comprehensive overview of TD curriculum models. Models include case study methods (including formative scenario analysis, modelling systems dynamics, integrated risk model, future workshops, and life-cycle assessment), stakeholder workshops, seminars and fieldwork based around a real-world challenge that combines ID approaches with TD i.e. collaborating with extra-academic actors. These learning experiences may be supported by thematic modules e.g. ecosystems, values, social transformation in addition to disciplinary content.

In Chapter 2, I proposed two pillars of TD to describe the central tenets that have emerged from different schools of thought. These are the integration of knowledge and actionable knowledge (closing the knowledge-action gap). Programmes and modules vary in their design specifics but the two pillars of TD – knowledge integration and actionable knowledge – are present and co-joined in the majority. Analytical and integrative methodologies to cope with complexity are demonstrated in learning outcomes e.g. systems thinking and engagement with extra-academic actors (Krasny et al., 2009; Miller et al., 2008). Actionable knowledge is evident in the focus on shared problem definition, focus on a grand societal challenge and also collaboration with extra-academic actors (Nurius et al., 2017; McGregor, 2017). TD curricula articulate a variety of problem-solving processes for example problem identification, problem definition, clarification of aims, problem analysis including

context and development of strategies to address the problem. Models are teamwork-based either within university environments or in work places through work placements. Fam et al. (2018, p. 90) outline curriculum approaches that reflect Klein's list and identify the commonalities of ID and TD teaching and learning approaches for example: team-orientation, project-based addressing complex problems and collaboration with external partners and clients (businesses or public bodies).

While there was a clear gap in the literature regarding how TD programmes or modules are created institutionally from the perspective of process, staffing and disciplinary contributions, there are many examples within the literature on the structure and final design of TD learning experiences (Gibbs, 2017; Fam et al., 2018). Within the literature, TD curricula are referred to in terms of the process of learning rather than the content. The line between curriculum and pedagogy is blurred. TD learning has been described as learning in a TD setting and learning about TD (Pearce, Adler, Senn, Krütli, Stauffacher & Pohl, 2018). Greenhalgh-Spencer, Frias and Ertas (2017, p. 75) describe the TD curriculum as beginning with "a problem to be solved or a project to be developed, and then shows how knowledge from multiple disciplines must be brought to bear in order to solve a problem". More commonly, the curriculum uses a real-world societal problem or challenge as the starting point but the interaction between students, academics and extra-academic actors in a defined problem-solving process forms the curriculum. ETH Zurich (Pearce et al., 2018) cite Meeth's definition of TD learning (Meeth, 1978, p. 173) as their starting point: "Whereas interdisciplinary programs start with the discipline, transdisciplinary programs start with the issue or problem and, through the processes of problem solving, bring to bear the knowledge of these disciplines that contributes to a solution or resolution". TD learning is seen as learning as a process. For example, the

Tackling Environmental Problems (TEP) course at Department of Environmental Systems Science (D-USYS) at the Swiss Federal Institute of Technology in Zurich (ETH Zürich) places complex real-world problem-solving at the centre of learning. Each year, students work with affected stakeholders on a specific case study connected to sustainable development in Switzerland (Pearce, 2021). Learning goals were designed to develop what the course organisers describe as transferable skills in students. Pearce summarises the learning goals as follows:

1. Reflecting about self and others – Students reflect critically on their own and others' perceptions and biases.
 2. Framing complex problems using diverse perspectives – Students identify and frame clear, relevant problems using information that may be unstructured and which comes from diverse sources.
 3. Communicating values – Students identify, ground and communicate assumptions and normative values related to sustainable development.
 4. Imagining solutions and their consequences – Students develop solutions for real-world problems while being aware of any unintended consequences of these solutions and taking responsibility for these consequences.
 5. Applying concepts in the real world – Students apply conceptual knowledge to specific contexts, and, in parallel, apply practical skills (such as project organisation and time management) to deliver the required end products.
- (Pearce, 2021, np).

However, the case study does not explicate the role that disciplinary content plays and how different disciplines are integrated. The ETH Zurich example has similarities with work by Crosby, Fam, and Mellick Lopes (2018) who outline a Living Lab at the

Transdisciplinary Living Lab (TDLL) at the University of Technology Sydney (UTS). Like Pearce above, they describe TD as an iterative learning process. In the case of TDLL, this centres around an on-campus food waste management system. The course has an explicit learning cycle designed around Jahn's concept of an 'ideal transdisciplinary process' (Jahn et al., 2012). Crosby et al. (2018) contend that students develop skills (critical listening, thinking and reflective practice) and competencies (observation and system mapping) in three phases: (1) joint problem formulation, (2) co-production and integration of knowledge and (3) the implementation and assessment of societal and scientific outcomes from the TDLL.

Much of the literature on TD pedagogy used the languages of skills, attitudes and competencies to describe the desired learning process (Gibbs, 2017). Mutual learning is seen as an important component of models as is the development of competencies: collaboration, communication, reflexivity, team development and project management. TD learning, according to Gibbs (2017), is social in its nature, a community of learners that is defined by flexibility, adaptability, reflexivity, participation, dialogue and collaboration. McGregor (2017) identified TD learning processes as comprising three emergent themes: (a) transdisciplinary learning (compared to disciplinary learning), (b) the transdisciplinary learning cycle, and (c) transdisciplinary habits of mind. For many educators and research leaders, the focus of TD is to equip students to develop key competencies to work in and contribute to the field of sustainable development (Tejedor et al., 2018). TD has been called a competence (Segales et al., 2009) and is said to develop competencies (Tejedor et al., 2018). This orientation towards conceptualising TD in terms of competency development harmonises with a body of literature on TD that can be traced back arguably to Nicolescu's *Manifesto of transdisciplinarity* (2002) and the *Charter of transdisciplinarity* (1994) both of which

are heavily normative and promote the idea of a TD individual and the need for integral education of the human being. While the literature on TD education points to a clear orientation of TD pedagogy around learning as a competency-developing process or competency-based education (CBE), in my experience in practice this can lead to challenges in how TD education is perceived by educational science and broader university communities. While a full critique of the concept of CBE falls outside of the scope of this thesis, the following section serves to capture the challenges CBE can bring in practice. This is followed by an account of the challenges facing TD education.

3.3 Competencies

The most pressing issue with regards to CBE – and one which perhaps captures reservations about it as an approach – is the difficulty in defining what a competency is and the lack of consensus in the literature. The literature has no clear, widely accepted definition of CBE (Frank et al, 2010). In practice, within the fieldwork in this thesis, there was a constant lack of clarity on how competencies differed from so-called soft skills e.g. communication and collaboration; disciplinary skills e.g. systems' thinking; or transversal disciplinary skills e.g. research methods. Norris (1991, p. 331) described competence as “an El Dorado of a word with a wealth of meanings and the appropriate connotations for utilitarian times” that is “shrouded in theoretical confusion”. Lozano et al. (2012) see competencies as deriving from a classical economic-utilitarianism view of education that focuses on employability. In a review of the literature on competence as it is used in school education in Germany, Glaesser (2019, p. 80) describes competence as “knowledge but also the capacity (or disposition...) to apply what has been learnt”. Messick (1984) defines competence as

what a person knows and can do under ideal circumstances. In the 1990s the word was associated with a drive towards more practicality in education and training (vocational education) placing a greater emphasis on the assessment of performance rather than knowledge. In its inception it was associated with standards narrative: “the term competence re-emerged as a motif around which an innovation could grow” (Norris, 1991). Although the competence approach is evident in the Bologna Process and had been tied into the overarching framework of the European Qualifications Framework for lifelong learning, it has not been defined (Davies, 2017; Lozano et al, 2012). Davies (2017) traces the development of the term competence in the ECTS User Guides from 2005 to 2015 where the term seems synonymous with learning outcome: “Learning outcomes are sets of competences, expressing what the student will know, understand or be able to do after completion of a process of learning, long or short”. Competencies are described as both generic and subject-area related. These should be fostered, according to the EC, on all educational programmes.

Competency development is a central concept in global and European policy and Education for Sustainable Development (ESD) yet even its foremost proponents highlight the generalities that exist regarding connected didactic concepts, competency acquisition. Barth describes the concept as vague and defines competencies as (2007, p. 417) “dispositions to self-organisation, comprising different psycho-social components, existing in a context-overlapping manner, and realising themselves context-specifically. They may be acquired gradually in different stages, and they are reflected in successful actions”. According to the OECD (2018), the ability to develop competencies is itself something to be learned using a sequenced process of reflection, anticipation and action. This is in response to societal challenges listed by the OECD as environmental, economic and social. To Barth

(2007), competencies are an interplay of cognitive and non-cognitive and this fact raises the issue about how and whether competencies can be learned. CBE is further complicated by the relationship between competency, skill and knowledge. According to the (OECD, 2019): “Skills are part of a holistic concept of competency, involving the mobilisation of knowledge, skills, attitudes and values to meet complex demands”. The generic and catch-all nature of competencies is one of several challenges facing the broader adoption of TD education within universities. The following section will elaborate on these in more detail.

3.4 Challenges for TD education

As I outlined in the previous section, literature on TD education focuses on the learning process – a combination of curriculum and pedagogy – which is expressed in curricular language in terms of competence development. The curriculum comprises the choice of a problem-oriented methodology. While knowledge integration – between disciplines as well as between different stakeholders – is seen as a necessary part of TD, the process of disciplinary knowledge is seldom explicated. More often, within the literature on TD education, integration is seen as happening in the classroom i.e. students seek out information from within or outside their discipline to solve a challenge (e.g. Greenhalgh-Spencer et al., 2017). Educators at ETH Zurich, for example, describe the goal of their teaching in ID and TD as “to link students’ work back to the realm of practice” (Neuhauser & Pohl, 2015, p. 113). This is achieved through for example undergraduate students working on real-life case studies, meeting stakeholders and learning how to do a stakeholder analysis. When disciplinary learning objectives are not specified, TD learning is framed in terms of competency development. This presents challenges to the systematisation of TD

within universities. This competence focus can lead to a perception, in my experience within universities in Europe, that TD is a means to develop soft skills but does not have the same rigour, longevity or ability to genuinely ameliorate societal problems as disciplines do. Findings suggest that TD courses can increase collaboration, problem-solving and engagement (Greenhalgh-Spencer et al., 2017) but how this differentiates it from problem-based learning, project-based learning or workplace-learning is unclear. Likewise as the black box of disciplinary integration is seldom opened within the literature, how TD develops or integrates disciplinary learning is not clear. The theoretical confusion surrounding the term competence and how it is developed, taught or assessed does little to counteract this. Critics of ID for example accuse ID of a dilettantish handling of ephemeral societal issues without rigour; viable, long-term intellectual communities; or sound, identifiable conceptual frameworks (Benson, 1982; Barrett, 2012; Hansson, 1999).

It is widely acknowledged in TD research that knowledge integration is a major challenge of ID and TD (Bammer, 2005; Bergmann et al., 2005; Klein, 2008; McDonald et al., 2009; Jahn et al., 2012) and there is a growing literature within research practice on integration methodologies. In this regard, educational research lags somewhat behind the depth of research carried out on TD research and the methodology of knowledge integration (Hoffmann et al., 2017). In practice, I have witnessed the fact that integration of disciplinary knowledge in TD educational practice needs a boundary and defined approach or it can be too diffuse or overly specialised, particularly with groups that comprises students from different backgrounds.

3.5 Conclusion

Given the increased impetus in European policy (European Commission, 2019, 2020, 2022) to promote TD, and growing evidence that knowledge integration is a crucial skill for successful research focused on tackling societal challenges (Hoffmann et al., 2017), there is a need to inform practice and policy with research into TD education. In this chapter I sought to ground the key question explored in Chapter 2 – ‘What is TD?’ – by answering the question ‘What is TD education?’ TD is now evidently linked to the global challenge of sustainability and climate change in particular within the fields of environmental science and engineering. The literature demonstrates that practice reflects the two pillars of TD: knowledge integration and actionable knowledge. These pillars are evident in the literature through case studies that describe TD learning processes. Learning is described in the main as the development of TD competencies. Spurred by these two aspects of TD learning, practitioners articulate a need and a desire for learning to be reimagined as an intrapersonal, interpersonal and cognitive. This is a new paradigm of emotional cognition (for example Walther et al., 2012). Learning is no longer viewed solely as a student activity but is seen as a process that the entire group participates in: students, academic and extra-academic actors (Gibbs, 2017; Klein, 2018; Fam et al., 2018). I sought to illustrate that TD is undoubtedly a values-driven educational practice that depends on the intrinsic motivation and the interiority of those involved (for example, Parkes & Blewitt, 2011). In this manner, I would argue, TD education is a U-shaped educational approach wherein a set of intra-personal, interpersonal and epistemological competencies act as a ballast to support the two pillars of knowledge integration and actionable knowledge. These are competencies that all participants in TD develop and learn including academic actors, extra-academic actors and students.

TD education therefore bridges two divides: the research-education divide and the content expert-learner divide (Pearce et al., 2018; McGuigan & Kern, 2016).

Chapter 4 European policy on the European University Initiative

“Knowledge, as embodied in human beings (as “human capital”) ...”

(OECD, 1996)

4.1 Introduction

This chapter analyses the evolution of European policy in higher education in the twentieth and early twenty-first century that gave rise to the emergence of TD in European higher education policy and the call for the European University Initiative (EUI) examined in this thesis. I describe the university's place historically as a societal institution that prevailing power structures have seen as a potent source of societal leadership and advancement (Scott, 2006). I argue that the while the dominant narrative in global and European policy in the early twenty-first century has been that of the knowledge economy, more recent policy narratives are characterised by a Quintuple Helix model. The EUI has emerged amid this context. It signals a shift in European higher education policy from differentiated integration to greater integration and Europeanisation and a concentrated focus on challenge-driven, TD education.

4.2 The changing role of the university in society

As one of Europe's most enduring social institutions, the university comprises basic form and function that have not evolved considerably (de Ridder-Symoens, 2006; Maassen & Stensaker, 2011; Scholz, 2020). Indeed, its methods of teaching have

survived almost intact from medieval times: the four faculties of arts that comprised the medieval university are still evident today. Against the backdrop of ever-changing social and political structures over centuries, the university has proven incredibly nimble in preserving its autonomy, power and existence despite its dependence on external powers for patronage. Popes, emperors, territorial princes, bishops, municipal authorities, aristocracy and the bourgeoisie all expected to gain support from the scholarly and scientific knowledge “in their struggle for existence”: knowledge, social advantage and improved well-being (Ruegg, 1992, p. 14). Universities created the elites that gave leadership within states and mini-states and brought cultural prestige. Whether led by students or masters, universities were given financial support and a level of protection by cities. As early as the thirteenth century any reform of universities came from negotiations among all social agents: local, municipal, national and from the Church.

Disciplines as discrete structures emerged during the eighteenth century when the creation of a taxonomy of knowledge was essential to ordering a growing body of knowledge (Weingart, 2010). Whereas during the eighteenth century, all output was addressed to the general public, thereafter “the increasingly esoteric nature of knowledge production led to a growing distance from practical concerns. The more specialised communication among scholars became, the more it was addressed to themselves” (Weingart, 2010, p. 6). In the eighteenth century there was widespread recognition of the limitations of traditional universities (Briggs & Michaud, 1972).

When the University of Berlin was founded in 1810, there was a perceived crisis of the university (Menand et al., 2017). When Humboldt was charged with planning a new institution of higher learning in Berlin in the nineteenth century, one of his key arguments was that the state should guide and resource universities that were

research intensive, providing an organisational framework and selecting staff.

However, Humboldt believed that research should be protected from all external influences including the state (Menand et al., 2017; Von Lüde, 2012). This freedom, however, Humboldt argued could only be guaranteed by the state. This was the beginning of a tension that exists today.

The success of the Humboldtian model is demonstrable by its reproduction globally in the nineteenth and twentieth centuries. The late nineteenth century brought with it research grants, research students and government contracts. The university's potential to develop society economically and militarily came to the fore in the twentieth century (Audretsch, 2014). The successful contribution of applied science during and in the wake of World War II had a marked effect on the relationship between the university and the state (Scholz, 2020). For example, in 1940, almost 1,000 academics from physicists to economists and mathematicians were involved in the British army operations research. Strategic warfare required inter- or cross-disciplinary work and the successes of World War II led to the industrial-military-university alliance and a deep well of funding. ID fields such as game theory, systems engineering and cybernetics emerged from this work (Scholz, 2020). Funding of science post-World War II led to rapid economic growth. The logic behind driving state investment into the research function of universities was that no individual economic actor would invest in research because it would not recoup its investment.

Governments could, however, invest in fundamental research and make that research available to all interested economic actors. In this scenario, knowledge would flow naturally from the university to society based on demand (Laredo, 2007). The approach was that basic scientific research was scientific capital. Knowledge was capital. The idea of the university as driving the economy solidified in the 20th

century. With the rise of neoliberalism, the university and higher education came to be seen by governments as “the new star ship in the policy fleet” driving economic growth (Olssen & Peters, 2005, p. 313). It is during the late twentieth century that we see growing pressure on the university to act as an economic player. The following section explores the influence the dominant global economic model and policy has had on the twenty-first century university.

4.3 The university as the engine of the knowledge economy

At the turn of the century, the university was described as a “critical pillar of human development worldwide” (World Bank, 2002, p. ix) driving the economy and creating the conditions for economic development. In World Bank rhetoric, third-level education was seen to empower domestic constituencies, build institutions and nurture favourable regulatory frameworks and governance structures. These were the conditions seen to “increase social capital and to promote social cohesion”, determinants of economic growth and development (ibid, p. x). The ability of the university to develop “higher order capacities” and the narrative that knowledge is the main driver of growth was emphasised by the World Bank. The commodification of knowledge was seen as at the core of a country’s “competitive advantage in the global economy”. The narrative is the fruit of “prolonged and continual work by an immense intellectual workforce” (Bourdieu, 2003) of lobbyists, policy analysts and administrators, linking the European Union, the OECD, the World Bank (Lawn & Lingard, 2002) and latterly consultancy firms (Ernst & Young) and university associations (European University Association (EUA)).

The connecting points between these bodies are often data sets produced by the OECD (for example, OECD, 1996), an organisation heavily influencing if not driving this narrative. The OECD has arguably had more influence than any other global organisation on the “social imaginary of the knowledge economy” and the role of education in “human capital formation” (Rizvi & Lingard, 2009, p. 445). In 1996, the OECD produced the document *The knowledge-based economy*. In calling for the development of new knowledge-related indicators to accurately assess activities within the knowledge economy, the OECD listed the “development and skilling of human capital” and “the functioning of knowledge networks and national innovation systems” (OECD, 1996). The OECD does not have any legally binding mandate over its members but it exerts influence by collaborating with governments. For example in 2007, the OECD (2007) set its objective to “provide policy makers with information and analysis to assist them in formulating and implementing policies to achieve national social and economic objectives through tertiary education”. The purpose of the OECD is to shape policy and in the case of the European Commission (EC) the relationship is bi-directional. Like all members of the OECD, the European Union has a permanent delegate to the OECD. The links between the OECD, the EC and the Bologna Process are evidenced by the presence of the EC at the table of both the OECD and the Bologna Process but also the cross-pollination between groups of key individual policymakers. For example, the EC was closely involved with the European Cultural Foundation (ECF), when the two organisations co-founded the European Institution of Education and Social Policies in 1975, with the aim of advancing educational cooperation in Europe. Several key thinkers behind the ECF team who were closely linked to an education futurology exercise, Europe 2000, were in favour of using the EC to aid national education innovation (Corbett, 2003). From the early 1970s onwards, the EC had been developing two projects for inter-university

cooperation and student mobility, known as the Joint Study Programmes and Short Study Visits schemes. They were the immediate predecessors of ERASMUS. The ECF was involved in the development of the Erasmus programme in the decade prior to the launch of ERASMUS in 1987. The ECF group included the political scientist, Ladislav Cerych, head of the OECD higher education unit.

The OECD carries out surveys of EU policies and produces statistical data and economic comparisons, providing the EU with the material required to analyse and monitor its economic, social and environmental policy (OECD, 2022). In April 2004, EU countries agreed on the framework for educational review with the OECD. The OECD sets the measure for review and assists in surveillance and review. It evaluates educational systems based on output, outcomes and impact. The effectiveness of an educational system is framed in terms of employment and earning benefit. Well-being, social cohesion and equity are seen as indirect effects. Whether or not the educational system works is evaluated purely in terms of the weight of its contribution to the economy:

“Outcome indicators examine the direct effects of the output of education systems, such as the employment and earning benefits of pursuing higher education. Impact indicators analyse the long-term indirect effects of the outcomes, such as the knowledge and skills acquired, contributions to economic growth and societal well-being, and social cohesion and equity” (OECD, 2021).

The drive for quality in the higher education sector is to enhance competitiveness and effectiveness in producing new knowledge capital. Knowledge-Based Capital (KBC)

being the only factor of production that will never become scarce (OECD, 2013). This marks its difference from labour, natural resources and physical capital. In the language of these policy bodies, aspects such as a transparent and flexible governance structure allow the university to perform better as an engine of economic growth.

This concept of the university as an engine of economic growth originated in the mid-1990s when universities became “explicit instruments of economic growth in the knowledge economy” (Wissema, 2009) through the Triple Helix thesis (the interconnection between university, industry and government) a time when universities and industry were exhorted by policy makers to work together more closely for the benefit of society derived from the commercialisation of new knowledge. Innovation became a factor of economic success (Scholz, 2020). The Triple Helix was described as the university’s second academic revolution (Etzkowitz & Leydesdorff, 1995) (the first revolution was the emergence of the research university) creating the entrepreneurial university that would capitalise on its knowledge. The Triple Helix established economic development as an academic function, and the university as an economic actor (Leydesdorff, 2012). This integration of a mission of economic development by universities, next to their traditional activities of research and teaching is also known as the Third Mission (Minshall et al., 2007, p. 3). The Third Mission describes an entrepreneurial university that facilitates the commercialisation of university research, generates start-ups and new ventures, and provides leadership in entrepreneurial activity and nurturing of entrepreneurial skills in its students (Audretsch, 2014). These developments were supported and, in some cases, driven by policy and the direct link between employability, earning power and the possession of a higher-level degree led to policy encouraging the

massification of higher education. The changing role and expectations of the university and its ability to meet those has been stretched by the massification of universities and globalisation of research (Altbach, 2011; Wissema, 2009).

Enrolments have increased at least 30% over the past 50 years. For example, between 2000 and 2008, post-secondary enrolments increased from 100 million to well over 150 million (OECD, 2008). In 2021, there were 220 million tertiary education students (World Bank, 2021).

The increase in student demand has not been matched by expenditure on higher education (European Commission/EACEA/Eurydice, 2020) and funding varies across the education systems in Europe. Several countries had large funding gaps from 2008 to 2019, for example, Italy and Spain. Czech Republic, Ireland, Romania and Slovakia reinvested in their systems by 2019 but have not exceeded 2008 levels of investment. Likewise demographics differ across EU countries. Not every country experienced a growth in student numbers while other countries, for example Ireland, experienced strong growth in student numbers in what the EUA describes as an “extreme case” with “grave” funding cuts (Bennetot Pruvot, Estermann, & Stoyanova (2021, p. 20).

Globally, some universities are forging ahead with a ‘third generation’ model, protecting themselves from the shortfall in national and international state funding (Wissema, 2009) by seeking funding from and collaboration with technology-driven enterprises. Likewise, enterprises are out-sourcing fundamental research to universities. This creates increased competition globally for high-quality students and academic staff with a gap between top and lesser universities increasing. Financial sustainability is one of the key challenges facing European universities even though there has been gradual improvement in funding since 2015 (Bennetot Pruvot et al.,

2021). EC members decide how they want to fund their higher education and research and the EC has been critical of public spending on higher education in Europe as it compares to the USA or Japan (Highman, 2016). There are major implications of massification: financial and infrastructural challenges and quality assurance. The perception of the university as an engine for the global economy both in terms of profit and employment has led to universities being treated as businesses (Connell, 2019) with all the performance monitoring and target setting that sit at home in a business model. A body of material that has emerged in the 'consultancy' realm regarding the role of universities in society (for example Ernst & Young, 2022) with increasing despondency in terms of the economic viability of universities. From this perspective, universities are viewed as economic engines that are failing their central task: to get students jobs and make economies powerful and competitive. Their cost-effectiveness is repeatedly questioned in this grey literature and in the popular media.

As the following section will outline, the idea of European knowledge architecture linked through universities to the bloc's economic performance reflects the language of the knowledge economy expressed across the global educational policy community. However with limited funding and legal power at its disposal to implement policies, the efficacy of the EC in matching the financial power of US or Asian universities is questionable. Instead the EC has relied on a policy approach of "differentiated integration" with mixed results (Veiga et al., 2015).

4.4 European policy on higher education

At the turn of the twenty-first century, two European Council meetings (Lisbon and Stockholm) set the EU the target of becoming "the most competitive and dynamic

knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion” (European Parliament, 2000). This signalled a significant change in European policy for higher education. Until the late twentieth century, higher education in Europe was regarded as a national rather than supra-national matter. The broader history of higher education as a central pillar of the European community can be traced to 1 June 1955, when the foreign ministers of Belgium, France, Italy, Luxembourg, and the Netherlands and the civil service head of the German Federal Republic’s foreign ministry (all members of the European Coal and Steel Community (ECSC)) met at Messina in Sicily to find a basis for extending European integration. Walter Hallstein, the German Federal Republic representative, brought a late paper to the table at Messina proposing a European university with a clear mission:

...the Federal Government hopes to show that tangible testimony to young people of the desire for European union through the foundation of a European University to be created by the six ECSC states.
(Corbett, 2003, p. 317)

Efforts made after World War II to establish 'European' universities were largely unsuccessful because of the resistance of the existing universities, which regarded themselves as already European. The diversity of national cultural and educational traditions was seen as a precious European heritage that formed an academic elite, the ethos of which rested on common European values and which transcended all national boundaries. In the early years of the European community, ultimately the issue of tackling education at a European level was seen as 'taboo' and the 1957 Treaty of Rome did not give the community any competence to act in education but it

did give it the right to encourage cooperation in higher education through reports and funding (Berndtson, 2013). It was not incorporated into an EU treaty until the Treaty of Maastricht in 1992 (Beerrens, 2008). The Maastricht Treaty set out that the community would “contribute to the development of quality education” (European Parliament, 1992) by encouraging collaboration but while respecting the responsibility of members for the content of their teaching and the structure of their education systems. The treaty sought to develop the European dimension in teaching and to encourage mobility and cooperation between institutions but primary responsibility for higher education remains, as it still does, the preserve of individual EU Member States. The European Commission (EC) Directorate-General for Education and Culture has a limited legal basis and relatively small financial resources for its ‘supplementary’ activities in higher education (Keeling, 2006).

However, the 1998 Sorbonne Declaration returned to Hallstein’s aim: that Europe is not only a Europe of the single market, it must be a Europe of knowledge as well. The Sorbonne Conference and Declaration set in a motion a cooperation process that has had a significant impact on higher education. It began the process of the Europeanisation and harmonisation of education that gathered power and intensity with the Lisbon Agenda in 1999. The Lisbon Agenda identified the strategic role of higher education in driving the creation of what was perceived as a dynamic, competitive knowledge-based economy; promoting an economic competitiveness that has universities at the centre as a source of this human capital. It stated Europe’s “need to adapt both to the demands of the knowledge society and to the need for an improved level and quality of employment” (European Parliament, 2000). The creation of the European Higher Education Area (EHEA) and the modernisation of universities were seen as core to the success of the Lisbon strategy (Capano & Piattoni, 2011).

The goal of the EHEA was convergence in compatibility and comparability of academic qualifications. The EHEA is now a complex bureaucracy of quality assurance, accreditation, qualification frameworks regulation comprising 38 million students, the majority (56%) of whom are in first cycle. This machinery brought with it a massive administrative architecture that feeds into and is fed by the policy architecture which flourished with the Lisbonisation of higher education. Alongside this, a European education space emerged between “state and EU offices, between agencies and subcontractors, between academics and policy managers, between experts and officials, and between voluntary and public sector workers” (Lawn & Lingard, 2002, p. 292).

Lisbon led to the Bologna Process, which in 1999, began the reconstruction of higher education (Neave, 2003). Bologna is considered the most profound set of reforms for higher education in the history of Europe (though also “strange, complex and fuzzy” (Witte et al., 2009)). The process sought to create convergence in European higher education systems (Cino Pagliarello, 2022). It introduced a three-cycle system (bachelor-master-doctorate) with the goal of increased student and staff mobility and employability. It influenced national and local decision makers to introduce considerable reforms in higher education systems and individual universities and exemplified how influential European policy can be even on those spheres over which it does not have direct influence (Veiga & Neave, 2015). The language within EC policy is resonant of neo-liberalist discourse: HEIs are referred to in terms of their performance and their international attractiveness (Veiga & Neave, 2015). Bologna sought to position European universities as global players vis-à-vis USA, China, India and the Times Higher/Shanghai league tables (Deem et al., 2008). The 2003 Berlin communication states that European universities are not as attractive to students and

staff as US universities. It solidified the EC's view of the role of universities as the "crossroads" of the knowledge economy and society. At this juncture the EC introduced the idea that this knowledge production necessarily implied "a greater number of players":

The knowledge economy and society stem from the combination of four interdependent elements: the production of knowledge, mainly through scientific research; its transmission through education and training; its dissemination through the information and communication technologies; its use in technological innovation. At the same time, new configurations of production, transmission and application of knowledge are emerging, and their effect is to involve a greater number of players, typically in an increasingly internationalised network-driven context. Given that they are situated at the crossroads of research, education and innovation, universities in many respects hold the key to the knowledge economy and society. (European Commission, 2003 p. 4-5).

The EC said Bologna should define a framework for skills "as a key measure in Europe's response to globalisation and the shift to knowledge-based economies, and emphasised that people are Europe's main asset" (Official Journal of the European Union, 2006). This reflected the race for countries globally in the twenty-first century to have a world class university: the ushering in of an "age of academic hype" (Deem et al, 2008, p. 21).

The two pillars of the Bologna Process were the creation of the EHEA by 2010 and the European Research Area (ERA). The ERA was developed as a supra-national initiative, to create a “single market for knowledge, research and innovation” (Cino Pagliarello, 2022). The EC stated that “the European Higher Education Area and the European Research Area must be fully open to the world and become worldwide competitive players” (European Commission, 2006). This competitiveness would be driven by the following policies:

- breaking down the barriers around universities in Europe;
- ensuring autonomy and accountability for universities;
- providing incentives for partnerships with business;
- providing ‘the right mix’ of skills and competencies for the labour market;
- reducing the funding gap and making funding work more effectively in education and research; enhancing interdisciplinarity and transdisciplinarity;
- facilitating the interaction of knowledge and society;
- rewarding excellence;
- making the European higher education area and the European research area ‘more visible and attractive in the world’ (European Commission, 2006).

In 2018, the EC agreed a more ambitious EHEA (European Commission, 2018) through a focus on degree compatibility, quality and compliance with European standards and European higher education to play a key role in meeting the UN’s Sustainable Development Goals (SDGs) (Jungblut, Massen & Elken, 2020). This more ambitious EHEA called for a higher number of graduates driving further human capital development in all areas. As with the original Lisbon script, effective governance and funding mechanisms were called for along with and a strengthening

of the knowledge triangle (Highman, 2016). This indicates the increasing political coordination of higher education in the EU but how effective policy has been is questionable. Bologna has not been implemented uniformly (Cino Pagliarello, 2022). Countries were invited to move at their own pace in a policy approach described as differentiated integration, “a multi-layered system of decision-making responsible for enacting and stocktaking the processes and, simultaneously, persuading relevant policy actors at the national and sub-national levels to coordinate the achievement of EU policy goals” (Veiga et al, 2015, p. 89). These policies appear as soft laws that are realised in and through practice and this approach of ‘differentiated integration’ has not led to further integration (Veiga, 2019). The success or convergence of policy is hampered at the point of implementation. Neave & Veiga (2013) identify three levels of policy diffusion: European, Nation State and institutional. Implementation at a national level can be as diverse as the number of countries implementing. The biggest obstacle to mobility is difference in degree structures across EU countries (Gunn, 2020). As a result one of the EHEA’s central aims, to increase student mobility, has not been realised substantially (Teichler, 2017). Countries and institutions have differing levels of resources available to support harmonisation and some are underfunded and lack political support (Kwiek, 2005; Veiga, 2019).

Precarity of and disparity in resourcing are important contexts in policy implementation, which also emerged as a factor in the fieldwork in this thesis. It is not just the level of financial support that has affected policy implementation, there is evidence of a lack of political will within EC member states to support implementation of the EHEA. In highlighting the deterioration of core values including academic freedom in a number of European countries Jungblut et al. (2020) present evidence of a lack of political will. Cino Pagliarello (2022) argues that the Bologna Process has

deepened asymmetries. For example the European Institute of Technology supports the development of EIT Innovation Communities between universities but these communities are mainly in Northern Europe (Veiga, 2019).

The ERA has also been the subject of criticism for the same reasons. ERA policy is not legally binding and the 20-year-goal of investing 3% of EU GDP in research and development to meet ERA targets has not been met (Deketelaere, 2021). European research performance is considered low in comparison to the US leading to a questioning of the efficacy of European research policy (Rodríguez-Navarro & Brito, 2020; Rodríguez-Navarro & Narin, 2018; Bonaccorsi, Cicero, Haddawy, & Hassan, 2017). The European Economic and Social Committee (2021) stated that the EU lags behind in patent performance, for example in 2019, Asia submitted 65% of global patent applications while the EU now has only 11.3% of global patent applications.

4.5 Beyond the Triple Helix: TD and the university as an actor in sustainability

Since the late twentieth century there has been increasing pressure from business, governments and societal groups for universities to contribute to societal problem-solving (Scholz, 2020). Within this context, we can see the emergence of the Quintuple Helix model. The model builds on the Triple Helix, industry, government, academia, and Quadruple Helix, industry, government, academia, and users/civil society (Hasche, Höglund & Linton, 2020). The Quintuple Helix “grasps and specializes on the sum of the social (societal) interactions and the academic exchanges in a state (nation-state) in order to promote and visualize a cooperation

system of knowledge, know-how, and innovation for more sustainable development” (Carayannis, Barth & Campbell, 2012, p. 4). This model has its roots arguably in the drive from public concern for the environment. Following global outrage at a series of environmental disasters in the 1980s, for example Bhopal in 1984 and Chernobyl in 1986, the 1987 United Nations’ Declaration on Our Common Future promoted the idea of intra- and intergenerational justice. There was a recognition that sustainable development was a matter of negotiation and to support the inclusion of societal actors, both from a fairness perspective but also value of knowledge produced in society, universities needed to change to a new culture of learning – a participative process (Barth et al., 2007). This increasing complexity and global concern promoted ID and TD research and TD emerged as a perceived public good in tackling sustainability. The language of the Quadruple and Quintuple helix models has made its way into European higher education policy (Centre for Strategy & Evaluation Services LLP, 2020). This policy paper describes the implementation approach for these models as TD and transnational which will connect research, innovation, education, industry, government and wider societal actors. This model encapsulates the increasing pressure on universities via funding to collaborate with external actors.

The university as an actor in sustainability emerged in the twenty-first century in two tracks: research and education. Regarding the former, in 2003, four particular narratives that promote ID and TD emerged: research as responsible for knowledge growth and innovation; research as capable of tackling societal challenges through ID; researcher training as necessary to drive innovation and societal action; innovation and societal action as the impetus to link the university to a “greater number of players”. In February 2003, the Commission published the communication *The role of universities in the Europe of knowledge*, which aimed to “start a debate on the role of

European universities in the knowledge society and economy” (European Commission, 2003). It introduced sustainable development into the policy narrative alongside the phrase “the reorganisation of knowledge” to describe a profound change in higher education. The EC promoted research as “driving education” and addressing societal problems. There was also a need, it stated, for “horizontal skills”. This rise of ID and TD is linked to the policy shift in the 2003 Berlin conference, where the EC had made the connection between a Europe of Knowledge and a Europe of world-class researchers, most notably articulating the need for the third cycle (doctoral and post-doctoral) to be included in the Bologna Process and a commitment to funding this. This move was proposed by the university sector through the European Universities Association (EUA) (EUA, 2005). The EUA saw doctoral programmes as “central to the drive to create a Europe of knowledge” (EUA, 2005, p. 4) and recommended doctoral training not only to advance knowledge through original research but also to meet the needs of the employment market. In 2003’s Berlin Communiqué, ID was stated as key to maintaining and improving quality in research training and to enhancing competitiveness. This continued in the Bergen Communiqué 2005 which urged universities “to ensure that their doctoral programmes promote interdisciplinary training and the development of transferable skills, thus meeting the needs of the wider employment market” (European Commission, 2005).

TD emerged in European policy in 2006. The Communication from the Commission to the Council and the European Parliament *Delivering on the modernisation agenda for universities: Education, research and innovation* said that universities needed to enhance ID and TD by reconfiguring their teaching and research agendas. Universities needed to do this, the EC explained, “to seize new opportunities” (European Commission, 2006). They encouraged universities to focus less on

disciplines and more on research domains e.g. green energy or nanotechnology and this reconfiguration meant associating these fields with complementary fields e.g. humanities or entrepreneurial or management skills. Universities needed to foster this interaction between students and research teams and greater interaction between disciplines, sectors and research settings. This would require organisational changes, they state: “to staff management, evaluation and funding criteria, teaching and curricula and, above all, to research and research training” (ibid, 2006).

In 2009, the EC stated that within the Bologna process education should be based on state-of-the-art research including ID and it once again stated the need for ID training for doctoral candidates. In EC communiques in 2012, policy ties ID (articulated as cross-disciplinary and ID) with academic and work-based learning; synergies between research, innovation and education; cross-border cooperation; and innovative teaching. It calls on higher education for sustainability to contribute to the UN SDGs and states that the EC will encourage ID programs. With the launch of Horizon 2020 in 2014, the EC moved to a societal challenge-based framework approach that tailored funding structures to support ID research. Horizon Europe further develops this trajectory. The communiqué issued from the Paris Ministerial Conference 2018 reiterated the need for ID programmes combined with work-based learning. Engagement with research and innovation with ID is promoted to develop in learners a critical and creative mind-set, to enable students to find novel solutions to emerging challenges. The desired synergy in institutions and in learning is to combine education, research and innovation.

4.6 The European Universities Initiative

The idea for the EUI is credited to Emanuel Macron (2017), who outlined the preliminary idea in a speech in 2017 on guaranteeing Europe's future through the re-establishment of a sovereign, united and democratic Europe. Europe, he said would be united through social and fiscal convergence and the bond of culture and knowledge. The latter would create "a feeling of belonging" "the cement that holds Europe together". A key action was the proposal of "European universities, networks of universities which allow students to study abroad and follow classes in at least two languages" (Macron, 2017). At a meeting in Gothenberg, the European Council (European Commission, 2017) developed Macron's idea by advocating the development of strategic partnerships between higher education institutions through the creation of a European university network, and the joint delivery of university programmes 'to reinforce and structure cooperation among higher education institutions'. The European Council Conclusions of 2017 encouraged the emergence of approximately 20 European Universities. This would be a flagship initiative of the European Education Area and allow students to get a degree by combining studies from several EU countries. The goals of mobility and competitiveness and quality as outcomes of the initiative were reiterated in the Education Council Conclusions of 22 May 2018. The conclusions stated that the link between teaching, research and innovation and knowledge transfer would be strengthened. It staked out an ambition that European Universities "could play a flagship role in the creation of a European Education Area as a whole" (European Commission, 2019). The aims of European Universities as laid out in the 2019 Erasmus+ Programme Guide were described by its own scribes as "ambitious" (ibid, p. 125). The policy documents outline the role of European Universities as "key drivers" to increase quality and competitiveness but also to act as a mechanism to educate citizens in European values and to bolster the

knowledge economy, employment and welfare. The involved HEIs committed to organise 50% student mobility as a standard feature and to develop joint curricula.

The first aim was to develop in a new generation of Europeans (ibid, p. 125) the ability to cooperate and work across European and global cultures, languages, borders, sectors and academic disciplines. This would promote common European values (article 2 of the Treaty on the European Union) and strengthen European identity. Identity then could be extrapolated as the ability to cooperate and to work inter- and transculturally and inter- and trans-sectorally. The second aim connected European Universities to the European “knowledge economy, employment, culture and welfare”. The goal was to “reach a substantial leap in quality, performance, attractiveness and international competitiveness of European higher education institutions” and to “make the knowledge triangle a reality” through cooperation between research, innovation and education. The language of the calls emphasises deeper collaboration and the formation of networks. The term Knowledge Creating Teams utilised by the EC builds on the language of the OECD’s knowledge economy and the network society, where “know-who” is a key component of innovation, growth and productivity (OECD, 1996). The goal was for these universities to “adopt a challenge-based approach according to which students, academics and external partners can cooperate in inter-disciplinary teams to tackle the biggest issues facing Europe today” (European Commission, 2022). The move was significant: the EUI cojoined the aims of the EHEA and the ERA into a common transnational approach by linking education, research and innovation (Cino Pagliarello, 2022). The concept of the EUI was co-created by Higher Education Institutions, student organisations, Member States and the EC (European Commission, 2018) and launched under the 2019 Erasmus+ call by the Directorate General for Education, Youth, Sport and Culture (DG EAC) of the EC and the

Education, Audiovisual and Culture Executive Agency (EACEA) (European Commission, 2019). Chapter 11 will discuss the implications of the EUI for European policy in greater detail.

4.7 Conclusion

This chapter sought to illustrate the changing mission of the university by analysing higher education policy in Europe in the twentieth and twenty-first centuries as it sits within the history of the modern university. It gave context to the political, economic and social policy environment that produced the EUI. This chapter outlined the macro context for the fieldwork examined in this thesis and the emergence of TD in educational policy. It situated this historically by describing the evolution of a global narrative on the role of the university in the late twentieth and early twenty-first century. While this was initially dominated by the language of the knowledge economy and the market, it has more recently been replaced by a Quintuple Helix model. The sustainability agenda brought with it a new narrative that reflects the TD narrative explored in Chapter 3: societal impact, grand sustainability challenges and global crises. Emerging as we are from a global pandemic, and in a time of war, it is clear that there is potential for this narrative to increase rather than decrease.

Chapter 5 Realist evaluation

5.1 Introduction

This chapter outlines the epistemological and ontological standpoint from which this research was designed and the methodological framework employed. This research was approached from a critical realist standpoint, which reflects my ontological and epistemological perspectives. The methodology chosen is realist evaluation (RE), a framework underpinned by the epistemology of critical realism and pioneered by Ray Pawson and Nick Tilley (1997). Chapter 6 will provide a more comprehensive picture of how the methodology supported the research questions and guided the research design. It also details the methods of data generation, data analysis and includes an overview of ethical considerations and trustworthiness.

5.2 Critical realism

From the outset of the research process, I struggled with the concepts of epistemology and ontology and as an emergent social scientist, I found this terrain to be particularly challenging. I had no understanding that as in the words of Bryman (2012, p. 27): “An epistemological issue concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline”. Yet immersing myself in the labyrinth that is epistemology and ontology, I found that the very purpose these concepts serve allowed me to express long-held frustrations I have with how decisions were informed within my professional practice. The world of journalism and policy seemed based on the epistemology of the natural sciences and during my

experience working within university management, positivist “knowledge” was the go-to epistemology for evidence-based claims. All policy seemed to be formed based on surveys of things that worked or did not work. In my experience, this approach never captured the complexity of my lived experience and in particular the complexity of what constitutes an educational experience. An example of the latter is the feedback forms students are asked to fill out at the end of any semester: a Likert scale of what they learned or did not learn. It supposed that this could be observed and identifiable i.e. I wanted the students to learn, therefore I could control this by doing x (clearly identifiable action) and it would either have effect y (they learned) or not. My own experience in the classroom with students was ever-changing. What worked one week with one set of individuals, worked differently another week. Each year, the incoming group appeared to have a different group dynamic which itself affected learning, the curriculum, the “energy” of the classroom. I began lecturing before the economic crash in late 2007. My incoming students in 2010 were a very different group with different concerns to the students in 2007. They were coming of age in a massive global recession and how I taught and what they needed in terms of support and mentoring changed. My own experience suggested that there were processes and structures at play that meant isolating any variables and claiming clear cut causation between them was false.

Positivism hinges on discovering regularities, what Bhaskar (2008) called a constant conjunction of events. It presumes clear causation modelling is possible. Its ontology is such that there is a reality that can be clearly understood (Denzin & Lincoln, 2005) and that this reality is a predictable environment. Researchers, operating within a positivist stance, strive to identify or propose variables that evidence causation. The role of research from a positivist perspective is to test a theory and to gather evidence

to develop laws. Within positivism, theories are employed to generate hypotheses. These can be tested and laws deduced or facts can be collected and laws induced. The idea to me that laws are apt tools to explain the complex dynamics of human interaction or societal dynamics was insufficient, an insufficiency best captured by the lab-reality mismatch (Bhaskar, 2008). What can be proven in the lab cannot be said to hold in experience. And through experience we can observe certain regularities that we cannot test in a lab. It is this key idea that leads proponents to contend that a realist approach to causality is far more realistic than an experimental one (Porter & O'Halloran, 2012). Positivists contend that objectivity is attainable and science is value-free, objective and independent of interest or belief, therefore statements are scientific and not normative (Bryman, 2012). As outlined in Chapter 2, TD is openly normative and my own experience in practice is that the normative repeatedly leads decisions. In my role as an academic strategist, I noticed that senior leaders would often begin with "objective" evidence in their narrative but frequently move to their own personal experiences or anecdotal evidence to push an idea over the line. They also employed interpersonal connections to usher in new ideas and often leveraged their power to barter (helping a colleague with a conflict or supporting a push for promotion for example) in return for loyalty to a new system innovation. To me, how new ideas are received and successfully implemented was far from value free or objective and most frequently it depended on interpersonal connections and interpretations. Thus the philosophical approach needed to reveal these "powers" (Bhaskar, 2008) and to acknowledge the layers of reality that exist beneath the readily observable and measurable. These causal powers. They are the capacity an object has to behave in a certain way or its susceptibility to change (Sayer, 2000).

My concerns with positivism failing to ‘unveil’ human meaning or the layers of complexity in even presupposing there is a reality that can be observed, would seem a natural signpost to employing constructivism as an epistemological stance. Indeed, having graduated with a degree in sociology and English literature, I had a background that predisposed me to the constructivist approach to knowledge i.e. knowledge about the world is constructed through our cognition and perception but there is no ‘real’ only our mental constructions of what is. Social constructivism in the tradition of Berger and Luckmann (1991) or Vygotsky (Cole et al., 1978), for example, are valuable approaches for the processes they seek to uncover and how these contribute to our understanding of the institutionalisation or learning. And I explored this in detail at the outset of the D. Ed. programme. I was familiar with the work of Piaget and Saussure for example. However, I sought an epistemological approach that would enable me to examine a process at play. Even if causation is ever-changing, open to different interpretations and context specific, I sought an approach that would allow me to conceptualise causation. I felt that positivism failed to capture the complexity of social situations and constructivism. While providing valuable insights into the relationship between subjects and ‘reality’, it failed to even attempt to capture reality, a necessary precursor I believed for action. Like critical realists, I felt that interpretative understanding is important in social science but I did not want it to push out causal explanation.

I was seeking a middle ground between these two orientations (positivism and constructivism), which I found in critical realism (Bhaskar, 2008; Archer et al, 1998; Wong et al., 2013). With it, I could “avoid both scientism and ‘science-envy’ on the one hand and radical rejections of science on the other” (Sayer, 2000, p. 3). It also tapped into a very strong sense I had in lived experience of the complexity of life –

that what we observe is not all that exists and while the contributions of social science are many, it should attempt to observe and capture that which we cannot yet see or perhaps ever see. Not everything that exists can be observed and that does not mean it does not exist (Bhaskar, 2008). Critical realism, also known as transcendental realist philosophy of science (Archer et al., 1998), bridged the ontology-epistemology divide for me i.e. the questions 'What is reality?' versus 'How do we know it?'. To me, these seemed so closely entwined as to be usefully considered as two sides of one coin. Critical realism does, like positivism, contend that there is an observable reality "out there" (Flick, 2009) and though that cannot be measured directly because our brains, language and culture for example process it, we can still know it indirectly. Critical realism appears to combine and reconcile ontological realism, epistemological relativism and judgmental rationality (Archer et al, 1998; Bhaskar, 2008).

Critical realism can be traced to Roy Bhaskar's seminal 1978 publication *A realist theory of science* in which Bhaskar asserted that there is a reality, that we can differentiate between this reality and the knowledge we have of it and that we have a rational basis for judging knowledge claims (Bhaskar, 2008). This reality comprises physical and social systems that are both ordered and complex but contain persistent underlying mechanisms and these are key to explaining causation. However critical realism does not claim that the account is objective or complete but is a partial, contextual and evolving view. To Bhaskar, western philosophy conflated 'what is' with 'what we can know'. This is, according to Bhaskar, an epistemic fallacy (Bhaskar, 2008): statements about being cannot be transposed into statements about our knowledge of being. Bhaskar proposed the terms intransitive and transitive to capture a distinction between 'what is' and 'what we can know'. The intransitive dimension of science are the things we study: physical processes or social phenomena (Sayer,

2000). The transitive dimension refers to theories and discourse of science (but these are also part of the social world and can therefore be treated as objects of study).

Critical realism proposes a 'stratified ontology' consisting of and distinguishing between the real, the actual and the empirical (Archer et al, 1998). To critical realists, what is real differs from what is actual and what is empirical. The domain of the real is distinct from and greater than the domain of the empirical (Archer et al., 1998). The real is what exists: natural or social. It consists of objects with structures and causal powers i.e. capacities to behave in particular ways, and causal liabilities or passive powers, that is, specific susceptibilities to certain kinds of change (Sayer, 2000). The actual refers to what happens if and when those powers are activated. The empirical is defined as the domain of experience. Bhaskar (2008) described experiences, events and mechanisms as the overlapping domains of the empirical, the actual, and the real. Bhaskar's depiction of the differences between the domains of the real, actual and empirical is illustrated in Figure 5.1.

	<i>Domain of Real</i>	<i>Domain of Actual</i>	<i>Domain of Empirical</i>
<i>Mechanisms</i>	✓		
<i>Events</i>	✓	✓	
<i>Experiences</i>	✓	✓	✓

Figure 5.1 Bhaskar's depiction of the differences between the domains of the real, actual and empirical (Bhaskar, 2008, p. 2).

To critical realists, causation is not a succession of events but a process that can produce varied results in different contexts. Critical realism focuses on contingency

rather than regularity and on open rather than closed systems (Sayer, 2000). And they expect open systems and discourses to be messy. The external social reality, however construed, is influenced by human behaviour and in turns influences human behaviour (Wong et al., 2012). Observation and measurement alone cannot give us a full understanding because reality is in constant flux but reality can be explained by identifying causal mechanisms, establishing how they work and seeing if they have been activated and in which conditions. Critical realists propose that although “generative mechanisms” cannot be observed directly, their effects can be witnessed (Bhaskar, 2008). Therefore generative mechanisms can be part of theory. Powers that are triggered are mechanisms but these powers may or may not be triggered or exercised (Archer et al., 1998). To critical realists, as flux is particularly the case in societies and systems, which are self-transforming, we must therefore create theory-driven hypotheses about what might provide order. Likewise with complex systems, observability may not be possible but we can make a case for unobservable entities by observing effects that can only be explained “as the products of such entities” (Sayer, 2000, p. 12). Critical realism also proposes the idea of emergence. Situations arise when two or more aspects converge and create new phenomena which is not irreducible. Critical realism allowed me to consider the complexity within the case of the creation of a new system – a system innovation – and surface possible causal explanations (Gorski, 2013). However, critical realism is not without its challenges. The following section describes these in more detail.

5.2.1 Challenges of critical realism

One of the challenges of adopting a critical realist stance is demonstrated by the fact that critical realism is referred to as a meta-theory. It is an enormous and challenging

body of work to grasp and sits within the philosophy of science. In this regard, I found it as challenging as elements of Basarab Nicolescu's work, which brings principles of quantum physics into the epistemology of TD. The substance of arguments within critical realism can at times move well outside the comprehension of academics who are not specialists in the philosophy of science (Cruickshank, 2004). While general texts on research methods (Flick, 2009; Bryman, 2012; Denzin, 2005) describe critical realism in a manner that is entirely accessible, once the non-specialist reader strays into the core material or critiques of the core material, the philosophy can be challenging. For example, a critique proposed by Cruickshank (2004) postulates that critical realism has two definitions of ontology that are mutually exclusive. For Cruickshank, critical realists are engaged in "an hegemonic project which seeks conceptually to re-tool the natural and social sciences" (ibid p. 567). Like, the writings of Nicolescu, Bhaskar's work can stray from philosophy into the hegemonic, writing can seem less normative-inclined than almost religious, which is suggested by the title transcendental realist philosophy (Archer et al., 1998). Indeed, some of critical realism's most active and high-profile academics have sought to "establish a level playing field between religious and secular ideas" based on their own religious beliefs about which they felt it necessary to go public (Archer et al., 2004).

In this regard, realist evaluators Pawson and Tilley (1997) have succeeded in making the key propositions of critical realism accessible but also shifting the focus from ontology to methodology through the development with others of RE. That is not to say that RE is without its own conceptual challenges. And the methodological approach, I would contend, carries with it this thread of abstraction that allows leeway for creative narratives and interpretation. RE or realist inquiry is a realist philosophy and while it allows the researcher to attempt to capture the complexity of a program or

intervention, it brings with it a complexity in methodological implementation that is challenging. The following section explicates RE as an analytical framework in more detail.

5.3 RE as an analytical framework within the research

My intention to explore causal powers triggered within contexts at micro-, meso- and macro-levels was a key motivation to choose RE as an analytical framework. Wong et al. (2013, p. 2) describe one of the key tenets of RE as follows: “Social programs (including complex interventions) may change the macro social context (for example, by introducing legislation). They may also change the resources or opportunities available to participants and, in that sense, change the meso- or micro-level context for those participants”. I sought to examine how a complex policy environment and institutional system such as higher education can manifest change ‘on the ground’ that would also inform change at the policy and institutional level. In my experience, change in education is often seen as micro: a change in teaching and learning methods in the lecture room; the addition of an extra-curricular module on soft skills development; additional European or government funding released for a skills programme or new degree. Rarely in these instances is the system treated as an interconnected whole. Rarely indeed are these changes seen as connected to the overall culture of the system from the lecture hall to the university design to European policy. I sought to illuminate the layers of context that sit behind change and by focusing closely on resources within the boundary of a case, to reflect how change can inform shaping future contexts.

Although closely emanating from critical realism, RE finds its home in scientific realism (Pawson & Tilley, 1997, 2004). It acknowledges the existence of an external social reality and the influence of that reality on human behaviour. RE is an inherently theory-driven process that is both a research strategy and design (Pawson & Manzano-Santaella, 2012). Its key aim is to unpack programmatic black boxes to explain how and why programs work (or fail to work) in different contexts and for different program stakeholders (Astbury and Leeuw, 2010). A program theory then is visualised as a holistic endeavour designed to affect change. It begins with the axiom: what are the mechanisms for change triggered by a program and how do they counteract existing social processes? If human action is embedded within a wider range of social processes and structures, then causal mechanisms reside in social relations and context as much as in individuals. RE aligns with the critical realist stance in that it enables the exploration of causality. Rather than judging the worth of a program globally, an evaluator can identify successes and failures and factors that lead to outcomes. Throughout the next section of the chapter, I will explain what RE methodology is and how it is implemented by using graphic illustrations. In this research design, I followed a series of steps proposed by Pawson and Tilley (1997) as illustrated in Figure 5.2. These were: form a program theory; collect data; analyse the data; and form CMOs in response to the question *What works for whom in what circumstances?*.

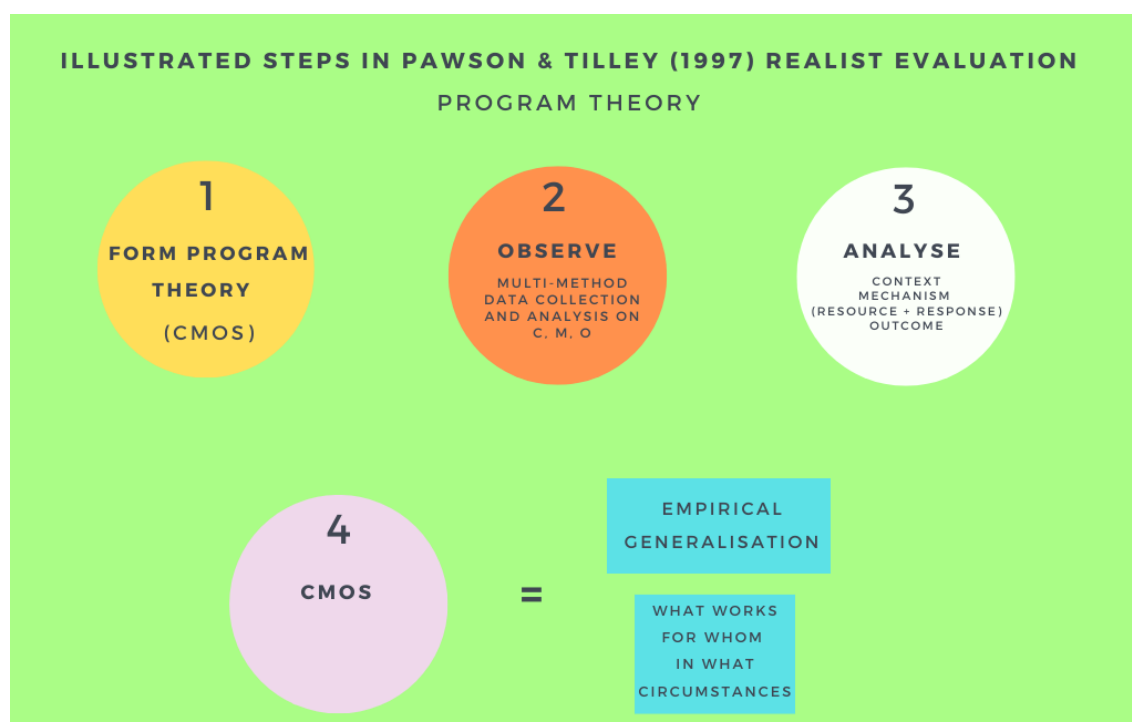


Figure 5.2 Author's own illustration of Pawson & Tilley's RE steps (1997).

While Chapters 7 and 8 offer greater detail on the context and resources, I offer an introductory level of description here to illustrate the methodological approach. Figure 5.3 illustrates how RE is utilised in this research and the following sections provide a detailed explanation of each element. The complexity of these interconnecting theories, actions and configurations necessitated the creation of these graphics and throughout the analysis stage I found myself regularly returning to Figure 5.3 to guide analysis.

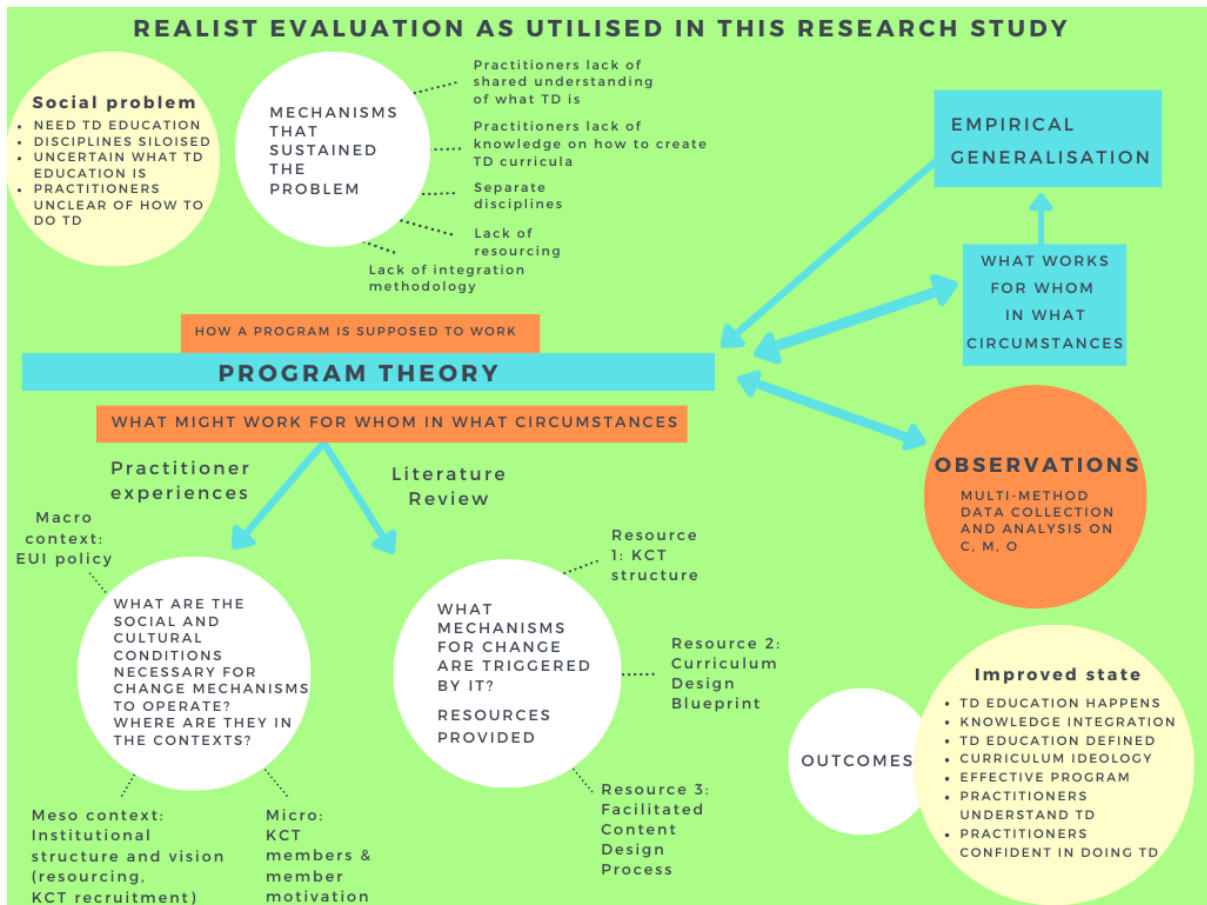


Figure 5.3 Author's illustration of the RE research design.

5.3.1 Program theory

Theory-driven evaluation starts by clarifying the 'program theory' – that is, clarifying how program activities are understood to cause (or contribute to) outcomes. As explained in the previous section, the program theory is implemented and then analysed through data collection (observations, in Figure 5.2) to ascertain the responses of participants to the resources provided. Within this thesis, data collection comprised official documents, my participation in the process (including field notes, emails, a diary, video recordings of sessions) and two sets of 10 interviews with KCTs members. As an empirical generalisation, this feeds back as an evaluation of the

program theory. The evaluation is expressed as configurations of CMOs. I used a case study to place a boundary around the program theory within the Alliance structure. A program theory can be created at the outset of program design, midway through a program to guide implementation and monitoring or after the program as an evaluation tool (Astbury & Leeuw, 2010). According to Tilley (2004, p. 256), program theories are often unstated and program theories can evolve during the program. He recommends therefore that before program evaluation is possible, "it is necessary to bring those theories to the surface and to articulate them" (ibid, p. 256). The purpose of a RE is as much to test and refine the program theory as it is to determine whether and how the program worked in a particular setting. Program theory can be used for example to assess if a program could be implemented full scale. It can be used for mid-program evaluation and used through interviews to uncover the underlying implicit assumptions about how a program works. Evaluators recommend a combination of methods including document analysis.

As Chapter 7 will explain in more detail, the Alliance sought to pilot a TD university model through the creation of a TD master's programme. The aim was to bring disciplines, extra-academic actors and students together in an exercise of knowledge integration to collectively examine, understand and attempt to solve complex societal challenge. I formed a program theory after taking part in the content creation process as an aid to analyse the Alliance as a context; to analyse documents prepared by the work packages I was involved in; to reflect on the decisions we made at various junctures during the curriculum design process and link how we made these to our ongoing literature scoping review and practitioner experience. The program theory is broken down into three spheres: C-M-O. This CMO in the program theory is a hypothesis that a program works. In particular contexts (C) some underlying

mechanisms (M) come into action. If both processes and conditions are right, the program will work. The ‘equation’ $C + M \rightarrow O$ demonstrates the causal and conditional nature of this. Figure 5.4 illustrates the program theory tested in this research. We can conceive of the program theory within the Alliance as comprising the following steps: form KCTs; design a flexible structure that mobilised KCTs based on self-motivated participation in thematic clusters; provide a facilitated co-created curriculum design process and curriculum blueprint. The following sections describe the different components of RE in more detail with examples from the fieldwork within the Alliance.

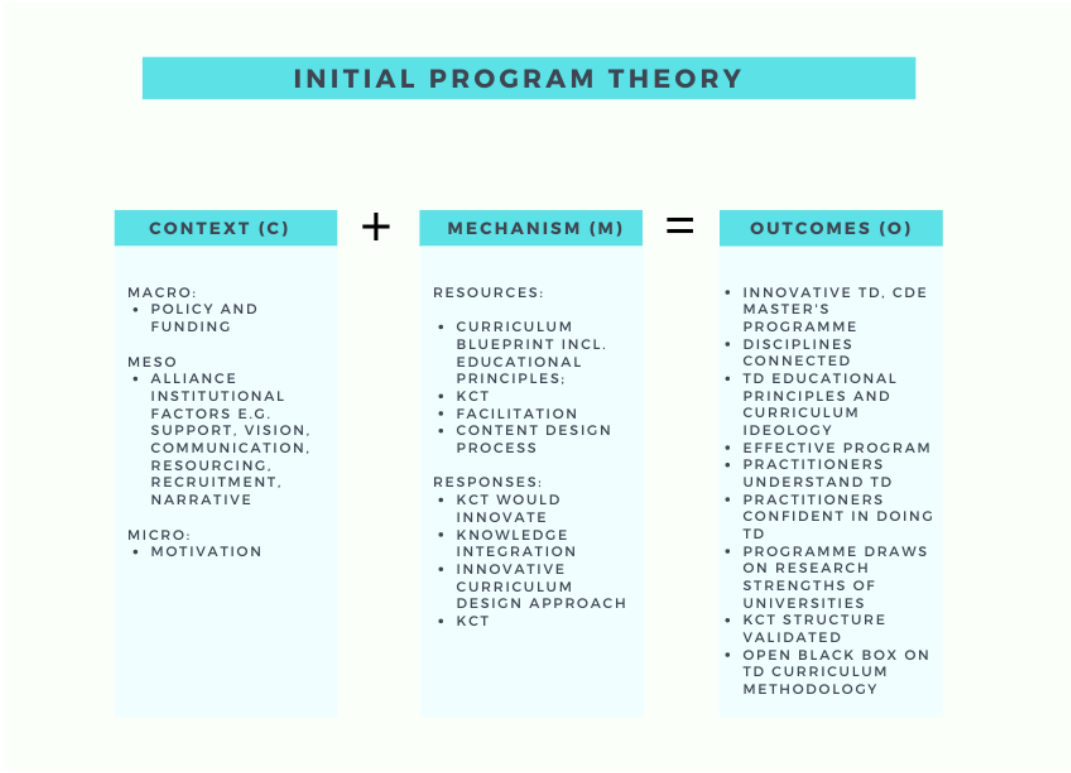


Figure 5.4 Author's illustration of the program theory as CMO.

Context

Within RE, the context refers to the social and cultural conditions necessary for change mechanisms to operate. The evaluation program explores where these might lie within and between contexts. Programs can have multiple contexts and these can be “the spatial and institutional locations” and “the norms, values, and interrelationships found in them” (Pawson & Tilley, 1997, p. 216). Within this research, context can be conceptualised at different levels. It was crucial I felt to examine context not just at a European level (a macro context), and an institutional level (meso context) but also at an individual level (micro context). Micro context would include not only basic facts about participants but also an exploration of what their motivations were to take part in this experiment, what their understanding of TD was and what they understood the process they were engaged in to be. Were it the case that everyone recruited to take part in the KCT objected to TD or had significant expertise in TD, our theory, contexts, mechanisms and outcomes could all be different. Within RE, aspects of context (in addition to interventions) are seen as triggers for mechanisms. These mechanisms result in outcomes that can be observed. Contexts are “the conditions that an intervention operates in (often but not exclusively sociocultural)” (Jolly & Jolly, 2014). A context can be a pre-existing structure, for example, that can enable or disable the intended mechanism of change (Pawson and Tilley, 1997). The contexts were the EUI funding call; the Alliance institutional vision, educational principles and mission as articulated in the official funding application; and the motivation of KCT members to take part in this educational “experiment”.

Mechanisms

Chen and Rossi (1987) were the first to introduce the term mechanism within the context of theory-driven evaluation. Mechanisms can be described as an interplay

between social resources and participants' reasoning (this has also been referred to as responses). They allow researchers to surface specific causal pathways. They connect cause and effect and are context dependent. We can say that in a certain context, mechanisms fired for a set of actors; however, in another context, another mechanism may have fired. Different outcomes may be generated in different cases. Within the Alliance, the program theory centred on the provision of certain resources within a particular context. The resources were: the creation of KCTs, formal networks drawn from the academic staff of five universities; the creation and dissemination to the KCTs of a Curriculum Design Blueprint; and a facilitated content creation process. The KCTs were themselves a resource provided to those who wanted to co-create a TD master's that addressed sustainability challenges. These responses and resources combined are expressed as mechanisms. Mechanisms then are fired within certain contexts and lead to outcomes and resultant CMOs can be formed. From this, realist evaluators contend that we can answer the question: "What works for whom in what circumstance?" We anticipated (hoped) that the Alliance resources would elicit the following responses (thus triggering certain mechanisms): the KCT would innovate educationally and form a TD team; knowledge from all parties would be integrated; KCT members would respond positively to the resources.

Outcomes

RE uses the term outcome to include short, medium and long-term changes, intended and unintended, resulting from an intervention (Westthorp, 2014). An outcome is generated by the action of a particular mechanism in a particular context (Pawson & Manzano-Santaella, 2012). Pawson and Tilley (2004, p. 8) describe outcome-patterns as "the intended and unintended consequences of programmes, resulting from the activation of different mechanisms in different contexts". Programs can be tested

against a range of outputs (intermediate implementation targets) and outcomes (changes in the behaviour targeted) but these can take many forms. Outcomes are linked to a measurement of success. In other words, programs work (have successful 'outcomes') only in so far as they introduce the appropriate ideas and opportunities ('mechanisms') to groups in the appropriate social and cultural conditions ('contexts') (Pawson & Tilley, 1997, p. 57). Of course, program theories often do not work and when they do, they may also produce unintended outcomes. Tilley (2004) distinguishes between 'supposed to do theory' and 'otherwise/also does theory': the evaluation stage allows for outcomes to emerge that were not anticipated. The desired outcomes from the Alliance program theory were an innovative TD master's programme; connections formed between disciplines; TD curriculum ideology and methodology; academics confident in doing TD; research strengths of the universities integrated; and the black box of curriculum formation opened. In sum, the desired outcome would comprise an innovated system with academics empowered to design effective TD educational programs supported by their participation in nimble and flexible KCTs that provided a loose organisational framework in which academic and extra-academic actors could participate based on the challenge identified.

5.4 Criticisms of RE

As highlighted in the opening section, RE is not without its shortcomings. It was particularly suited to the Alliance project as it allowed me to look at multiple levels, however for other programs this approach can be time-consuming and resource intensive (Holmen et al., 2021). While it is method neutral, RE is very complex. It can be challenging to complete the RE cycle and in particular develop CMO configurations, which can be absent from RE implementations as a result (Salter &

Kothari, 2014). I found CMO configuration to be the most pronounced stumbling block in my research. And indeed at the point of creating CMOs, because there is so much room for interpretation, I had to take conscious steps to ensure I was not framing the evidence. I did this by using thematic network analysis, which I explain in detail in Chapter 6.

In utilising RE, the concept of context proved challenging and at times confusing. Jolly and Jolly (2014) describe context as “sociocultural conditions that affect outcomes by influencing the shape of the program and responses to it” (ibid., p. 35). Distinguishing context from mechanism, and their effects, can be demanding (Holmen et al., 2021; Alvarado et al., 2017; Jolly & Jolly, 2014; Pawson and Manzana-Santaella, 2012) and there is potential for an overlap between context and mechanism. Indeed, mechanisms are one of the more challenging conceptualisations of RE (Astbury & Leeuw, 2010; Jagosh et al., 2013). They are the central concept used to capture the dynamism as a process. Wong et al. (2012) provide an insight into the complexity and challenge of utilising mechanisms through outlining their characteristics as follows: “mechanisms cannot be seen or measured directly (because they happen in people’s heads); they are context-sensitive (reflection, for instance, may be preferentially triggered when students know that deep learning will be assessed); they are multiple (hence, when researched, they need to be unpicked, defined and prioritised), and they are best expressed at a somewhat abstracted level so that they are not tied unnecessarily” (Wong et al., 2012, pp. 92). Certain researchers have responded to this challenge of identifying mechanisms by disaggregating resources from responses/reasoning within mechanisms (Dalkin et al., 2015; Holmen et al., 2021; Wong et al., 2013). After much investigation, I chose to follow this route in analysis but I found this to provide a further challenge in how responses relate to outcomes.

For example if participants responded positively to a resource, was this an outcome or a response? How was a researcher to capture two entities – a resource and a response – and pair them under one label, as it were, to then become another entity: mechanism. The writing process helped give clarity and allowed me to work with these constructs iteratively (I describe this in more detail in Chapter 6, section) but also my participation in the Alliance from almost the beginning of the curriculum design process through to the production of the master's content allowed me to “step back” from the CMOs and use the guiding RE question “What worked for whom in what circumstances?” In answer, and as a practitioner, I could return to the definition of outcome as a measurement of success. Success for example was not team bonding but the ability of members to do TD. Therefore I could code ‘team bonding’ as a response.

Realist evaluators aim to unearth CMOs that are transferrable across cases but they are also clear that their results are not to be confused with best practice – because the mechanism is connected to context, actors and circumstances. The idea of surfacing demi-regularities can appear non-committal. The very aspects of RE, therefore, that allow us to be nuanced may also weaken the strength of findings. If what we learn is context specific, some social scientists, policymakers and constituents may find it a weakness that the findings of a large, time-consuming and potentially costly evaluation ‘may’ help policy and other programs. RE may also ignore broader social issues e.g. technology use in CCTV evaluation and surveillance in society (Porter & O'Halloran, 2012) or the cultural and political elements that evaluation approaches such as Guba & Lincoln's (1989) constructivist Fourth Generation Evaluation include. The role of values in RE is also absent (Porter, 2015).

5.5 Alternatives to RE

As part of my professional practice, I have been the subject and the recipient of evaluations: student evaluations of teaching; external evaluations of programmes; governmental evaluations of institutions; internal institutional evaluations; internal institutional evaluation of strategic performance. This all seemed to follow the same methodology: 'Did it work?' What it means to 'work' is measured by asking does it do what it says on the tin?' The 'tin' might comprise module learning outcomes, key performance indicators, strategic goals, needs assessment etc. This summative (retrospective, judgmental) approach can be seen for example in Tyler's objectives-based evaluation (Stufflebeam & Coryn, 2014). More formative (constructive, proactive) approaches that are collaborative or iterative and open in their scope are evident in Stake's responsive model, Scriven's goal-free model, Guba & Lincoln's Fourth Generation Evaluation or Stufflebeam's CIPP (Context, Input, Process, Product) model which is suitable to more management-oriented evaluations.

Of these approaches, the Fourth Generation Evaluation (Guba & Lincoln, 1989) approach held the most appeal to me as a researcher as an alternative to RE. It is an emergent evaluative process that is collaborative, continuous, recursive and is a teaching and learning process. However, the collaborative nature precluded its use in this instance as this requires "evolution of consensual constructions about the evaluand" (ibid., p.253) which the organisation of the content creation stages precluded. It is a resource-intensive model and the focus on stakeholder involvement can lead to bias or lengthy evaluations (Stufflebeam & Coryn, 2014). Additionally, the constructivist stance mitigated against the casual patterning I wished to represent through the C-M-O, which allows context, resources, responses and outcomes to be

linked. To contribute to the evolution of education we need to ask not just if it works but for whom does it work and why: what social settings for example or what level of resourcing creates the right amount of 'working'. Education is always a complex intervention with many components and these interact in complex, non-linear ways (Wong et al., 2012). The traditional approach to evaluation evidenced in the summative approach is described as the black box problem in evaluation (Astbury & Leeuw, 2010). The evaluation of programs rests primarily on the analysis of effects rather than how these were produced. RE allows us to be nuanced and to examine context, providing an alternative to black box evaluation (Blamey & Mackenzie, 2007; Salter & Kothari, 2014; Kazi, 2001). It allows researchers to examine context, it supports evaluation of complexity and it supports causality.

The famous example given by Pawson & Tilly (1997) is an evaluation of the use of CCTV to reduce the incidence of crime in car parks. There was a reduction in crime after CCTV was introduced and this would lead traditional evaluators to conclude that CCTV indeed reduces crime. However, a realist evaluator would go further and look at the context within which the CCTVs were installed – which car parks, where, how incidence reduced relative to geography etc. Additionally they would examine the response to the CCTV cameras. They would review literature and practice on crime reduction in car parks and urban areas. Gathering data in this manner may instead lead them to conclude that drivers feel safe when there are signs publicising CCTV cameras in a car park. This might lead to increased numbers of drivers, which in turn leads to increased footfall and it is this footfall as opposed to the cameras that leads potential criminals from targeting these locations. Thus authorities may decide only to install signs rather than CCTV cameras. Weiss (1997) illustrates the benefits of RE through the evaluation of a contraceptive counselling program. The program may

work for pregnancy prevention i.e. the number of unwanted pregnancies reduces after the program has been implemented but a black box evaluation will fail to explain what is it about the counselling program that worked. Maybe it was that participants became empowered about sexuality. Maybe the visibility of a counselling program reduced taboo. Perhaps the positive outcomes may then be achieved through means other than counselling.

The need to consider context and examine change as a complex process is needed across all sectors. Within the scientific and public health community (Wong et al., 2012), RE offers a viable alternative to the paradigm of the randomised controlled trial for example not just whether a drug works or not in a lab but who takes it, who doesn't and why not (of which the anti-vaccination movement was a stark example). RE is important for education research because interventions or trials can be unethical, impractical, inappropriate or unaffordable. RE enables both micro and meso levels to be integrated into research. The framework allows for the investigation of the role of actors in addition to structural or institutional features in change. Action is embedded in social processes and structures. Causal mechanisms therefore lie in social mechanisms in addition to the level of actors (Marchal et al., 2010). RE additionally identifies the place and effect of human volition in systems change analysis. Choice is a condition of change, not a hindrance to understanding it. Programs can be thought of as "learning situations" and "choice making is the agent which engineers change within social initiatives" (Pawson & Tilley, 1997, p 37).

5.6 Conclusion

As RE comprised the research design for this thesis, this chapter sought to provide an overview of the methodology. While both critical realism and RE are complex and challenging concepts to adopt, I chose them as the most appropriate means to investigate a complex, dynamic and emergent process that falls outside the norm of program and curriculum development. The RE approach enabled me to explicate the context of the research, the interplay between resources and responses and the outcomes in a CMO configuration. I utilised RE because it allowed me to conceptualise social programs as having the capacity to trigger change at the macro level (policy) as well as meso or micro (resourcing); to use the concept of mechanism to understand how context relates to outcome; and to provide an insight into a complex intervention (Wong et al., 2013). The methodology is highly suited to educational environments as it allows us to also ask not what changed but how or why.

Chapter 6 Methodology

6.1 Introduction

Hammersley (1992) best captured my experience of methodology: it is a maze. For someone who had spent 20 years in practice, it seemed at times a pointless exercise, a case of codifying common sense. There were moments still in the last weeks of writing that I questioned what seemed like endless rabbit holes in methodology, epistemology and ontology. Yet ultimately the methodological journey was my biggest learning opportunity. It gave me a renewed appreciation of rigour, of argument and of conviction in choosing and defending a position. It also reaffirmed my perspective that methodology is about position. Chapter 5 described my position or paradigmatic approach, the rationale for this approach and it explicated how the research design supported the paradigmatic position. RE underpinned by the ontological and epistemological paradigm of critical realism guided the research design. This chapter describes my research journey from the research question through the choice of a deeply qualitative methodological approach and describes how a case study was used in tandem with RE to enable a boundary to be set around the context of the programme under study. I then describe the methods of data generation and analysis and discuss trustworthiness, reflexivity and ethics.

6.2 Research journey and research questions

My methodological framing of the research questions was approached by answering two overarching prior questions, as posed by Fleer (2016): 1) “What is developing? 2)

How can we investigate this?”. As a practitioner working within the area of curriculum design, I followed the lead of Thomas (2012, p. 40): “Education’s cumulation is by the cultivation and sharing of practical understanding, not accumulation of data”. Through participation in the design of a pilot master’s programme I was in the position, along with my colleagues, to be able to test a program theory, based on a literature review and my own professional practice, that the creation of a fluid structure i.e. a KCT, guided by a team of facilitators, could be supported to create a TD curriculum to realise the goal of challenge-driven education. The pilot master’s programme was situated within a complex project structure (an Alliance of five universities) that sought to model a TD university and I was seeking to “investigate different facets of a phenomenon in order to provide a more holistic and rich account of that phenomenon” (Scott & Morrison, 2006, p. 252).

As stated by Tashakkori and Creswell (2007) a strong study starts with strong research questions. One of the biggest learning journeys I undertook in this research was discovering the importance of a focused research question. From the outset, I wanted to find out how ID and TD educational programmes with staff from different disciplines could be created successfully within a university. This led to my central research question of: *How can ID or TD education be successfully created in a university?* During the first two years of the D. Ed. Programme, I refined and revisited the research sub-questions iteratively. I found throughout this time that Yin’s (1994) basic categorisation scheme for planning research was a helpful tool to keep the literature review and data gathering on track. The researcher should ask and answer: Who? What? Where? How? and Why?. I employed this approach in the initial stages of this research design as follows:

Who: Academic practitioners of ID and TD education

What: Purposively engaging with other disciplines to create ID and TD curricula on grand societal challenges

Where: University

How: In-depth case study of ID or TD curriculum design

Why: To create an evidence base and recommendations for universities seeking to develop in students and staff the skills to respond to grand societal challenges through ID and TD education

Over the course of the first two years of the research process, both my craft knowledge and knowledge of the literature evolved to create a greater understanding of the difference between ID and TD. The key difference is that TD hinges on the inclusion of extra-academic actors and often focuses on a societal challenge. This refocused my research question after the first two years of the programme from ID to TD only: *How can TD education be successfully created in a university?*

My initial fieldwork was within an Irish university that had created a suite of ID and TD modules accessible to all undergraduate students as part of their curriculum. These modules had been developed institutionally and as I began my doctoral thesis they were being launched. I carried out three informal interviews with university staff, including the Dean of Undergraduate Studies and the project manager responsible for the modules, to investigate the aims of these modules. I also performed scoping research mainly on desktop and via email with the university project manager to explore the curriculum content. The university had created videos for each module that described the module content and learning outcomes. They also presented the staff involved in its creation and design and mentioned the teaching staff. My concern

on viewing these videos was that many of these modules were not explicitly articulated as ID or TD and the curriculum design process varied very widely across the modules. Some modules were written by one academic and appeared largely multi-disciplinary i.e. the content was written by one or two academics and then other academics were recruited to teach sections of the module dependent on their expertise. If neither the aim nor the realisation was ID or TD, this would greatly inhibit my research question.

In October 2019, I proposed a change to the case study that comprised my doctoral fieldwork. Figure 6.1 illustrates the research timeline. The change was from the Irish university to the European university alliance. The reasons for this change were to perform research into an explicitly TD educational project. I could also situate the research within the context of European policy while focusing my research on academic practitioners at European level (micro as a direct expression of macro). TD has been explicitly articulated by the alliance. It then also emerged that I had the opportunity to take part in the curriculum design process, providing immediate access to all documents and to participate in and observe a work in progress. I would have the opportunity to attend workshops and staff meetings at the alliance.

RESEARCH TIMELINE

SEPTEMBER 2017 - AUGUST 2018	SEPTEMBER 2018 - SEPTEMBER 2019	OCTOBER 2019 - SEPTEMBER 2020	OCTOBER 2020 - AUGUST 2021	SEPTEMBER 2021 - JULY 2022
• Preliminary literature review completed including ID/TD history and practice. Literature on methodologies explored: Activity Theory; Grounded Theory; Critical Realism. • Research question refined. • Develop understanding of methodology and research process.	• Literature review further expanded to include European and Irish policy; curriculum; critical realism. • Fieldwork changed. • Research questions revised. • Pilot interview completed. • First draft Methodology Chapter.	• Begin fieldwork (participation in European University Alliance). • Ethical approval for interviews. • First set of interviews completed. • Transcribe interviews. • Realist Evaluation literature review • Revise Literature Chapters	• Delay in fieldwork due to family bereavement. • Second set of interviews completed. • Data analysis. • First draft of chapters.	• Second draft of chapters. • Write Findings and Discussion.

Figure 6.1: Research timeline from September 2017 to July 2022.

I therefore refined my research question to be both exploratory and explanatory in the form. I used a case study to mark a boundary around the resources provided. The case study described the program theory namely a curriculum design process utilising KCTs to create a TD challenge-driven master's. I employed RE to describe this program theory and evaluate if the program theory was realised. Wong et al. (2017) describe this as retroduction. While, inductive reasoning reaches conclusions from observation and deductive logic tests propositions, retroduction uses both inductive and deductive logic as well as hunches or insights to identify "hidden causal forces that lie behind identified patterns or changes in those patterns" (ibid, p. 1). The realist evaluator considers what causal powers might be at work in producing outcomes by using "common sense, intelligence, expertise, and informed imagination to build and test theories about underpinning causal processes" (ibid). Figure 6.2 illustrates the evolution of the research question and research sub-questions (RSQs).

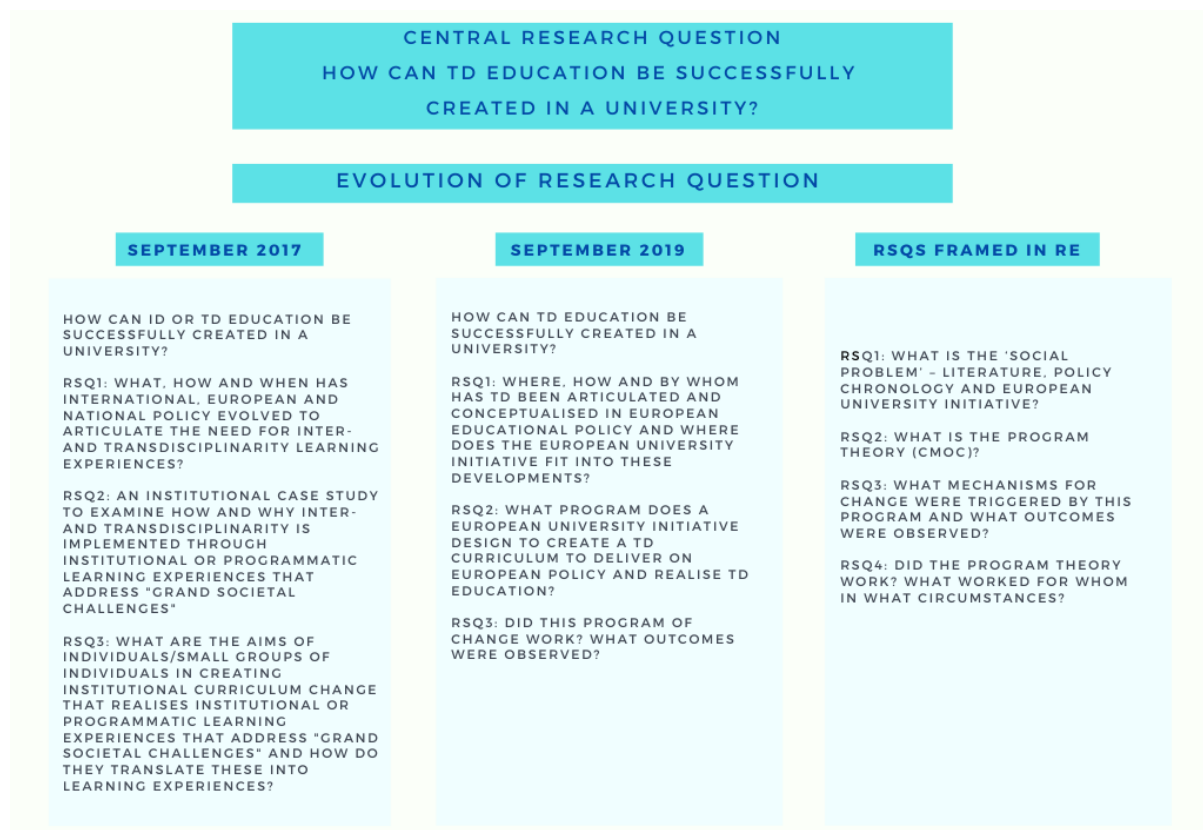


Figure 6.2 : Evolution of research questions and research sub-questions 2017-2019.

6.3 The research framework

I found the process of distinguishing between a research approach, epistemology, ontology and a research design to be very challenging. This was complicated by the fact that I was using both case study and RE to examine the phenomenon under study and that realist evaluators are theory-driven evaluators (Astbury & Leeuw, 2010). As outlined in Chapter 6, RE is often referred to as a research design or strategy (Pawson & Manzano-Santaella, 2012). Additionally, case study can be referred to in multiple ways as approach, type of design, methodology, object of study and product of inquiry – sometimes all at once (Creswell, 2007).

I found the perspective of Creswell and Creswell (2018) to be most useful in organising my thinking in terms of the language and layers of research. They describe the overall approach to research as the research framework. The components of this framework are: research approach, worldview, research strategy and methods. The researcher chooses a research approach that is qualitative, quantitative or mixed methods. Within the research approach, the researcher chooses a research design or a type of inquiry. Suitable methods are then chosen to support this design. Figure 6.3 illustrates their conceptualisation of research framework and Figure 6.4 illustrates my research framework as adapted from Creswell and Creswell.

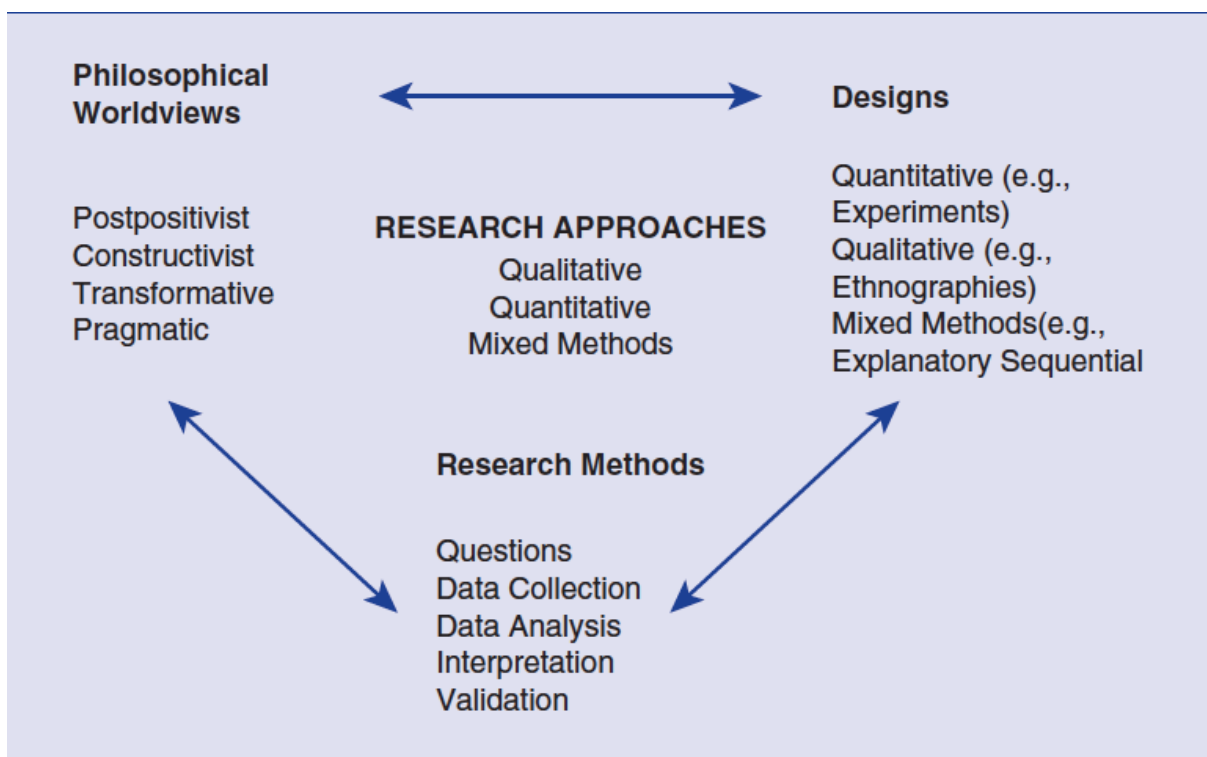


Figure 6.3 Creswell and Creswell's illustration of a research framework (2018).

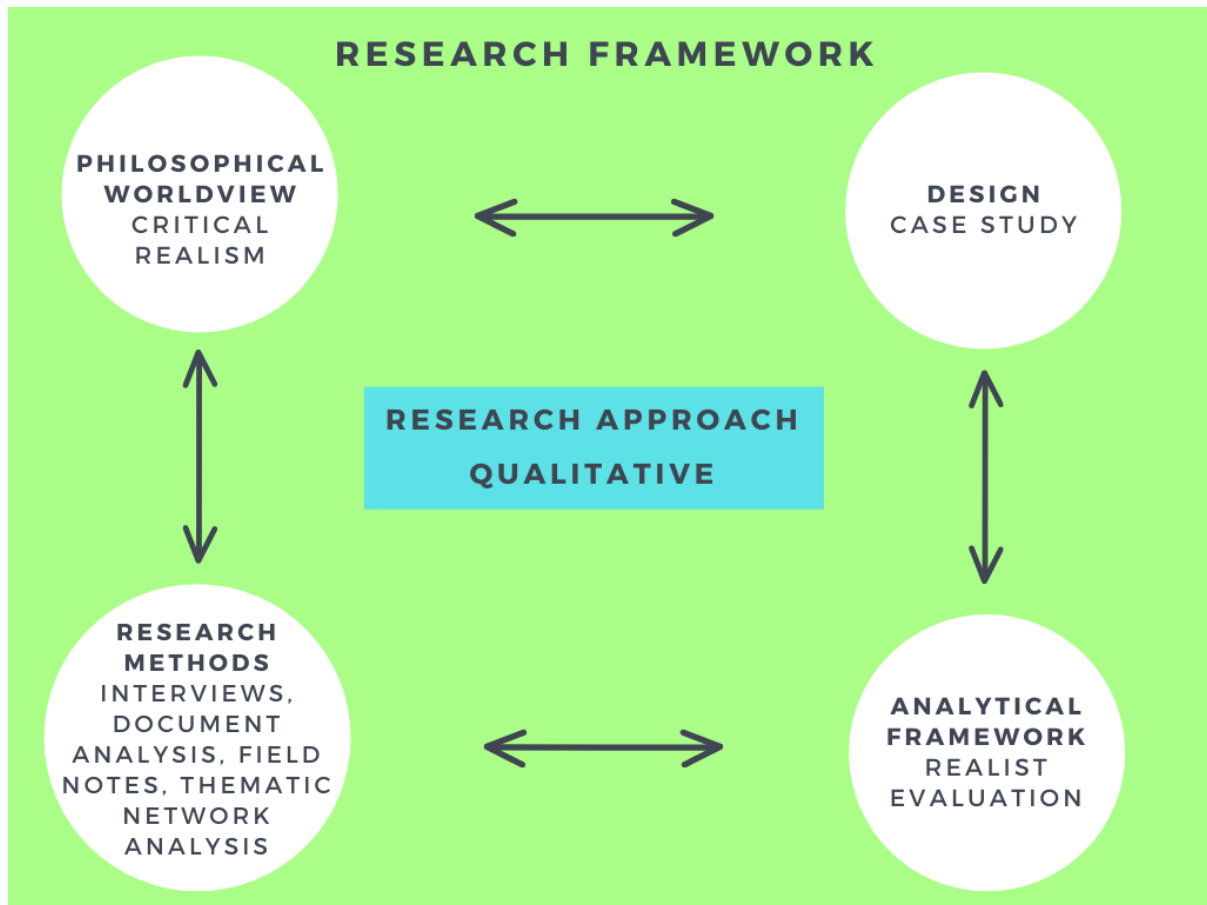


Figure 6.4 Author's research framework adapted from Creswell & Creswell (2017).

My research orientation was qualitative which by its nature turns the world into “a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self” (Denzin, 2001, p. 3). A qualitative approach attempts to capture non-linearity and is theoretically driven (Attride-Stirling, 2001). I designed the research as a case study and employed RE as an analytical frame (Holmen et al., 2021). RE, in the words of Basarab Nicolescu, allowed me to integrate multiple levels of reality (Nicolescu, 2010) but the case study served to draw a boundary around this phenomenon. I therefore did not use case study as a methodology but employed it to help me set a boundary around what is to be studied (Stake, 2003). As an analytical frame, RE enabled me to form a program theory and

evaluate a program. RE transforms the 'Does it work?' question to 'What is it about the program that works for whom?' (Pawson & Tilley, 1997). RE is referred to as white box evaluation. As outlined in Chapter 5, RE allows researchers to open the box and examine the mechanisms that either enable or disable change within that box. In terms of evaluation, RE framed my investigation as a series of potential outcomes that were reached or not reached. At the simplest level, a case study design allowed me to demarcate the box under study and RE was the frame I used to examine the contents of the box. I used a case study to place a boundary around the program theory within the Alliance structure.

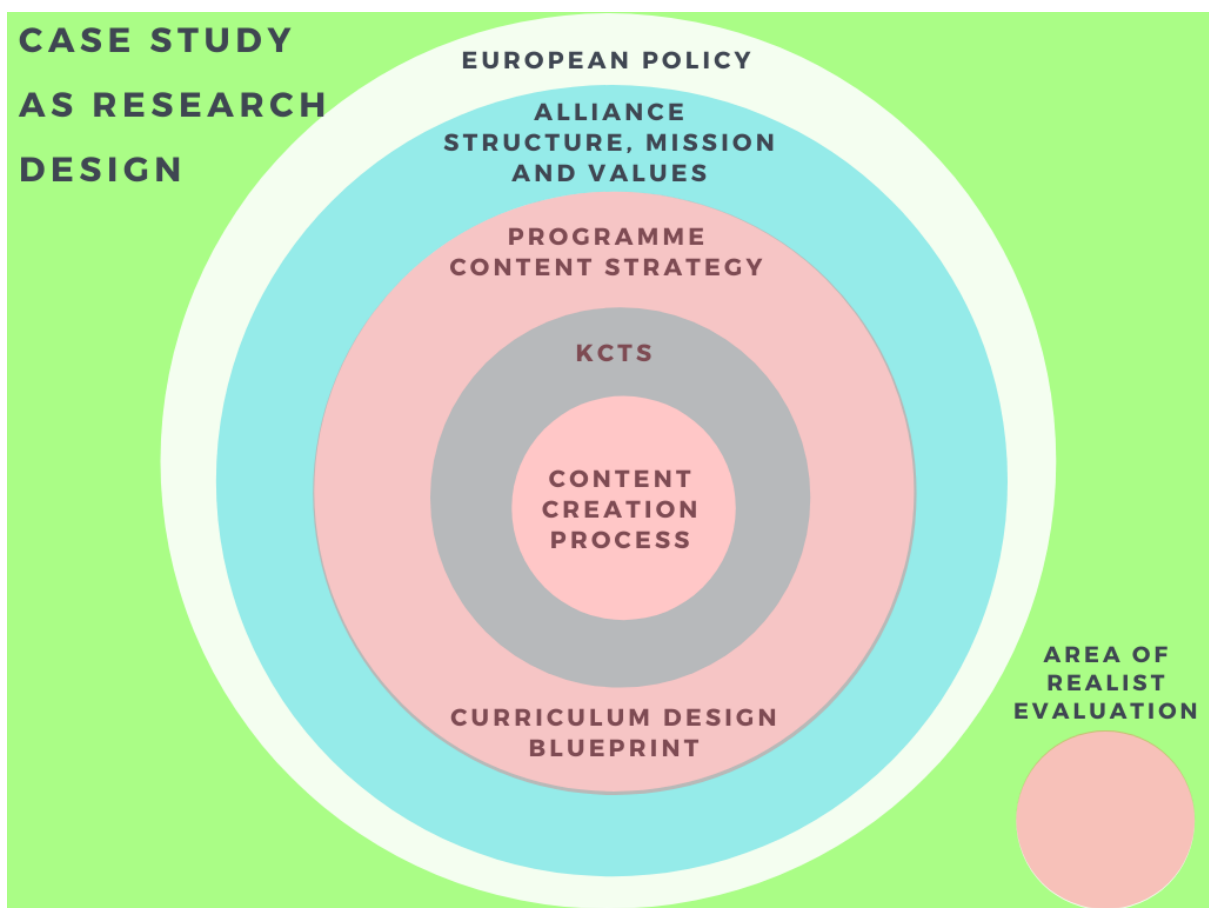


Figure 6.5 Author's illustration of the case study as a research design.

6.4 Case study

One of the problems with case study as a method is that the term itself has been used in so many ways (Gomm, Hammersley and Foster, 2000). To Stake (2003, p. 136), a case study is both a “process of inquiry about the case and the product of that inquiry”. Hammersley describes it as a research method and traces its emergence in US sociology in the 1920s and '30s. Yin describes case study research as “an empirical inquiry that investigates a contemporary phenomenon (the “case”) in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident” (Yin, 2016, p.15). Stake (2003) suggests it is not a methodology but a choice of what is to be studied. To Merriam, it is an “intense, holistic description and analysis of a single instance, phenomenon, or social unit” (Merriam, 1998, p. 27) and confusion surrounding case study use arises when the process is conflated with the unit of study and the final product.

Yin identified six types of case study: single or multiple versions of exploratory, descriptive, or explanatory (causal). Exploratory cases can be utilised as a preparatory exercise for further research for example to define questions or theories for further studies or to establish if research procedures are appropriate. Explanatory case studies can be used to investigate cause and effect and explain why something happened. Descriptive cases are complete descriptions of a phenomenon in its context. As I did not seek to establish causality or provide a complete description of a phenomenon, these types did not support my approach.

Stake (1995) proposed three types of case study: intrinsic case study, instrumental case study, and collective case study. An intrinsic case study is where the researcher has an intrinsic interest in the case. An instrumental case study is utilised when we

need to understand a case to understand a larger research question i.e. understanding the case study will help us to understand something else. A collective case study is multiple cases in an instrumental case study. Stake defends the importance of the particular and intrinsic in research and argues that valuable outcomes do not always rest on generalisability.

Merriam (1998) describes case studies as descriptive, interpretative or evaluative and the latter best describes my approach. The evaluative case study involves description, explanation and judgment, which captures the three layers of my research ambition. I sought to create a rich description of how this content creation process worked. This was a unique project: to use a master's to pilot a TD university structure. As I described earlier in this section, this was a complex project but I sought to isolate a thread of TD curriculum design and trace it through the macro-, meso- and micro context down to a specific program theory.

The differences between the three approaches (Yin, Merriam and Stake) are subtle - arguably differences in emphases rather than methodology. Merriam's stated aim of the case study captured my goal: to delimit the object of study and Merriam's evaluative case study best described the purposes of my design. The advantage of using a case study design was that I sought to examine this TD curriculum design process as an individual case and "an integrated system" (Stake, 2003). I was not investigating the other Alliance components that were being piloted, for example governance to support TD or resourcing to support the KCTs or even learning activities or timetables. Following Merriam (1998), I used interviews, my own observations and documents to provide a rich description of the case. To employ Merriam's classification, the case study of the content creation process was

particularistic (I focused on a particular program); descriptive (by employing RE, I sought to include as many variables as possible and describe their interaction); and heuristic (I sought through describing the content creation process from my own perspective to immerse the reader in the experience). I also sought to illuminate a process which is a perceived outcome of case study design (Merriam, 1998). My case study was evaluative but also both descriptive and explanatory. I sought to add the question “How was this done?” to the RE question “What works for whom in what circumstances?” This marks a difference in use of RE. This choice was informed by my experience as a practitioner and the original goals of this research: to provide a blueprint and advice to institutions seeking to create TD education. My primary goal in carrying out this research is to advance practice and support innovation in the HE sector. For example, I was invited to present preliminary research on the KCTs and the curriculum design process at the Global Alliance for Inter- and Transdisciplinary (ITD Alliance) Conference at ETH Zurich which I attended virtually in September 2021 (see Appendix 5). In reviewing my presentation, the review panel requested that I focus on the process that led to the creation of the master’s programme rather than the evaluation of the masters. I was also invited to present a description of the process at the European Universities’ Association (EUA) Teaching and Learning Forum, February 2021, which I also attended virtually (see Appendix 4). Attendees at my session asked about the process and all questions submitted to me were on further process detail.

Per Merriam’s description of evaluation, I sought also to illuminate a meaning – to give insight into TD and how it was understood by the different actors in this case. I sought to share tacit knowledge: my own, that of the work packages and through interviews, the tacit knowledge of the KCT members. I used interviews as a means to

build a thick description. I drew on the combination of my own perception of the process and my interviewees' perceptions to create a holistic, grounded and lifelike evaluative case study. To Merriam, the case study is suitable to education as a means of evaluation and this also reflected my own sense as a practitioner of capturing the dynamics of an education program. I did not seek to evaluate the curriculum design process using existent indicators – most importantly because indicators of the success or failure of TD education have not yet been created.

While flexibility is undoubtedly a strength of the case study design, to me the danger of case study as a method is its potential inclusivity, which Gomm et al. (2000) highlight: the breadth of its application from individuals to countries to global systems and social relations, makes its substance difficult to communicate. If it can be used in any setting, for any number of people, with any number of variables, is it actually anything? Are there boundaries or guidelines? I faced this question at numerous points in analysing the data within my fieldwork: how is this a case? What is it that makes my research approach a case study? What further complicates this questioning is the relationship between case study and theory. Where then did it sit with RE as an analytical framework? Hammersley (2013) argues that the case study should not be thought of as synonymous with one epistemology. It is neither qualitative nor quantitative. As mentioned in the previous chapter, RE offers a very detailed set of constructs with which to manage investigation and evaluation. Yet I returned to the case study design repeatedly to draw a boundary. The case study compromised all components implicated in the TD curriculum design: the EUI call; the Alliance and the five universities therein; the work packages within the Alliance that were responsible for the curriculum design; the KCTs; the Curriculum Design

Blueprint; the Content Creation Process. I used the case study design as an aid to support my evaluation.

I describe the case study in detail in Chapter 7, drawing on official documents created by the trans-institutional alliance and field notes I took as a practitioner within the curriculum development process. I used my field notes, emails and video recordings to provide my description of the process from my de facto role as KCT lead. This ensured I had access to and utilised “stakeholder knowledge” (Pawson and Tilley, 1997) – both my own and the collective of individuals engaged in this curriculum design process. In this instance, I was both researcher and stakeholder. The end result presents the evaluation as a “bricolage”, “a pieced-together set of representations that are fitted to the specifics of a complex situation” (Denzin, 2001, p. 4). It allowed me “to tease out and disentangle a complex set of factors and relationships” (Easton, 2010) while fencing in my object of study (Merriam, 1998).

Though the case study can lead a rich and detailed exploration or explanation of an event, phenomenon, individual, group or institution, it can also be time-consuming to carry out particularly for the individual researcher (Merriam, 1998), have limited generalisability and may not be representative (Denscombe, 2010). There is a risk that the output can be too lengthy or detailed for policymakers and management. Within the research community, its length and size may not lend the style to academic publication or to transferability. Although the case study provided me with the concept of a boundary and the ability to focus on detail within that boundary (Denscombe, 2010), I struggled to identify in what other ways it supported rigour or clarity in how it should be employed to guide research or how it aligned or led the selection of methods and analysis. There seemed a danger to me, as a novice researcher, that it

could be a licence to simply describe something in detail. Indeed, there is a lack of consensus about its design and implementation (Yazan, 2015; Merriam, 1998; Stake, 2003) which can cause confusion in researchers (Yin, 2003). The advantage of this openness is that the case study can be comfortably used with other methods; however this may lead to a perceived lack of rigour (Denscombe, 2010).

6.5 Sampling strategy and characteristics

I used a non-random, purposive sampling method to recruit as many respondents as possible from the five university partners. The target group was members of the KCT Core. The sample is therefore a judgmental or expert sample – a nonprobability sample. They were selected based on the following criteria:

- full-time academic staff of the partner university;
- members of the KCT Core;
- participants in the content creation workshops;
- active teachers and researchers.

6.5.1 Recruitment

The Irish PI to whom I reported assisted my recruitment of participants. We drafted an email to send to the approximately 40 KCT members and sought the support of the Alliance PMT, of which we were both members, to send the email. The PMT requested that we wait until the first Content Creation Phase was completed in July 2020 before emailing the KCTs. This was to ensure that the KCTs did not feel overburdened during what was already a compressed timeline. I sent the email to the four KCTs in August 2020 and eleven members responded. I sought to recruit

approximately 15 members of teaching staff, three per partner university to allow for withdrawals. Recruitment was voluntary. The target sample was ten participants i.e. two per university. Eleven interviewees volunteered to take part and completed the first round of interviews in Autumn 2020. One interviewee was not available for the second round of interviews. I therefore withdrew their transcript so the final number was ten. I successfully arranged interviews with nine of the 11 interviewees in the first two weeks of September 2020. Two further interviews were scheduled in October 2020. I sent each interviewee a consent form and a list of semi-structured interview questions that would guide the interview (Appendix 3).

6.5.2 Sample characteristics

Current university systems hire subject matter specialists who design and teach content specific to their area of expertise. The Alliance recruited participants based not solely on their disciplinary expertise but on their willingness to engage in a broad challenge area in which they may or may not have had any expertise. Eight of the ten participants had submitted expressions of interest to take part in the KCTs. Two participants did not self-select. None of the participants had created TD educational programs or modules before but two of the respondents were very well-informed on the domain of TD either through reading, research, practice or all three. I strove to create a balance of seniority, gender, nationality and discipline in the sample and also ensure that interviewees were representative of all phases of the master's: P1CT, KCT (Water, Food, Life & Health), Capstone Phase. I have not recorded nationality, institution or disciplinary area below as this information might lead to the identification.

Table 6-1 Sample characteristics (to protect interviewees' anonymity, these do not include discipline or nationality).

Interviewee	Gender	Level of Seniority	Masters' Phase
A	M	Assistant Professor	Flexible, Capstone
B	F	Assistant Professor	Flexible
C	F	Assistant Professor	Preparatory, Flexible, Capstone
D	M	Full Professor	Flexible
E	F	Full Professor	Flexible
F	M	Assistant Professor	Withdrew
G	F	Associate Professor	Flexible
H	M	Full Professor	Flexible
I	F	Associate Professor	Flexible, Capstone
J	M	Full Professor	Preparatory
K	F	Associate Professor	Preparatory, Flexible, Capstone

6.6 Methods of data generation

Researchers employing RE most commonly used multiple qualitative methods: case studies, semi-structured interviews, documentary analysis and ethnographic observation (Marchal et al., 2012; Shaw et al., 2018; Greenhalgh & Manzano, 2021; Holmen et al., 2021; Brönnimann, 2022). To support a deeply qualitative research approach, I combined multiple qualitative methods within the case study. I followed a methods approach comprising fieldwork notes and observations, interviews and document analysis.

6.7 Interviews

6.7.1 The pilot interview

My interview approach was informed by the results of a pilot interview carried out in summer 2019 which was based on the original literature review. The pilot interview was exploratory and took place in the early stages of the doctorate when I had not finalised my research methodology. I took a very broad and flexible approach to the interview. I was most interested in what my interviewee would perceive TD to be, how informed they were about the literature in ID and TD education. The interviewee is very accomplished within an ID field. He is highly cited and produces high-impact research. He had a senior role within the university and has also a significant profile on social media with a non-academic audience. What struck me most was that the interviewee had little if any exposure to literature on ID and TD. The interviewee stated that he could not provide a definition of ID and TD, though he clearly produced ID work. However when given a freedom to state in his own words what ID, for example, was, he provided a definition that reflected the literature. What I found most beneficial about the pilot interview was that it really affirmed to me the importance of aligning interview questions with my research questions. I left the pilot interview with a really interesting transcript but not one that shone much light on my research questions. Therefore, having completed the pilot interview and read more deeply into the literature on research methods, it impressed upon me the need to be more selective in structuring interviews questions, “to decide which variables are most important, which relationships are likely to be most meaningful, and as a consequence, what information should be collected and analysed – at least at the outset” (Miles et al, 2014, p20). I structured interview questions to explore micro

context, uncover mechanisms and outcomes and to assess if the outcomes were successful.

6.7.2 The Alliance interviews

I chose semi-structured interviews as the main data generation method in research to capture the richness of KCT members' experiences and to realise the "dialogical potentials for knowledge production" in conversation (Brinkmann, 2017, p. 990).

Brinkmann describes the two key approaches to interviewing: the interview as research instrument and the interview as social practice. Within the former, the interviewer is gathering reports from people to study a certain subject with a focus on lived experience. Examples include phenomenology and grounded theory. Therein, interviews are the 'what'. Within the latter, the interviewees are seen as giving accounts that become the subject matter. Interviews are the 'how'. These seem to align with two camps: positivist and constructivist. Like Brinkmann, I contend that both are "legitimate but also problematic when taken to extremes" (ibid, p. 1002) which is a key reason why I adopted a critical realist perspective. Sometimes it is helpful to approach "human talk" as a report and sometimes you need to view the talk as created by the situation. These perspectives can co-exist depending on the goal of research and the focus. To Denzin (2001), for example, the interview is an active text, a site where meaning is created and performed. The interview is part of a social exchange with all the role-playing, norms and influences that come with social interactions. This is a helpful perspective to adopt when examining the role of the interviewer and the interviewee in what is essentially an artificial recreation of a naturally occurring behaviour: communication. Denzin's perspective cautions us not to treat interview data as unproblematic. To Gubrium and Holstein (2001, p. 3) the

interview is “a way of understanding the social organization of experience” or “a site for the production of meaning”.

Pawson and Tilley (1997) divide approaches to interviewing into two camps between what they would describe as the positivists and phenomenologists, or quantitative versus qualitative. They don't reject either approach but propose to move beyond the opposition. The perspective they adopt is “pluralist empirical inquiry” (Pawson & Tilley, 1997 p. 158) i.e. just because you use a particular strategy, doesn't mean you represent what they describe as the “whole explanatory package” (ibid). They describe realist interviewing as occupying a space between positivism and phenomenology where qualitative realism resides (Pawson and Manzano-Santaella, 2012). I approached interviewing from this qualitative realist space, which would fall arguably somewhere between Brinkmann's two perspectives: what and how. While I did not strictly adopt the RE approach to interviews in detail, I did utilise program theory to structure the line of questioning.

As I was a colleague of interviewees, I could naturally approach the interviews as an exchange between two colleagues who were reflecting on a shared endeavour. By creating a shared understanding of what we were trying to discover, the interviewee and I were attempting to be reflexively and purposively transparent in our aims.

Pawson and Tilley encourage the researcher/interviewer to play an active role in the interview process by “teaching the overall conceptual framework of the investigation to the subject” (1997, p. 167). As TD was a relatively new concept to interviewees and as there are differing schools of TD and definition, I supported questions by verbally explaining the reason for certain questions and linking narratives. The advantage of semi-structured questions is that they allow for this level of investigation in an

interview setting. Interviewees were sent sample questions and question categories before each interview. Semi-structured interviews enabled dialogue between interviewer and interviewee that supported both the teacher-student relationship and the conceptual refinement process. In many cases, interviewees contacted me after the interview to say it helped them clarify their own thought process and solidify their learning.

As outlined in Chapter 7, the design of the master's took place in a highly compressed timeline. In essence, a group of complete strangers from multiple disciplines and five different universities, in five different countries were brought together in a series of virtual meetings to engage in an experimental process to write a TD master's programme. I was aware that KCT members had worked under a compressed timeline and I took this into consideration when thinking of the most appropriate data collection method. At this point in the pandemic, colleagues were feeling a certain online meeting fatigue and for this reason I chose not to hold focus groups. Additionally, given my experience in interviewing as a former journalist, I was confident that I could create a relaxed and trusted environment where interviewees could speak openly.

One of my key roles as a journalist was to carry out lengthy interviews for the Arts section of a British national Sunday newspaper. Earlier in my career while working as a features writer for other newspapers, I also carried out numerous interviews. The process of conducting in-depth journalistic interviews provided me with a certain measure of confidence beginning this period of data collection. However, I was also mindful of the words of Rudyard Kipling as quoted by Brinkmann (2017):

Why do I refuse to be interviewed? Because it is immoral! It is a crime, just as much a crime as an offence against my person, as an assault, and just as much merits punishment. It is cowardly and vile. No respectable person would ask it, much less give it.

Having interviewed numerous times and edited interviews of others, I was very conscious of the bias that can be brought into the interview process, both in guiding questions and in quoting interviewees. This can vary greatly from interview to interview. As Brinkmann writes (ibid p. 988) “we should beware of naturalizing this particular form of human relationship”. As interviewers, we undoubtedly frame questions to elicit certain responses and we frame the narrative within which we present these responses. Realist evaluators hold that within these programs, the intervention is embodied in the interpersonal relationships between stakeholders (Dalkin et al., 2015) and as I wanted to investigate how the KCT structure worked, I sought to create a protected space for interviewees to speak freely. Indeed, some of the interviewees had concerns about their privacy. It was my opinion that interviewees would not speak freely in focus groups with each other.

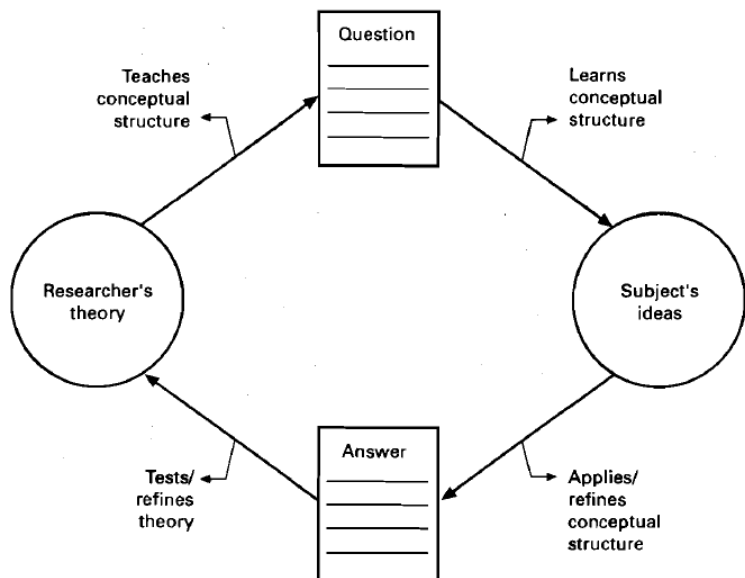


Figure 6.6 The basic structure of the realist interview (Pawson & Tilley, 1997, p. 165).

While there is no authoritative account of what the realist interview is (Manzano, 2016), the shared starting point is that realist interviews are theory driven and the researcher's program theory is the matter of the interview (Pawson and Tilley, 1997). I drew on Pawson and Tilley's (1997) basic structure of the realist interview (Figure 6.6) to organise interview questions in a manner that created greater distance between me (as interviewer) and the interviewees. In keeping with the overall research approach, the program theory was the subject matter of the interview. Interviewees contributed to confirming, falsifying and refining the program theory. As their colleague, I had shared the experience of content creation with them and had also built very close and collegiate relationships with them, despite the fact that we had only met via Microsoft Teams. We were speaking as colleagues. The interviewees said they took part in the interviews to support the research but also to give themselves space to reflect on the process they had just engaged in. They were familiar with the research questions and

the semi-structured interviews were based on the research questions. These were informed by the literature review of ID and TD characteristics, definitions and curriculum practices and by my professional practice in designing an institutional academic strategy for an Irish university and education principles to guide curriculum design for the Alliance pilot.

I choose to schedule two sets of interviews with the same participants: the first at the completion of the first content creation phase. At this point, interviewees had not been given training on TD or CBL but were immersed in a highly compressed curriculum design process. The second set of interviews took place three months after the completion of the second phase of content creation (the Detailed Content Creation Phase). I scheduled the first set of interviews to take place as close to the design of the master's programme as possible. I initially planned to hold three sets of interviews to establish who the participants were, what their motivation to engage with the Alliance was and what their understanding of TD was and how it would be implemented. Staging a second interview midway through the process allowed me to investigate how participants' understanding of the design process evolved and likewise their understanding of and confidence in practicing TD. The third and final interview would allow participants to review their engagement in the process, assess the outcomes and provide data against which to compare the benchmark understanding of TD to establish if the process successfully enhanced this and built their confidence. The final two sets of interviews combined with my own field notes and video recordings of meetings to support my field notes gave a rich insight into the process and the participants' experience of the process. Two sets of interviews provided me with an opportunity to use the first set of interviews to inform design of the second. In managing the scheduling of interview questions in the research phase

of the project, I scheduled time for post-interview reflection and note-taking in a research diary. I was also able to discuss my emergent findings and case study description with workshop co-facilitators, while protecting the anonymity of participants.

Using my central research questions as a starting point, I mind-mapped all possible questions that would feed information into these. This complemented the RE approach which gives a categorisation scheme in which to gather questions. The questions allowed interviews to leave space for the complex layers surrounding the ultimate program under examination (the curriculum design process). They also helped me to refocus when several themes began to emerge. The question *Did this process work?* was the ultimate frame for the questions. The process being the program theory: that the KCT structure combined with a facilitated institutional curriculum design process would result in a TD master's programme and a team confident in their ability to design TD education.

As outlined in Chapter 5, I designed the first interview schedule to explore context and mechanism (see Chapter 8). The second set of interviews (see Chapter 9) focused on mechanism and outcome. Within RE, Pawson and Tilley (1997, p. 155) recommend carefully mapping 'who knows what' as the organising framework to data collection. The semi-structured interview questions (see Appendix 3) in the first round of interviews were deliberately broad to gauge the respondents' level of familiarity with TD discourse. The goal was to investigate the level of familiarity they had with the literature and practice. The first set of interview questions was constructed to establish a baseline of how participants conceptualised TD and how they perceived the implementation of TD to work. Both the case study and the first set of interviews

sought to depict context at meso and micro levels. At a micro level, I sought to investigate the levels and type of motivation participants had in engaging with the project. I also sought to explore the level of their knowledge of the project and whether their interaction with project documents and personnel could be identified as a resource. Could these be identified as social and cultural conditions that were needed for change mechanisms to operate? The second set of interviews supported a conceptual refinement process, I offered interviewees a chance to return to their own thinking to see if they wanted to “present an evolution of that thinking” (Pawson & Tilley, 1997, p. 168). As these were semi-structured interviews, I followed the natural conversational arc of the interviewee while ensuring that I covered all questions I had prepared. This builds a more natural environment where the interviewee is relaxed in their thoughts and the rapport is protected.

6.8 Data analysis

It could be argued that there is a lack of widely accepted rules for data analysis in qualitative analysis (Bryman, 2015; Nowell et al., 2017). The ‘how’ of qualitative analysis is often missing i.e. researchers may present their analysis but not how they got there (Attride-Stirling, 2001) and the conceptual foundations of the method may be difficult to identify. Analysis of material qualitatively is a subjective process (Attride-Stirling, 2001) and while RE provides useful configurations in which to hold themes to communicate findings, I felt there was a missing step between coding and the configurations of context, mechanism and outcome. There were two weaknesses in using only RE to analyse data. Firstly, I had aligned my interview questions with the three concepts of context, mechanism and outcome. Were I to analyse transcripts

with these conceptual lenses only, I feared I would not see other themes emerge. Secondly, I sought to make explicit how I arrived at themes within these conceptual lenses.

A wide range of factors can influence coding: the researchers' level of involvement in the fieldwork, the types of questions asked and responses received, the research questions and how they frame a priori codes, and in the specific case of this research exercise, the concepts of RE: context, mechanism and outcome. The first step in data analysis is to increase manageability of the data. In this research exercise I therefore used thematic networks as a tool to organise and interpret content to surface Context-Mechanism-Outcome configurations (CMOs), not as an analysis. It also made my own process clear to me and served as a support in guiding this, my first large research exercise which was an analysis of a very large volume of data: 20 interviews in total, each approximately 80,000 words long. Thematic analysis strives to support qualitative research to demonstrate methodological rigour through greater disclosure of the analytic process: to disclose the process of interpretation. Researchers can make explicit the procedures they used to move from text to interpretation (Clarke & Braun, 2013). Thematic networks enable this disclosure and allow themes to be signified, structured and depicted (Attride-Stirling, 2001).

That said, with all the supportive analytical frameworks in the world, finding a path through analysis of qualitative data can still be very challenging (Bryman, 2015). I conducted the data analysis iteratively and followed a ten-step process which will be outlined in more detail within this section. As a researcher new to coding, thematic analysis and RE, I found that I went back and forth between stages repeatedly but in essence the steps I followed were:

1. Reading raw transcripts
2. Preliminary coding based on a priori code drawn from research questions
3. Iteratively coding with a priori and in vivo codes (MAXQDA)
4. Grouping coded segments into Basic Themes (MAXQDA)
5. Grouping Basic Themes into Organising Themes (MAXQDA)
6. Grouping Organising Themes within the three constructs; context, mechanism (i.e. resource or response) and outcomes (MAXQDA)
7. Rereading coded segments through lenses of Organising Themes and regrouping coded segments (MAXQDA)
8. Rereading groups of coded segments in Microsoft Excel and writing as narrative in Microsoft Word
9. Describing Organising Themes as they align with CMO constructs (in Microsoft Word)
10. Identifying Global Themes as CMOs (in Microsoft Word)

6.8.1 Coding

Before I began explicitly using a thematic analysis approach, I read all interview transcripts. I recorded all interviews on Microsoft Teams and transcribed them using the software programme Happy Scribe. This software application has trouble picking up different accents so it was necessary for me to carefully read all transcripts immediately. At this point, I kept a note of themes that were emerging in this transcription process. This was my first attempt at coding and it yielded overlapping codes and an array of similar concepts. To make the data more manageable, I employed thematic analysis and coded with MAXQDA.

Saldana (2015, p.3) describes a code as a “word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” and the coder’s primary task is to discover the repetitive patterns evident in the data and then to search for ideas that might explain why those patterns are there. To code means to discover, to link, not merely to label. I listed a priori codes based on the research questions, the literature review, the program theory hypothesis and the ontology. A first reading of interviews allowed these a priori codes to be further expanded to include in vivo codes.

A spiral process of coding supported revisiting and refining codes in an iterative manner during multiple readings of the data. Every effort was made to ensure codes were not duplicated or interchangeable and that they had discrete boundaries. The initial coding of the first set of interviews, for example, resulted in 104 codes. These were broadly organised into categories that aligned with the questions used in the semi-structured interviews. Following the steps of thematic network analysis, I first extracted salient themes from the codes. I refined these to make sure they were broad enough to capture a set of ideas that surfaced across a number of text segments. Indeed, this was a painstaking process and, for me, it recalled literary analysis and journalism writing processes. It required close reading and an ability to extrapolate a concept or theme from a cluster of statements or facts. I needed to remould the themes and rework them at every step. I grouped coded segments into Basic Themes. These were still too numerous and diffuse so I grouped Basic Themes into Organising Themes. The volume of codes prompted a return to the research question and further aligning the codes with RE. The data was intended to illuminate the broad approach of RE, *What works for whom in what circumstances?*, but in

support of the primary research question: *How can TD education be successfully created in a university?*. I then separated and grouped Organising Themes within the three constructs of RE: context, mechanism (sub-divided into resource and response) and outcome. I then re-read all coded segments and recoded to align with the new Organising Themes that sat now within the three constructs: context, mechanism (resource or response) and outcome (see Appendix 4).

I used the software MAXQDA to support this process or, as it sometimes more aptly felt, journey. It was a self-taught exercise both utilising the software and practising coding and the thematic analysis. However, there were drawbacks to using the constructs of RE during this stage. It led me to interpret the text solely by surface mentions of resources e.g. how many times did they mention Alliance documents or Microsoft Teams. This did not yield a depth of analysis so I concurrently revisited literature and examples of thematic analysis. Additionally, I found that there can be a difficulty in codifying data in RE and it can be challenging to differentiate between context and mechanism (Dalkin et al., 2015) or response and outcome. For example, the KCT structure could be seen as a context within which certain mechanisms fire (e.g. knowledge integration as a response to the resource of facilitation) but it can also be seen as a resource (e.g. knowledge integration is a response to the resource of multiple disciplines brought together within a KCT). When attempting to code for response versus outcome, it was not always clear when a positive set of interview segments was a response or an outcome. For example, the KCT members responded to being in a facilitated KCT by bonding as a team. Therefore I coded these interview segments as 'team bonding' however one could also argue that this was an outcome of the mechanism 'team' firing within the context of the KCT. This was where it was useful to have a program theory and I revisited my illustration of the program theory

throughout the data analysis stage. I also made changes iteratively and this was a very valuable part of learning. I investigated my confusion by moving codes to my outcomes category and back to responses.

I found it helpful at this stage to use summarising codes because these supported description and made the volume of data more manageable before I began writing the narrative to explore these Organising Themes (Saldana, 2015). I performed these same steps for both the first and second set of interviews. I then exported the groups of segments into Excel and reviewed them again within each Organising Theme. This allowed me to examine if the text segments aligned with the themes and to move around text segments if they were more appropriately coded within different themes. It was apparent at this stage if a theme was redundant or if a group of themes had similarities. I allowed the two findings chapters to naturally follow the narrative of the interviews. The questions in the first round of interviews were designed to unearth context and mechanisms (responses to resources). The questions in the second round of interviews were designed to further explore responses to resources, to explore how and if interviewees' responses to resources had evolved and to unearth outcomes (see Figure 6.7).

Theme	Count
Code System	478
indicator of success	8
comfortable with uncertainty	12
Challenges in TD education - implementation esp	38
Facilitation need	12
KCT thoughts	4
Shared understanding/team identity	24
curriculum ideology	66
Skills to learn/have learned	45
How to improve	52
What helps/works	13
Criticisms	53
detailed content creation stage	21
Need extra-academic actors	20
Confidence eg in design	38
Open Education System/Flexible	24
Defintion of TD	61
Sets	0

Figure 6.7 Screenshot of MAXQDA demonstrating Organising Themes revealing the RE construct of Outcomes.

The first findings chapter presented context and mechanism, whereas the second presented outcomes. Global Themes emerged at this point through the process of writing and illustrating these using the Canva application. Global Themes were a useful tool to check through mechanisms and context to network the chain of text comprising CMOs. Global Themes gave space to explore CMO as a named concept comprising a more complex series of actions. Once Global Themes were defined, I could then use the themes to once more filter information for validity and to ultimately

form arguments supporting my answers to the original research question: How could TD education be successfully created in a university?

6.9 Strategies employed to enhance trustworthiness

Given my epistemological and ontological orientation, I found myself identifying with writers such as Lather (1986, 1993, 2017) and Guba and Lincoln (1989). Although they have different epistemological and ontological orientations, we share a querying of validity as a concept. To me, validity brings to mind the binary approach of positivism and the presumption that there is a reality that can be known and that causation can be unequivocally determined within a controlled environment. It was more helpful for me to consider validity more broadly as deriving from paying attention to understanding, holism, honesty, depth, authenticity, richness, trustworthiness, dependability and scope of the data (Cohen et al., 2018, p. 246). I also found the perspective of Flick (2009) useful. It allowed me to think of the research not in terms of validity but in terms of transferability (which to Flick is synonymous with external validity) and quality of the research process (synonymous with internal validity). I also drew on Guba and Lincoln's (1989) Fourth Generation Evaluation and their intention to parallel the "rigor criteria" (ibid, p. 233) with criteria for ensuring trustworthiness: transferability, credibility, dependability and confirmability. While I identified with writers such as Pillow (2003) and Lather (2017), I found myself drawn back to my practitioner motivation: I wanted to generate data and CMOs that a wide range of actors (academic, third space or extra-academic) could access to potentially include in their own program theories. I found it more accessible as a novice researcher to consider every way I could ensure quality in my research, build credibility and express

my research approach in terms of how I perceive quality. To me, quality is synonymous with rigour, credibility, trustworthiness, transparency and reflexivity.

6.9.1 Credibility

Guba and Lincoln (1989) define credibility as the “isomorphism between constructed realities of respondents and the reconstructions attributed to them” (p. 237). They list the following techniques for increasing that likelihood: prolonged engagement, persistent observation, peer debriefing, negative case analysis, progressive subjectivity and member checks. My participation in the content creation process supported prolonged engagement and persistent observation. By the second set of interviews, I found myself in the position of ‘peer debriefing’ (Guba and Lincoln, 1989) with my interviewees. They were eager to hear the results of the first set of interviews and also discuss the broader policy behind the EUI and the Alliance approach. I created an environment where their input was welcome and they frequently volunteered an insight or opinion that was not directly questioned because they wanted to contribute to meeting the aims of the research. The process brought about a sense of catalytic validity (Lather, 1986). The majority of the interviewees said that taking part in the research made them reflect on their academic beliefs and the system in which they were situated. The interview process sharpened their ability to articulate what TD was and increased their confidence in a sense that they had acquired expertise. The interview process also supported them to reflect on the institutional support they received. To four interviewees, the interview seemed to provide a safe space in which they worried out loud about the precarity of their involvement in the Alliance, they confided in me about their frustrations at certain parts of the process. I seem to establish trust successfully with all interviewees. For

example, I offered each of my interviewees the option to view their transcript but none of them felt they needed to see it and expressed a trust in my recording their views accurately.

6.9.2 Trustworthiness

My goal was to give as much detail as possible in how I collected and analysed data and to build credibility by demonstrating the procedures I followed (for example, clearly mapped data analysis and transparent coding) to ensure findings were as accurate as possible (Denscombe, 2010; Creswell, 2007). Within this chapter and the following findings chapters I sought to build trustworthiness through clearly outlining the steps I followed in RE, coding and thematic network analysis and supporting this description with examples. A stumbling block for qualitative researchers can be in demonstrating the 'how' of qualitative analysis i.e. researchers may present their analysis but not how they got there and the conceptual foundations of the method may be difficult to identify (Attride-Stirling, 2001). When the 'how' is absent, it can weaken trustworthiness in the data and the researcher. Thematic network analysis provided me with the ability to order analysis transparently in a manner that counteracts perceived lack of rigour in handling interview data (Attride-Stirling, 2001).

The use of RE has increased in the past ten years especially in public health as a means to evaluate large, complex and hugely impactful interventions across large populations (Wong et al., 2016, 2013). RE demonstrates trustworthiness through the presentation and explication of program theory to guide data collection, analysis and presentation. Wong et al. (2013) suggest claims can be strengthened by avoiding the presentation of program theories and mechanisms as simple and linear. Rather where

inferences are made between context and mechanism, these should be well-articulated, as should the categorisation of context, mechanisms and outcomes. For key findings they recommend that inferences are clearly explained through for example a “detailed worked example, verbatim quotes from primary sources and (if appropriate) an exploration of disconfirming data (that is, findings which appeared to refute the program theory but which, on closer analysis, could be explained by other contextual influences)” (Wong et al., 2013).

To support credibility, at every juncture I tried to make visible my act of producing knowledge. In Chapter 1, as Hammersley and Atkinson (2007) recommend, I sought to make my intentions clear and my orientations explicit. Strategies such as triangulation promote the quality of qualitative work (Flick, 2009; Denzin and Lincoln, 2017). Guba and Lincoln (1989) distinguish between member checking, which can support “to verifying that the constructions collected are those that have been offered by respondents” (ibid, p. 241), and triangulation, which aids fact-checking.

Triangulation can be achieved by for example including multiple data sources, methods, and theoretical schemes (Lather, 1986). While I used the two sets of interviews with 10 participants in the curriculum development process as data for the RE, it also allowed me to triangulate my own observations as a practitioner who took part in the field work. I used video recordings of sessions and my own notes to check facts and vice versa. My own emails were an additional source of data checking. I also used the second set of interviews for both triangulation and member checking. By holding two sets of interviews with the same interviewees, I used an interview technique employed by journalists: I asked the same question in different ways within each interview to fact check. I also used the second interview to recheck ‘constructions’ collected from the first interview. For example, interviewees described

the process and their contributions and the outcomes in both interviews. Finally, the review of the master's programme by an external panel provided another perspective on facts and the nature and quality of the outcomes.

A recursive and thorough research design is also a means to triangulation. I additionally employed combined levels of triangulation by using more than one level of analysis: macro, meso and micro. I frequently debriefed one or both of my research supervisors and asked for feedback at regular intervals. Additionally, I presented the process of curriculum design at two conferences as a lead author. My co-authors were members of two work packages on the Alliance. Co-writing both the abstract and presentation with these two colleagues enabled triangulation (fact-checking) and a sounding boards for my findings. Both conferences had a question and answer and comments session and presenting my initial findings to a large online audience of academics and third space professionals working in academia also bolstered credibility.

6.9.2 Transferability

From the outset of this research, I sought to make clear the RE stance regarding transferability. The idea of transferability rests on the presumption that if causation can be determined in one place, it can be determined in another. A central tenet of the RE approach is that results are specific to a context. All observed outcomes are dependent on how certain mechanisms – the combination of resources and responses – are fired within certain contexts. Individual REs are seen as producing outcomes specific to a certain scenario that may or may not be useful to others depending on the contexts and mechanisms. Realist evaluators do not claim to create

a program that can be transferred. They seek to establish if their program theory worked. They do not seek to examine for example if implementation worked. Mechanisms may be transferred across cases and context without prescribing a particular “best practice” (Holmen et al., 2021, Astbury & Leeuw, 2010). It differs from a positivist understanding of reliability, which is premised on the assumption that “every repetition of the same, or equivalent, instruments to the same phenomena will yield similar measurements” (Guba and Lincoln, 1989, p. 235). CMOs have the “potential for transferability” because certain concepts may link to other program theories (Pawson and Tilley, 2004, p. 19). RE of programs leads to “emerging theory” but it cannot prove it. A series of tests may lead to “more powerful” CMOs in that they are more refined and better tested but ultimately, they are not proven (ibid).

6.9.3 Reflexivity

I outlined the weaknesses of a case study design earlier in this chapter but one of these is that, as Merriam (1998) points out, much of the analysis is left up to the choice and direction of the researcher. “The researcher is the primary instrument of data collection and analysis” (Merriam, 1998, p. 42). This also means that the material is filtered through the researcher. This can lead to bias and presents an ethical challenge if the researcher is the sole interpreter and/or generator of data. I was the lead author on official documents within the project and attempting to analyse my own writing was spurious. Both the case study design and RE enabled me to be clear that I was the author of these documents. In doing this I sought to acknowledge my role “in the construction of the research problem, the research setting and research findings” (Pillow, 2003, p. 179) and my conscious awareness of this.

Analysis of material qualitatively is a subjective process and I used thematic analyses to mitigate this “making sense of others’ sense-making” by disclosing the process of interpretation. Revealing one’s own sense-making of others is a vital step in this process, however revealing one’s own sense-making is equally important. My identity, values, beliefs and life experience all effect the lens through which I analyse data (Denscombe, 2010). This unavoidable fact that my ‘self’ is intertwined with the data gathering (as interviewer) and data analysis process can be minimised according to Denscombe by suspending personal beliefs and values during the research process. This is a naïve ambition, I believe, but having an awareness demonstrates at least a willingness to lessen the impact of a personal agenda on the findings. It is important for the researcher to pause to consider this agenda and as, Denscombe (ibid), for example, advises, to “come clean about the way their research agenda has been shaped by personal experiences and social backgrounds” (ibid, p. 303).

As an academic practitioner who was new to research, I found the concept of reflexivity to be both liberating and encouraging. Indeed, I grew to see it as a potential form of fieldwork (Pillow, 2003). As I mentioned in my introductory chapter, my early experiences of academia left me with the opinion that much of what we studied and discussed was so far removed from lives outside academia as to be almost meaningless. I struggled to see the connection between the more detailed methodological or epistemological discussions within my university in the 1990s, and life outside.

I was the first generation on one side of my family to go to university and many of my extended family greeted my studies with doubt and a light-hearted mockery. They saw academia as neither ‘real work’ nor of any benefit. Indeed, many greeted my decision

to go back to complete a doctorate in the same spirit. I find this stance or 'gaze' to be a powerful source of credibility, though an uncomfortable one as Pillow might recommend. I find myself within academia as someone who can hold both perspectives, with an awareness that there are more perspectives than these.

Reflexivity seemed to give me the 'right' to connect personal and public self. When I re-entered academia, I had instinctively switched off my "private view" as the Turkish writer Orhan Pamuk (2016) has said and entered with a belief that I could and should only voice my public view, the types of thoughts I had read in educational science. I should, I believed, speak the language of academia. Towards the end of my thesis I rediscovered the work of Wanda Pillow (2003) who wrote of tapping into uncomfortable personal narratives in research. It occurred to me that my own doubts about the value of research, my own position as someone who wanted academia to 'do something' about the world and the cynicism of my extended family and community about academic work, were actually a powerful means to build credibility and trustworthiness. At every step of this research process, I had questioned the merit of what I am doing. I had brought a deeply suspicious gaze to the process of research and research literature. I felt the echoes of my extended family and prior generations at every step of this process to the point that perhaps I was my own toughest audience.

Pillow (2003) provides a compelling critique of reflexivity as self-awareness (Is the act of revealing the self ever possible and is the attempt within a research setting mere window dressing? At what point do we risk collapsing into narcissism?), but the very act of being able to speak of my 'self' and being allowed to mention self in the academic world was a revelation to me.

Reading about reflexivity gave me confidence to examine how I approach this process of research as a woman, a parent and also someone who has a lived experience of how important the emotional dimension is in how lives are lived. I have long believed that the boundary between the personal and professional self that society perpetuates is a fallacy. I realised that in my interviews, while I drew heavily on my experience as a journalist, I drew much more on my emotional experiences, on my experience in psychotherapy, my experience as a mother and on the personal connection that I had established with most of my interviewees as a result of who I am, not what my professional role is. For example, my father died shortly before my second round of interviews were scheduled and I had to reschedule and let all interviewees know my father had died. As a result, I had some very moving conversations with my interviewees during the second interview. At least half of them spoke of their own experiences of losing a parent. We know from lived experience that having this type of connection with people undoubtedly influences how much they will share with you and at what level. It was liberating and inspiring for me to read Pillow (2003) and learn that my experience as a woman, friend, mother and colleague were experiences that I could voice as a researcher and they would be 'allowed'. I did seek to "deconstruct my authority" (Pillow, 2003, p. 179) in the interview setting. I did work hard to develop reciprocity, to hear, to listen and to equalise the relationship. In Pillow's words, it was of vital importance to me that I did research "with" instead of "on" (ibid).

The flip side of the personal connection I had established with interviewees was the danger of a lack of objectivity, one of the more frequently cited criticisms of interviewing that can affect the credibility of a study (Hammersley, 2017). I had, after all, an agenda (Gubrium and Holstein, 2001) and in instigating both the research and

the interview, had already manifested an asymmetrical relationship in different ways. I felt dependent on my interviewees for their time and their willingness to take part. I felt somewhat beholden to them but I was also conscious that they might have perceived me as part of the management within the Alliance. While I was not in management role, I was on PMT. I was conscious that they might have believed I exerted some influence on their roles or their opportunities within the project. I had an awareness that my interviewees might “simultaneously and continuously monitor who they are in relation to themselves and to the person questioning them” (Gubrium and Holstein, 2001, p. 17). In addition, there was a danger that semi-structured interviews would allow me the opportunity to select whatever fit my narrative (Pawson & Tilley, 1997). As I was a facilitator within the KCT and a project lead, I interviewed subjects with full disclosure about my role rather than attempting to take the position of a neutral researcher. I explained to KCT members what I was doing and why, what the literature review revealed about TD definitions and practice and what the change hypothesis was. This supported Pawson and Tilley’s conceptual refinement process. I contextualised the domain for participants to ballast mutual understanding. Pawson and Tilley (1997) distinguish between subjects, practitioners and evaluators. Each will bring their own limitations to insight into a program’s contexts, mechanisms or outcomes. In this research process, the subjects were also practitioners and to an extent evaluators. To Pawson and Tilley, practitioners are sensitive to context, mechanisms and outcomes.

RE provides room for professional practice research. The introductory chapter provided my biography, my motivations and my own perspective on TD. I have embraced the normative in TD as have members of the community of practice of which I am now a member (ITD Alliance). Employing a reflexive gaze on my approach

to the research, I acknowledge my epistemological and political leanings toward ID and TD. I contend that the higher education system is in need of reform and needs to adapt to the web-like nature of our contemporary 'knowledge society'. My motivations for doing this research were personal, professional and societal. This research is a form of activism: to contribute to changing a system that I believe is in need of change. According to Pawson and Tilley (1997, p. 37) RE is "a form of applied research, not performed for the benefit of science as such, but pursued in order to inform the thinking of policymakers, practitioners, program participants and public".

6.10 Ethical issues

The ethical approval was informed by the Principles for the Guidance of Action Researchers (Kemmis and McTaggart, 1981, cited in Cohen et al., 2011). Although this research project does not employ action research, the interviewees are actively involved in the subject area under discussion and it is appropriate to consider that their practice will be influenced by participating in the interviews. The Principles for the Guidance of Action Researchers emphasises negotiating accounts of others' points of view; taking care that all relevant committees, persons and authorities have been consulted and informed; involving participants and negotiating with those affected. This speaks to the need to reflect on the ethics of consent. In this instance, because the case was a curriculum design process within a pilot European University, consent was sought from the senior management team (Cohen et al., 2018). In preparing the formal set of interviews and the Ethics Approval Form prior to that stage, the issue of the potential consequences of the research was examined in addition to traceability. All care was taken to maintain the anonymity of the project in addition to the master's programme and the interviewees. Interviewees were offered the opportunity to

approve their own transcripts and have access to the data but they did not consider this necessary (Cohen et al., 2018). I took every effort to clarify my position and opinions and to keep these at a distance from the research. Additionally I sought iterative feedback from my supervisor to balance any potential skewing of data or framing of language that might have occurred. Interviewees were offered the opportunity to read transcripts but they declined. All interviewees signed consent forms (Appendix 5). As part of the process for selecting participants in the study, subjects were shown an information sheet and I explained the purpose of the project by email or in a Microsoft Teams meeting. I emphasised the voluntary aspect of their participation and their ability to remove themselves and their data from the research process at any stage during the timeline of the fieldwork.

6.10.1 Data protection

I stored participant names in an Excel spreadsheet with their pseudonyms in an external hard drive. I pseudonymised video files on creation and stored them on a personal computer that was encrypted. I stored digital consent forms under password in a separate documents folder on a secure external hard drive. I uploaded the file containing the digital forms and it will be uploaded to the university's Blackboard ethics module where it will be securely stored and archived for seven years. It will be accessible only to me and the School Ethics Committee and administrator.

6.11 Limitations

The study was limited by its nature as a case study, however replicability is not an aim of this research design and approach. RE approaches research as contributing to a

cumulative system of research. In following a realist approach, I began the research with a process of hypothesis making. This has limitations in that it restricts findings to testing of a particular theory. One could argue that this is a weaker point in RE. The theoretical framework that informs the study begins with a brainstorming based on both 'folk wisdom' i.e. knowledge of practitioners and academic knowledge (an initial and iterative literature review). The theory frames the research to a degree. The sample is purposively selective and, as such, generalisability is limited. However, the goal is to create a research design and recommendations that inform other practitioners of what worked for whom in what circumstances. The goal was to contribute to a growing body of knowledge on a nascent form of research. As I discovered through participation in two conferences, the broader community is interested to hear about processes and outcomes, conscious of the fact that contexts may be different. As this context – a European university alliance – is policy-driven and novel, a close description of the context itself is a relevant to other universities internationally.

6.12 Conclusion

This chapter describes my research journey from the research question through the choice of a deeply qualitative methodological approach, the challenges and limitations of the same. I sought to investigate the process of ID and TD curriculum formation at a practical level and an epistemological level through focusing on how or if individual academic practitioners found common ground epistemologically and methodologically through a new staffing approach, team structure and content creation process.

A case study design was utilised supported by RE as an analytical framework and thematic analyses as a tool to analyse data. I used content analysis of official documents, field notes and my own participation in the process as the data for the broader case study and context. In-depth semi-structured interviews provided the data for an exploration of what mechanisms were fired within this context and what outcomes were observed. While interviews have been perceived as over-used in qualitative research, they serve an important function in elucidating the conceptualisations of actors at the micro-level of this investigation and in answering the question posed by realist evaluators – what works for whom in what circumstances. The ‘success’ of this program theory is assessed through an analysis of the feedback from those for whom the resources were designed. Additionally, the quality of the programme was positively reviewed by an external panel (AQU, 2020).

Chapter 7 Meso-context: the European University

Alliance

7.1 Introduction

The fieldwork within this thesis took place within the context of a European University Initiative (EUI), which I refer to throughout this thesis as the Alliance. In this chapter, I apply a case study design to describe the elements that form both the context of and resources within the RE (see Figure 7.1). The Alliance was a complex project involving nine work packages and the activities of these work packages connected on many levels. The case study allowed me to place a boundary around which resources are the subject of this evaluation. Resources are both the Curriculum Design Blueprint and the KCTs and this chapter serves to describe these resources in detail. This chapter also builds on Chapter 4 in providing further detail on the policy and institutional context within which this curriculum design process took place. As I was both researcher and participant in the content creation process, this chapter also presents my perspective on the process of KCT formation and the content creation process.

I will begin by presenting a detailed examination of the Alliance application which provides a clear articulation of the pilot. I then describe the Alliance in terms of its composition, structure and goals. Thereafter, I describe the content creation process, the personnel involved in this process and the KCTs, which form the focal point of the RE, and my role in connection to the process and the KCTs. I conclude with a description of the master's programme. In the Chapters 8 and 9, I will present the

findings derived from the interviews carried out with members of the KCTs who were “recruited” by their member institutions to take part in the content creation process.

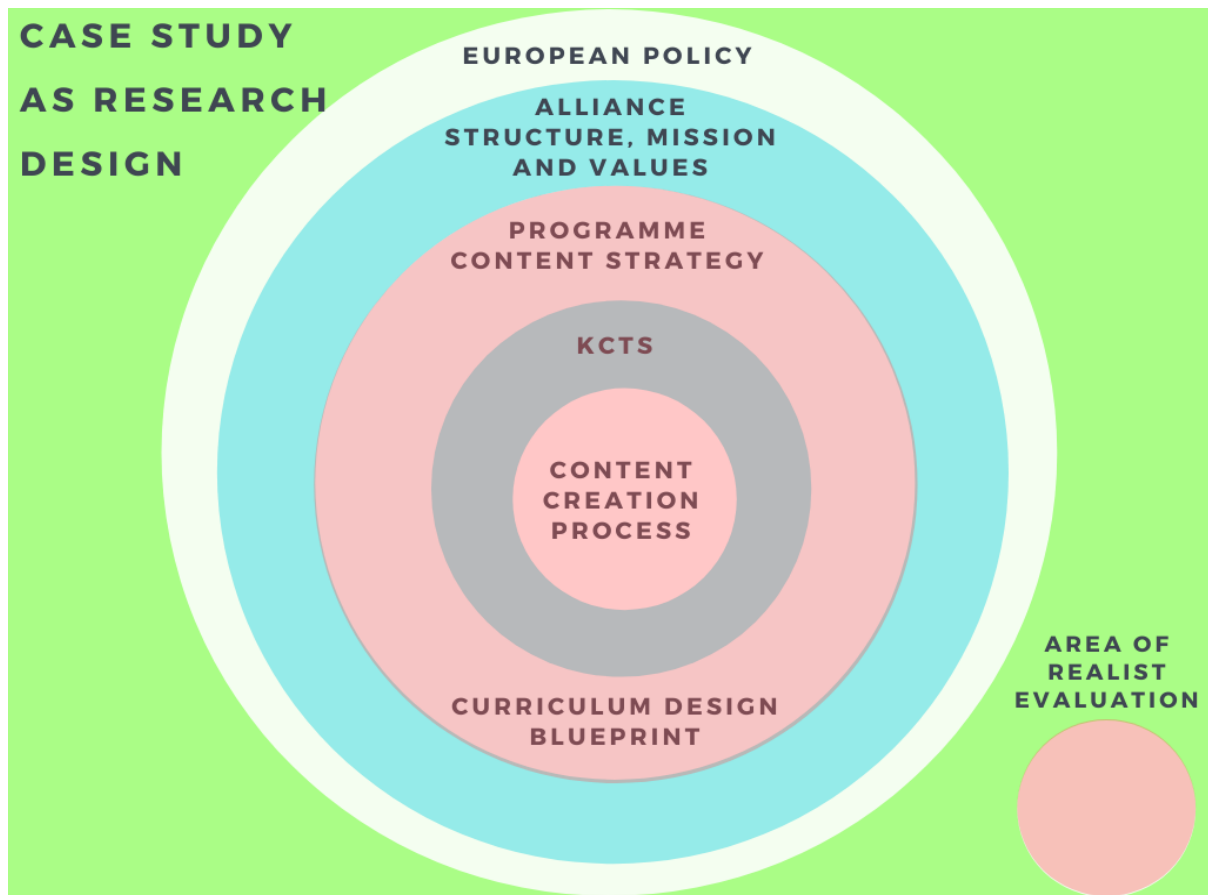


Figure 7.1: The case study design acted as a boundary identifying my research focus in this complex Alliance.

This chapter is intended to define the case and in doing so I draw on detailed field notes and memos I created following workshops, emails and meetings through my work within the Alliance. I refer to a number of documents, as illustrated in Table 7-1. I also both attended and subsequently had access to video recordings of content creation workshops. These served as an aide memoir when describing the resources provided and interviewees’ experiences of these resources from my perspective.

Table 7-1: Alliance documents referred to in the case study.

Document	Authors
KA2: Cooperation for innovation and the exchange of good practices (Pilot call for proposals: EAC-A03-2018)	European Commission
The official project application submitted to the European Commission in February 2019.	Representatives from each of the five partner universities including Project Directors and Project Managers
Curriculum Design Blueprint	Alliance Work Package 3
Teaching and Learning Strategies	Alliance Work Package 4
Content Creation Plan	Alliance Work Packages 3 and 4
Detailed Content Creation Plan	Alliance Work Packages 3 and 4

7.2 The EUI within European policy

Chapter 4 presented an overview of the development of European policy in higher education in the twentieth and twenty-first centuries as it relates to knowledge production and the production of skilled knowledge workers. The EUI continued these developments with a stated aim to increase quality and competitiveness in the university sector (European Commission, 2018). The announcement in 2018 of funding for European Universities presented a convergence of the key ideas present in European policy relating to the university's role as knowledge producer, producer of human capital and agent to solve societal challenges (in particular relating to sustainability). The following goals were articulated:

1. A deeper Europeanisation of higher education and “strengthened European identity” (European Commission, 2019, p. 125) through the creation of

supranational institutions and programmes that promote mobility, knowledge transfer, European citizenship and European values;

2. Greater synergies between research, innovation and education as represented in the concept of the knowledge triangle;
3. A challenge-based approach driven by students, academic and external partners;
4. A competency-based educational approach that transcends disciplines.

The EC specified that the challenge-based approach should utilise knowledge-creating teams (KCTs). These teams would purportedly address societal and other challenges of their own choice through the use of innovative curricula and pedagogies. Both students and researchers would then develop “high-level, entrepreneurial, Open Science and transferable skills” (European Commission, 2019, p. 126). The call very specifically reflected the language of new growth theories and the EC’s knowledge economy aspirations. The skills were needed, the EC states, to equip students and researchers for a “fast-changing labour market and knowledge economy and society” and the “transfer of research results back into education” to create “innovative solutions adaptable to different regions of Europe” (European Commission, 2019, p. 126). The call invited universities to form alliances that would test different innovative and structural models while demonstrating a step-by-step approach.

7.3 The Alliance: Composition, structure and goals

The EUI that is the locus of this research was formed in 2018 as a trans-institutional alliance to write the joint application to the EC in response to this call under KA2:

Cooperation for innovation and the exchange of good practices (Pilot call for proposals: EAC-A03-2018). The final document, comprising approximately 76,000 words, was submitted to the EC's Erasmus+ programme in February 2019. It outlines the vision and planned process of the Alliance (Alliance name redacted, 2019). The Alliance stated that it would build on the "strengths and complementarities" (ibid, p. 2) of the Alliance members, to strengthen links and build new cooperation mechanisms. The Alliance application was successful, and the Alliance was formed in June 2019 and comprises five research-intensive European universities from five different European countries. It numbers three high-ranked mid-sized European universities located in prominent European cities, one mid-ranked regional French university and one low-ranked accession state capital city university (Table 7-2).

Table 7-2: Profile of the five universities that formed the Alliance.

University	Country	Times Higher Education World University Ranking	Faculty size (full-time faculty)*	Student population
A	Spain	193	3,002	UG: 44,000 PG: 19,000 **
B	The Netherlands	69	3,254	UG 20,924 PG 12,824 **
C	Ireland	146	1,383	UG 12,160 PG 3,845 **
D	France	301-350	2,464	39,909 *** (UG/PG breakdown unavailable)
E	Hungary	601-800	2,302	28,450 * (UG/PG breakdown unavailable)

*Source: QS Top Universities (staff numbers are provided by universities to QS) <https://www.qschina.cn/en/universities/>

** Source: QS Top Universities <https://www.topuniversities.com/>

*** Source: <https://www.timeshighereducation.com/world-university-rankings/montpellier-university>

In its application, the Alliance addressed the original specifications of the call. Its key pillars were to be challenge-driven, accessible, research-based and mobile with a long-term goal of creating “substantial change” for each of the universities (Alliance Name Redacted, 2019, p. 2). The Alliance proposed a guiding theme: “To rethink the role of Europe in the World as it faces one of the main global challenges in the 21st century: Reconciling Humanity with the Planet” through engagement with the United Nations Sustainable Development Goals (UN SDGs) (ibid p. 36). The emphasis on delivering this goal was that the content of the programmes would be student-directed and flexible and “maintain a certain coherency around the principles embedded within the Sustainable Development Goals” (ibid, p. 36). The application refers to the “collective” solving problems (p.43) through an ID and TD approach that would develop problem-solving skills. The overall educational vision (ibid, p. 2) reflected the language of the EC call:

...to become a model of good practice to increase the quality, international competitiveness and attractiveness of the European Higher Education landscape. The model will be unique because it will use innovative pedagogical approaches and mechanisms that engage staff and students of different backgrounds to build truly challenge-driven, interdisciplinary education programmes, in a research-based multicultural/multilingual environment with mobility as a norm, contextualised within the knowledge triangle as exemplified through the European Institute of Innovation and Technology (EIT) which members of [Alliance name redacted] are actively engaged in. This model will promote a flexible cross-European higher education

learning experience aiming to educate traditional and non-traditional students whatever their profile and background. (ibid, p. 2)

The long-term vision was to develop a “learning, creative, transnational, multi-cultural, multi-lingual, interdisciplinary, and societally driven integrated campus (both physically and digitally) for all students (traditional/non-traditional) where students can freely move, create their own curricula, and interact, without papers and with smooth processes” (ibid, p. 2). This educational approach would develop students that were “empowered to become critical thinkers” and “committed European citizens capable of confronting and solving societal challenges linked with reconciling humanity with the planet and more generally the sustainable development goals” (ibid, p. 3).

The application proposed examples of different innovative pedagogies practiced at two of the Alliance partners which the Alliance listed as Transdisciplinarity, Social Constructivism, Elements of the Utrecht Education Model, Design Thinking and Educational technologies. It drew a clear distinction between curriculum design as the ‘what’ of education and pedagogy as the ‘how’ of education. Curriculum design was viewed as a high-level process used to define educational principles and a high-level programme framework. The latter was presented in the application and as a three-phase programme (see Figure 7.2):

- Preparation Phase: set of modules giving students common grounding in key skills and content required for challenges;
- Flexible Phase: Student customises learning from suite of modules drawn from all five institutions;

- Challenge-based Final Project Phase: Team-based learning focused on a challenge that has an active research profile from at least one partner and aligns with priority of the EU. Teams comprise students, academics, active researchers in the field, and business mentors and contributors.

Programme Learning Objectives were presented on p. 39:

- Identify and discuss the interrelations between the UN SDGs.
- Analyse complex societal challenges and develop a creative solution by exploring evidence and perspectives, thinking critically and conducting research.
- Collaborate and communicate effectively in diverse and multidisciplinary teams, while being appreciative of multiple perspectives.
- Reflect on their own current thinking and how it compares to other perspectives in order to develop future thinking practices and dispositions.
- Create and present a group multimedia presentation, aimed at a relevant stakeholder, proposing a solution to complex societal challenge.
- Develop a wide range of transversal skills such as problem solving, creative thinking, communication, collaboration, digital skills and life-long learning disposition.

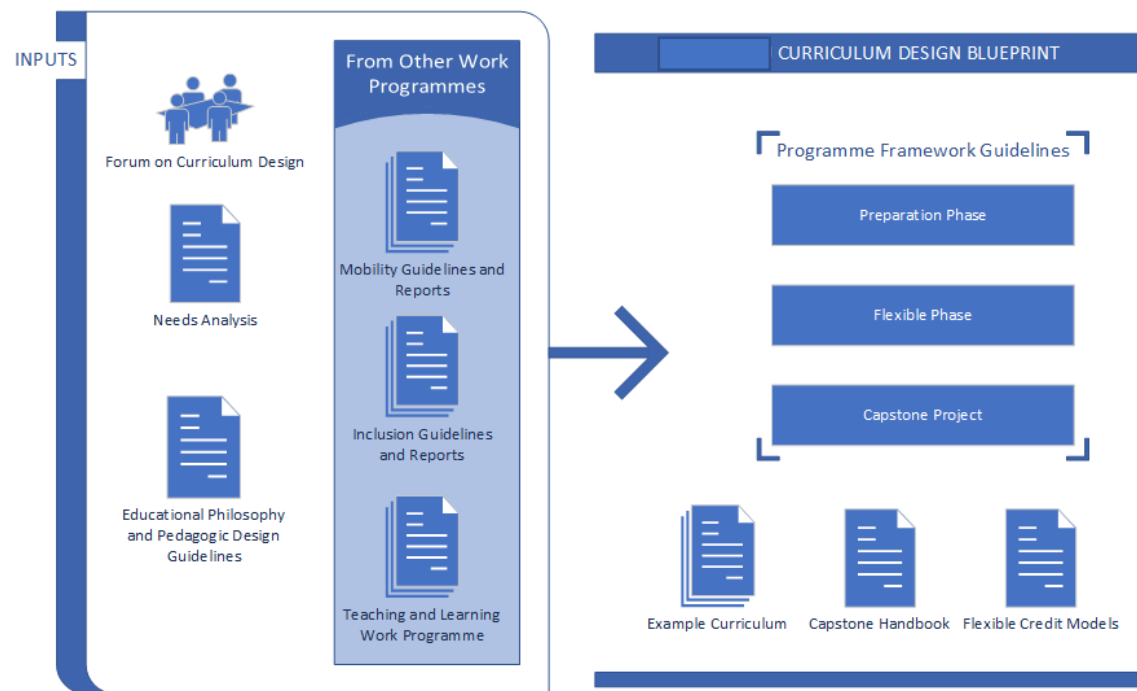


Figure 7.2: The first draft Curriculum Design Blueprint as featured in the official application.

The application authors promoted what they described as a content agnostic approach i.e. if challenges were chosen by students in collaboration with extra-academic actors, it would follow that content or knowledge would vary from challenge to challenge. Facilitators were promoted as integral to this approach and their role would be to guide students to source and utilise domain knowledge (ibid, p.41).

The original funding call stipulated that Alliances should divide the project into Work Packages (see Table 7.3 for the list of Alliance work packages). Work Packages 1 and 8 were compulsory but the Alliance was able to determine the other work packages according to their strategy and proposed activities. The purpose was to pilot, test and evaluate ideas that would then form a toolkit. A key outcome of the entire project was to disseminate a toolkit that demonstrated how to create a European University that is financially sustainable without the need for member universities to invest large sums of baseline funding.

Table 7-3: The Alliance project work package structure.

WP number	WP title	Start (month/year) - end dates (month/year)	Duration (number of months)
WP1	Management of the project	01/12/2019-01/12/2022	36
WP2	*Alliance future governance and management design	01/01/2020-01/10/2022	36
WP3	Curricula design	01/12/2019-01/12/2022	36
WP4	Teaching and learning strategies	01/12/2019-01/12/2022	36
WP5	Mobility	01/12/2019-01/12/2022	36
WP6	Inclusiveness	01/12/2019-01/12/2022	36
WP7	Pilot	01/12/2019-01/12/2022	36
WP8	Future *Alliance model and transferable toolkit	01/12/2019-01/12/2022	36
WP9	Sustainability and Dissemination	01/12/2019-01/12/2022	36

My role was as a WP3 leader, WP4 co-leader, member of the PMT, facilitator and central contact point for the KCTs. I was also a participant and facilitator in the section of the master's called the P1CT (Phase 1 Content Team) and a facilitator in the KCT Food team. Through my varied roles, I observed mechanisms firing i.e. responses to resources provided. I kept a record of my experiences in my role through a diary, notes and emails to colleagues, and through video recordings of virtual meetings held on Microsoft Teams. All KCT members consented to our recording workshops for the purposes of the Alliance. I used these recordings as an aide memoir in writing this chapter.

7.4 Implementing the curriculum design process

Once work packages were put in place, the Curriculum Design Blueprint specified in the application formed the starting point of discussion but by the end of the first nine-month period (July 2019 – March 2020), the curriculum design process had evolved to comprise Programme Content Strategy, the Curriculum Design Blueprint, KCT formation and the Content Creation Process.

Two work packages (WP3 Curriculum Design and WP4 Teaching and Learning Strategies) worked very closely during this period (see Appendix 6 for a timeline of curriculum design activities). WP3 had two representatives from each university partner. The majority of these representatives were senior, full-time, tenured members of staff at their home university and were a mixture of academics and third space professionals (Whitchurch, 2008) e.g. quality officer, educational project lead etc. The balance on WP3 was approximately 50% senior third space professionals and 50% high-ranking academics. Significant decisions e.g. the recruitment of KCTs, were submitted to the Alliance PMT, on which five members of WP3 sat including myself, the two WP4 leads (one of whom was a project director), a senior academic from the French partner (also a project director) and my principal investigator.

All decisions were therefore highly collaborative and were discussed in twice-weekly meetings of WP3 and on an ongoing basis between the leads and co-leads of WP3/4. Decisions were generally needed regarding any changes to the ongoing content creation strategy and both the choice to create KCTs and the recruitment of KCTs. WP3 served as a form of academic council enabling a chain of decision-making to be

evident and ensuring that all partners were party to these decisions and could review iterations of work package artefacts and contribute to decision-making. However, conceptual work and deep discussion relating to conceptual approaches happened within the Irish research team and between the leads of WP3/4. One-on-one conversations took place with other WP3 or PMT members as needed to seek support or feedback on strategic decisions. Ultimately, decision-making power rested with project directors who sat on the PMT but WP3/4 provided advice in terms of the educational vision of the project.

The interplay between Curriculum Design and Teaching and Learning Strategies caused confusion at the outset of the project, for example, both work packages were tasked with curriculum design. WP3 was listed as responsible for producing a Curriculum Design Blueprint. WP4 was listed as responsible for producing Detailed Curriculum Content. The key aim was to produce TD content. At the outset, both work packages understood that the detailed level of the master's content should be undertaken by WP4. However, WP4 understood their role to be to prepare academics for teaching only. The 'what' of the programme was interwoven with the 'how'. Certain work package members promoted the idea that TD happened in the classroom. Whereas other work package members argued that TD happened in content creation where integration of disciplinary expertise needed to be evident and without this integration, the master's programme risked being MD rather than TD. There was significant interconnection between WP3 and WP4 and frequently blurred lines between curriculum design and pedagogical design. This was the subject of ongoing discussion between the two work packages. The teams addressed this by ensuring core team members sat on both work packages. Figure 7.3 illustrates this dynamic interconnection.

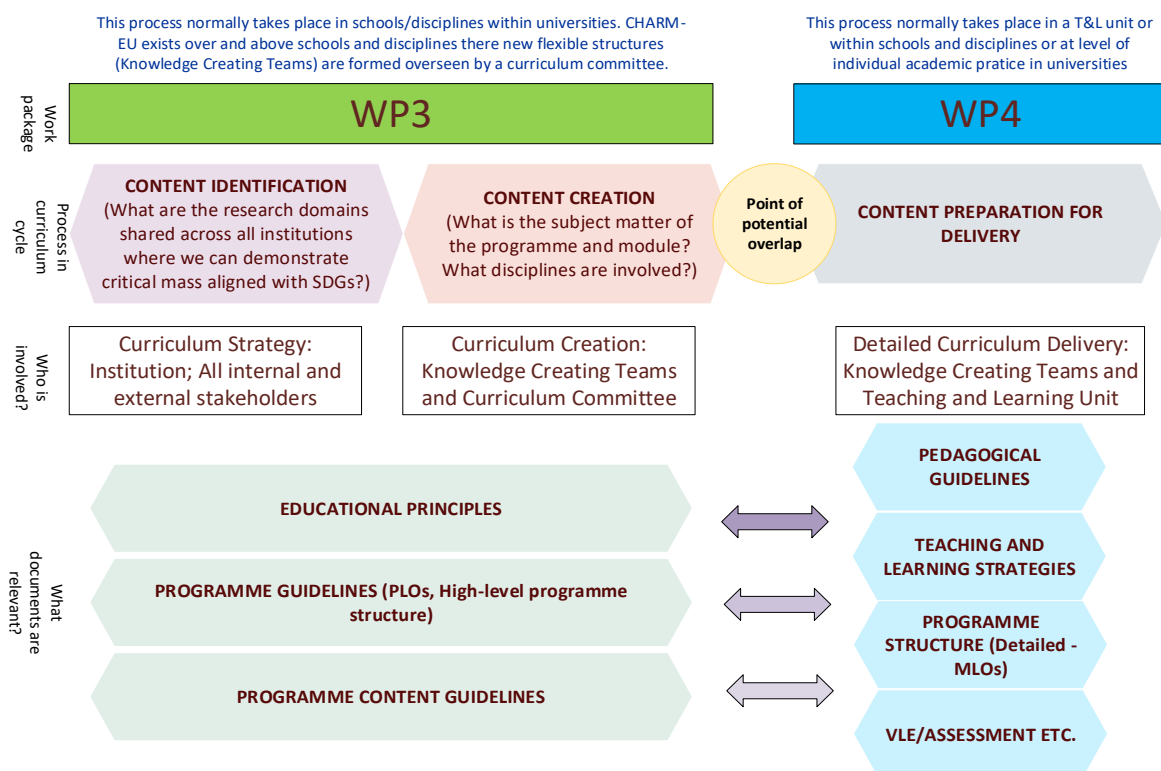


Figure 7.3: The curriculum design process as mapped by the curriculum design and teaching & learning teams.

As Figure 7.3 demonstrates, the starting point for implementation of the draft curriculum design process was Content Identification. The Programme Content Strategy served this purpose and proved crucial to the curriculum design process. It provided a template for how a large group of institutions or individuals could transparently and collaboratively identify challenges informed by policy and reflective of research and educational strengths. In a TD environment, it is expected that chosen challenges are the threads that connect a university structure through to a student's learning experience. The Alliance sought to utilise the research and educational strengths (including staff) of five universities to create a TD, challenge-based master's programme that aligned with the UN SDGs and key European policy

documents e.g. the European Green Deal in a manner that: maximised the knowledge base and strengths of partners; utilised existing teaching staff from partners; connected the curriculum with the research activities of partners; implemented the principles of TD and engaged extra-academic actors.

At this juncture, the Alliance was clear that the process of creating and running the master's programme would form the pilot that would test all work packages' activities. Once the design process was initiated, the collective choice of challenge areas became a priority. WP3 created the Programme Content Strategy Guidelines (O'Sullivan, 2020) to outline the process for identifying and commissioning thematic challenges for TD curricula, across multiple institutions. WP3 performed an analysis of the five universities' research and educational activities and strategies connected to transversal skills development, sustainability and the UN SDGs and European Green Deal. From this data, three thematic areas reflecting points of critical mass were identified: Food, Water and Life & Health (see Figure 7.4). The ongoing curriculum design process resulted in changes to how content for the Flexible Phase in particular would be commissioned and taught. Whereas the official application designed the phase to draw from a suite of existing modules from each university, WP3 chose to commission bespoke modules from KCTs who would be involved in programme design and "teaching". Therefore, in spring 2020, KCTs were proposed by WP3 and WP4 as a new key organisational structure in the curriculum design and implementation process (see Figure 7.4 for an illustration of the master's programme following an introduction of the programme content strategy and KCT structure).

MASTERS IN GLOBAL CHALLENGES FOR SUSTAINABILITY

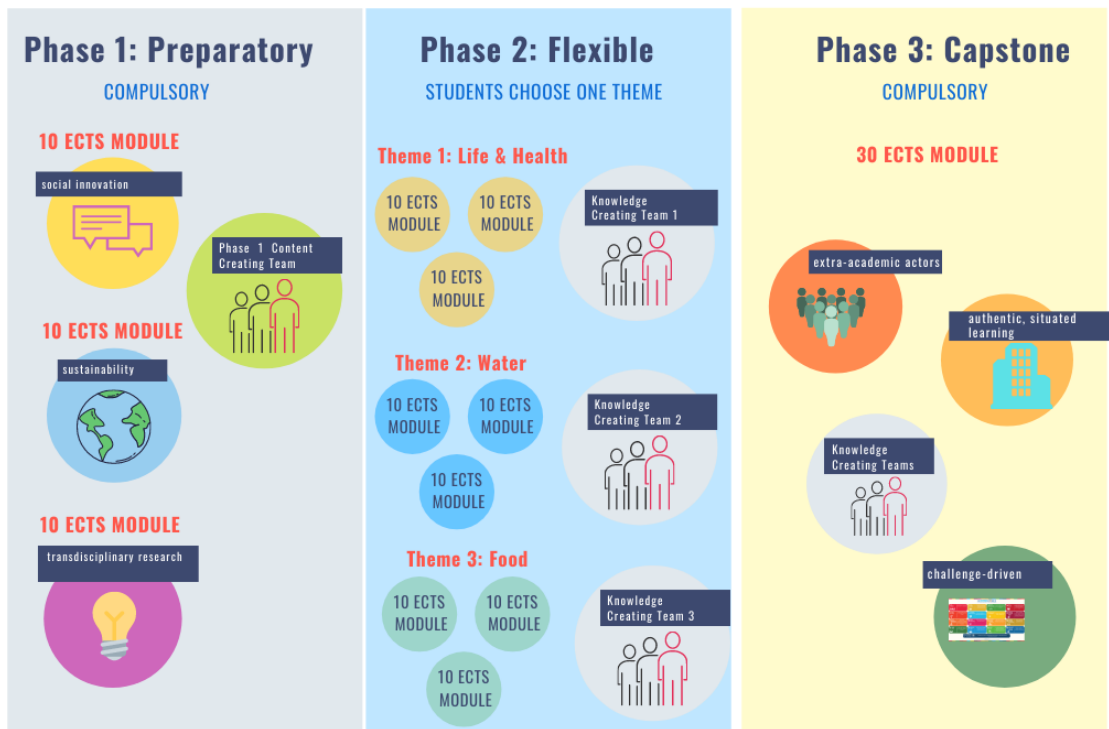


Figure 7.4: An illustration of the new programme structure after completion of the programme content strategy process.

KCTs (see Figure 7.5) were defined as a core team of academics and researchers and an expanded network of connected academics and stakeholders from traditional and social enterprise including government for example a staff member from an NGO, a representative from an engineering company working with hydrology or a local community organisation in an area affected by flooding. We proposed to create a KCT for Phase 1 (P1CT), a KCT per theme in the Flexible Phase of the master's and a KCT for the Final Phase, renamed as the Capstone Phase at this juncture. KCTs were recruited for the Flexible Phase and the Capstone Phase of the curriculum to research and design module content, teach and assess students and build cross-institutional research networks.

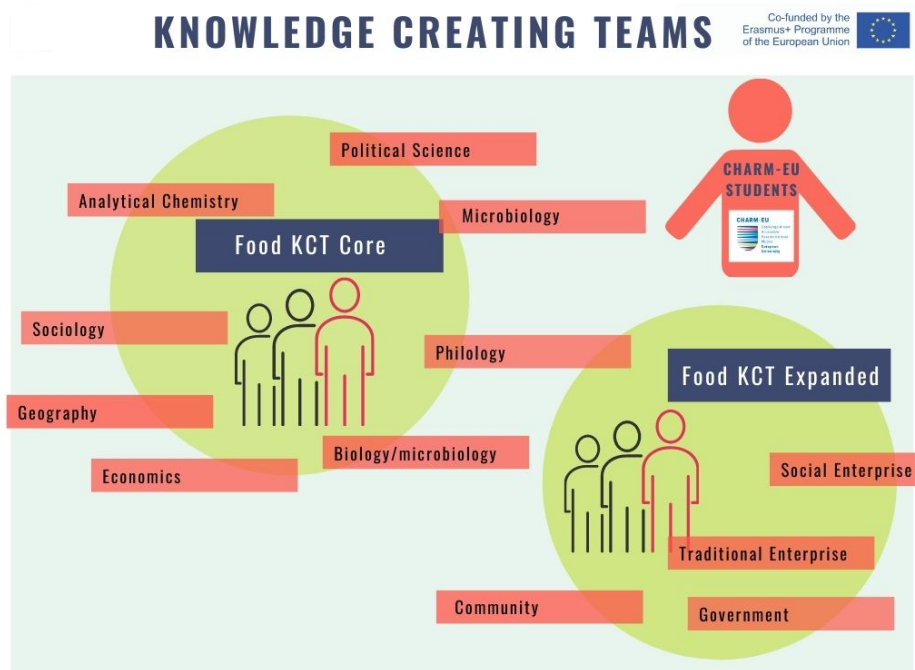


Figure 7.5: Sample KCT structure for the Food theme.

7.5 The KCT recruitment process

There was considerable pressure on the Alliance teams to teach a full master's outline to meet the deadlines of programme approval and external panel review by early Autumn 2020. In late spring 2020, the overall Alliance manager communicated to us that we needed to produce the master's by the end of July 2020. At this juncture, we had not recruited KCTs so my colleagues considered this a serious challenge. Some of my colleagues within the Alliance were outspoken about the pressure this deadline placed on the content creation process but the deadline was not negotiable. We therefore needed to recruit KCTs within two months. This included authorisation and support from all partners for creation of KCTs, communication and outreach to university communities, liaising with potential participants and shortlisting agreed by the Alliance and senior management of all institutions. The KCTs needed to produce

a master's programme thereafter in a number of weeks (this turned out to be three weeks).

In recruitment, there was considerable discussion among the work package leaders as to the form a KCT would take. There was discussion within the work package teams about whether a community of practice idea was most suitable conceptually. Communities of practice are defined as “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger-Trayner & Wenger-Trayner, 2015). However, although the spirit of a community of practice (the community learn from each other and form organically without managerial or institutional guidance) was attractive to some leaders within the Alliance, the KCTs were actually formed intentionally and given direction by the work packages and the PMT. The KCT members were recruited into a team and given tasks as a team. The only individual task was potentially teaching an element of a module.

The KCTs were institutionalised networks formed by issuing a call for volunteers to join. The level of motivation interviewees expressed to take part in the masters' design is therefore a significant factor. As will be outlined in Chapter 8, interviewees were motivated to take part to change the system. They were system innovators who sought to solve complex societal problems, respond to student needs and expectations and reflect changing academic values. They expressed a keen desire to drive change and either frustration with an inability to implement their ambitions or a hope that partaking in this Alliance would allow them to form new ambitions. As interviewee il1 explained:

...you work with higher education academics who've been in practice who would be territorial about their topic for so long, they're probably the wrong makeup to try and make transdisciplinarity you know. And I'm not saying It can't be done... but if you look at the individuals in question. Because people won't be inclined to shift their thinking when they have minded their territory for so long, and I think that's what I was hinting at earlier that we do get into that fix a little bit. You know, sometimes people won't take a topic as they think 'I know nothing about this' or they won't read themselves into it. And that in itself can be, you know, a barrier to something like transdisciplinarity for the simple reason you know... It's a bit like I was saying "You're only qualified for one thing'. You know you don't want to look foolish... [il1]

The system innovation therefore was that the Alliance formed and resourced a network of academics open to innovation and TD that stretched across five universities. This had a very particular structure. The KCT structure was loose and was not directly managed. As a result of the diverse recruitment process, the support of KCT members from and within their home institution varied. Only three were directly funded to take part in the KCT and two of these members were seconded to the project for a considerable portion of their roles. Of the ten interviewees, only one was bought out for time allocated to the Alliance work. To the best of my knowledge, eight out of the ten interviewees were taking on this work in addition to a full academic role. Two interviewees had a small amount of their time bought out to facilitate their involvement in the Alliance but in both cases that level of involvement was

considerable i.e. they were involved in many other aspects of the Alliance. All interviewees were members of the core and therefore had undertaken a commitment to content creation and potential teaching duties on the master's programme. Their only systemic connection was being nominated and accepted to become a member of the KCT Core and taking part in the content creation process. The resource provided by the Alliance here was therefore the KCT structure itself – the network the Alliance formed. Work Package 3 also created Terms of Reference for the KCTs and created specifications for the roles within the KCT, however, these were not disseminated to KCTs. KCT members were signing up based on an understanding that they were taking part in an experiment and that they would design this master's programme and contribute to teaching on it. How the latter would be organised was not made clear to members. Thus KCT members joined a very loose staffing structure that was flat organisationally despite the presence of staff with differing levels of seniority in their own institutions.

Members of these KCTs were recruited through engaging with staff from partner institutions. Different approaches were taken to recruitment depending on the institutional and cultural context of the partner university including official communications, snowball sampling, calls for participation and direct contact with staff. The different cultural and institutional contexts of partner universities needed to be carefully managed when designing recruitment of and communication with KCT members. This was particularly important as KCT members are academic members of staff at partner universities. The initial success of the KCT recruitment and establishment process was identified through the large number of academic staff registering as a KCT member (n=188), and the broad range of disciplines. A total of 75 disciplines were represented including Philology, Physics, Media, Law, Economics,

Ecology, Medicine, Engineering and Social Work. The final number of participants in KCTs before the fieldwork began was approximately 30. There were four KCTs in place at this juncture: the P1CT, and a KCT per theme in the Flexible Phase: Food, Water and Life & Health.

The goal as set by WP3 in consultation with the PMT was that each Flexible Phase KCT would have two members per university. KCT members were nominated by the university based initially on their expression of interest form completed after attending the virtual townhall session. At the end of the town hall, participants were asked to complete a Microsoft Form with basic information about their name, university, disciplinary background and research interests and to indicate if they were interested in joining a KCT either as a core member or a member of the expanded network. They also indicated which theme they were interested in joining. WP3 coordinated this work and we emailed the final list to each member of the WP3 team who in turn managed the review of this list in their home university including the nomination of and contact with the prospective KCT member. The five universities each took different approaches in this regard, but the common approach was that a long list was reviewed by the local leadership team seconded to the alliance either as nominees of the Rector's or as nominated members of the WP3 team.

It is important to note that there was a difference in how each university resourced, rewarded and/or recognised the nominated KCT member within the home university. For example, one university invited selected staff only to attend the townhall and actively recruited staff in an official and budgeted capacity to take part in a KCT. The relevant university school or department was financed to release the staff member for one day per week. Other universities had a smaller pool of respondents to choose

from and as a result almost all those staff who volunteered to take part in a KCT were asked to join and for the duration of their participation as voluntary i.e. they were informed by their university that participation would help in terms of promotion but that time was not allotted for it and it was not remunerated. Their school or department was not financed to release them. Three of the five universities took different approaches to nominating KCT members. They first vetted the list locally, narrowing it down to candidates they deemed suitable to take part in the KCT based on local criteria. At the end of this process, if they did not have the required number of candidates, they approached suitable candidates and asked them to take part. This is a notable contextual factor: some participants had been asked by staff members senior to them to take part while others volunteered from the outset.

Once universities had confirmed their final short-list, the WP3 team also reviewed the make-up of these KCTs for disciplinary mix. While not wishing to be overly prescriptive, WP3 wanted to ensure that a broad range of disciplines was represented. This took place in a virtual meeting held on Microsoft Teams. The final result was three KCT Theme (Food, Water, Life & Health) teams with ten academic staff on each team, each of whom were full-time staff at their home university. They ranged from junior to senior levels of experience, for example, from assistant to full professor. The P1CT team with only six members was a slightly different concept. The curriculum design blueprint emphasised that the Phase One (designed by the P1CT) would support students to develop transversal skills. The rough content of these modules was designed based on Needs Analysis workshops carried out in Summer and Autumn 2019 with extra-academic actors and students. Therefore the curriculum design blueprint led the WP3 to target a certain skillset for this team.

7.5.1 Extra-academic actors

The decision was taken by the Alliance in late spring 2020 to recruit KCTs and hold a townhall meeting communicating the Alliance mission, vision and educational principles to the five universities. The purpose was two-fold: to raise awareness of the Alliance and to announce the opportunity for academics (both teaching and research positions) to join a KCT as either a core member or a member of the expanded network. While it was an aim of the Alliance to invite extra-academic actors at this juncture, this became very difficult for two reasons: the pandemic had reduced the ability to meet extra-academic actors and build relationships, and, secondly, a lot of staff connected to the project were under significant pressure due to extra workloads connected to pandemic issues. Consequently, the Alliance was in the position where it did not have opportunities, time or resourcing to engage with a network of extra-academic actors. We were also informed at this point that due to programme approval processes the master's content would have to be written within a couple of months. This also precluded adding extra-academic actors. We were conscious that although this deadline was achievable, it was going to put WP3/4 under significant pressure. While we were willing and able to adapt to this deadline, it would not have been possible to ask extra-academic actors to engage under such time constraints. We decided to write the content with KCTs and thereafter to engage the Expanded Network of KCTs and extra-academic actors in teaching the content and advising on/participating in challenges.

7.6 TD as a core value of the Alliance

Two key decisions were recommended by WP3/4 during spring 2020 that had a significant effect on the project. These were the decision to promote TD as the core

value of the Alliance and the decision to create KCTs. The first decision was led by WP3/4 and approved by PMT in spring 2020. This had a considerable effect on the content creation process and influenced the choice to create and recruit KCTs. It represented a significant shift from the outset of the project. Certain members of WP3/4 were not familiar with TD and one senior academic staff member who was a research scientist and also a project director within their home university (one of the five Alliance partners) lobbied against TD. Their concern was that TD would weaken disciplinary contributions and make the participation of disciplinary research laboratories difficult, if not impossible. This provided an important balance to WP3/4 deliberations and discussions during spring 2020. The voice of this academic represented a voice that I and my colleagues are familiar with. It represents a constituency within universities who view TD as a “nice to have” but basically a problem-solving approach that does little to strengthen disciplines and can be difficult to connect to the work of disciplines. It is perceived as potentially wasting much needed resources that disciplines need for basic research. As a team, we welcomed this perspective and engaged in discussions around these concerns. This assuaged concerns and by late spring 2020, PMT and WP3/4 coalesced around a shared narrative regarding TD.

In this process, as a group we formed a team and through ongoing discussion we reached agreement on and a shared understanding of what the Alliance TD approach was. One exercise that supported this process, and which was another factor in WP3/4 promoting the recruitment of KCTs, was the programme content strategy produced in January 2020. Creating bespoke modules would also provide WP3/4, from a research perspective, to innovate and experiment educationally – to explore integrative approaches and to see what would happen if we brought together groups

of academics from multiple disciplines (who had never met before) to create content for a challenge-driven master's programme. This language appealed to the academic members of WP3 who after all were researchers. We affirmed to them that this was an educational experiment and we, in WP3/4, were educational scientists (the term used by our Dutch partner university). This created a shared language and common purpose. According to my own notes, at this juncture in late spring 2020, a real sense of solidarity emerged in WP3/4.

7.7 The TD content creation process

As mentioned, the KCTs at the heart of this research study were formed within a short period of time and brought together for a two-week period of content creation. Due to time constraints, we did not have sufficient time to finalise the teaching and learning strategies before the final programme was due for approval. I was conscious at this juncture that our KCT recruits on the whole did not have knowledge of the literature on TD and did not have experience of TD education. Each KCT had ten academics from multiple disciplines, for example, the Food KCT had members from ten different disciplines including Chemistry, Education, Microbiology, Geography, Economics, Philology and Sustainability Governance. WP3 and WP4 jointly designed a content creation process comprising two content creation workshops. The Alliance piloted this TD facilitation approach and ensured that TD principles were supported and implemented.

All KCT members had attended a forum introducing the master's programme, educational principles and programme learning outcomes in May and June. The

content creation process took place from June to August 2020 and involved four groups of KCT (Core):

- Phase One Content Team (P1CT)
- Three Flexible Phase Content Teams: Water Knowledge Creating Team (KCT); Food KCT; Life and Health KCT

The workshops were facilitated by six Alliance staff. Each was either a member of WP3 and WP4 or seconded from the university leading WP3 or WP4. The content creation facilitators were educational scientists who had achieved master's or doctoral level in educational science. Three had senior management roles on the project. The content creation facilitators were introduced to best practice approaches to TD and attended the fora outlining the Alliance's TD vision. Two members had expertise in TD and they worked with an educational scientist from the Dutch partner who had experience in creating workshops to support staff to write modules in their own content areas. These workshops were referred to in practice (in a Dutch university context) as "task analysis" workshops. The principles of TD (collective problem solving, challenge-focused learning and curriculum design, multiple disciplines connected using integrative frameworks) were merged with the task analysis approach. An iterative approach to content creation was one of the guiding design principles. This embraced trial and error and allowed workshop facilitators to adapt to the needs of the team within their specific workshop i.e. Food, Water or Life & Health.

The software Microsoft Teams was used to set up channels for the KCTs to communicate with each other and each KCT was assigned two facilitators for the purpose of leading the content creation workshops only. In addition, within the

Alliance, I acted as a contact point for the KCTs. The first KCT content creation workshop (30 June 2020) served to collate members' disciplinary and research insights as well as broader perspectives connected to the theme. The Alliance educational documents (Educational Principles, Programme Learning Outcomes and pilot master's programme structure) were resent to members ahead of the first workshop along with a worksheet designed to perform a "task analysis". Two versions of this worksheet were designed: one for the P1CT and another for the KCTs. The P1CT worksheet was designed to support the team to draft Phase 1 Module titles/concepts and Module Learning Outcomes leading to three 10 ECTS modules designed by P1CT for teaching in the first phase of the pilot master's. The P1CT Workshop posed the following question in preparation for content development workshops: What are the key skills and competencies, content, and attributes required from a preparatory stage to allow students to engage successfully with the content, pedagogy, and aims of the full programme?

The KCTs worksheet was designed as a questionnaire to collate information about members academic and research experience and to collate members' suggestions to support the definition and categorisation of problem spaces within the theme leading the KCT i.e. Food, Water or Life and Health. Members were asked, for example, the following questions:

Which societal challenges or issues are currently emerging within your KCT Theme?

What kind of skills/knowledge/attitudes are required from future graduates to tackle these challenges?

The task was to collate and collectively examine the long list of societal challenges and collaboratively shortlist problem spaces that could form modules. Team members decided to trial different approaches to short-listing: identifying repeated or cross-cutting challenge areas, ranking challenge areas and finally creating umbrella “problem spaces” within which challenge areas would sit. The term “problem spaces” referred to focused challenges within each challenge area for example within the broad challenge area of Food, KCT members listed Food Security as a problem space. The facilitators opened a Padlet giving access to all members to post their shortlist. It posed questions such as: How can we give students as much depth as possible? How can we focus without losing depth of learning in the Flexible Phase?

The output of the first content creation workshop was agreed problems spaces and module titles within challenge areas and a broad approach to how disciplinary content would be integrated i.e. systems approach or challenge-based design. While each facilitator guided this process, we left the KCT collectively discuss and agree how this process might work. The former (systems-based) followed the structured knowledge integration process pioneered by Swiss researchers (ProClim, 1997) as outlined in Chapter 3. This comprised the following process to form or gather:

- knowledge about what is (systems knowledge): this focuses on problem framing and systems knowledge;
- knowledge about what should be (target knowledge): this focuses attention on the solution, stakes in solution-making and resultant policy development;
- knowledge about how we come from where we are to where we should be (transformation knowledge): this focuses on policy and solution implementation;

- brings systems and target knowledge together to assess if the solution or policy recommendation brought about the desired changes.

For example, I took part in the Food KCT as facilitator. KCT members may have chosen one problem space either from the list of challenges or by creating an umbrella problem space that gathered some challenges e.g. Food Inequality. Following the ProClim framework the KCT would collaboratively write three TD modules about Food Inequality: systems knowledge to frame the problem; target knowledge to frame the potential path to a solution; transformation knowledge to frame solution or policy recommendation. The alternative proposed by some KCT members was to shortlist the challenges to three problem spaces within Food and then collaboratively write modules integrating disciplinary insights within these problem spaces. In other words, each module would be a standalone problem space (rewritten as a challenge) e.g. the three modules might have been Food Security; Poverty and Malnutrition; Sustainable Food Production.

Food safety
Disease and nutrition
Resources are becoming scarce (water, energy, land)
Climate change- impact of rising Co2 on nutritional content of food
Sustainable production of nutritious and affordable food
Impact of the human Microbiome on nearly all aspects of normal physiology, health and wellbeing
Sustainable food production, consumption and cooking practices
The future of meat and plant based alternatives
The role of Big Food Corporations in food production
Diet-related chronic conditions i.e. obesity and diabetes
Food poverty
Food waste
Food and labour
Industrial food production and role in pandemics
Land-use conflict: energy-biomass
Inequality in access to/production/growth etc. of food globally Innovation is highly concentrated in most developed countries e.g. - Patentability of plants. Gap between rich and poor, conflicts
Global warming

Figure 7.6: Long list of challenge areas created by the Food KCT at the first Food content creation workshop.

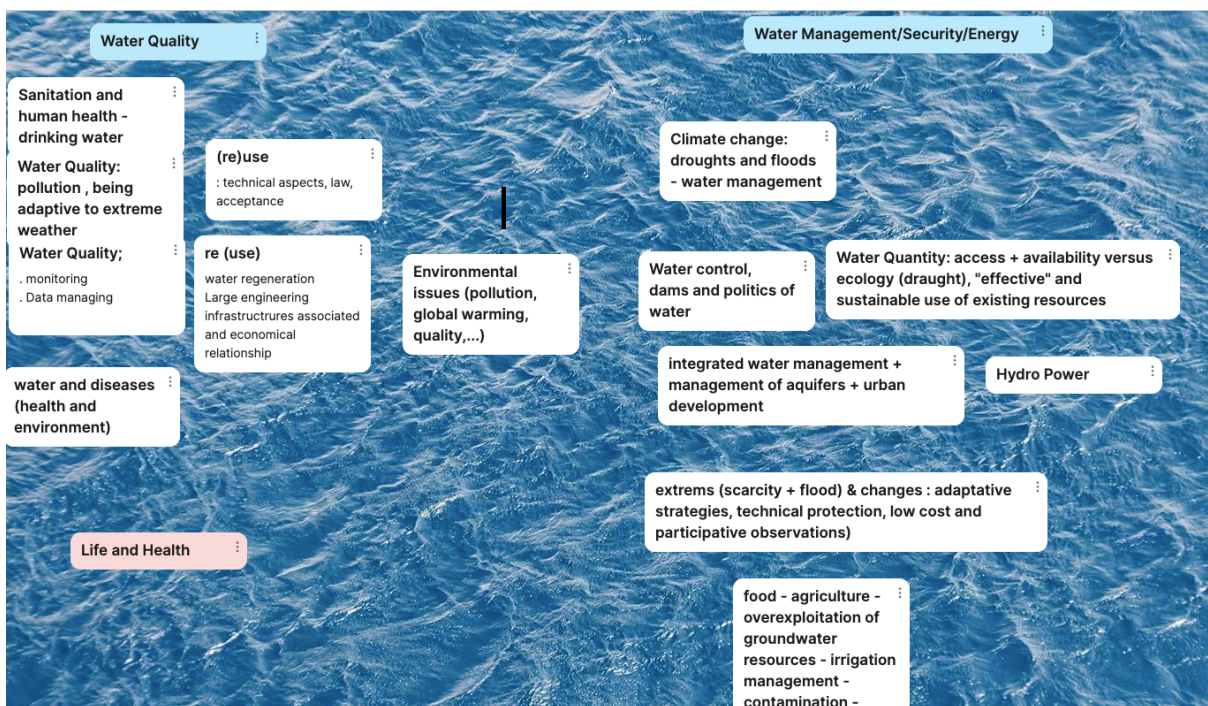


Figure 7.7: Grouping problem spaces as a team using Padlet within the Water KCT content creation workshop 1.

Ahead of the second content creation workshop, which was held four days later (both workshops were held in one week), members were emailed the programme learning outcomes (PLOs) and a questionnaire. The objectives of the second content creation workshop (3 July 2020) were to collectively flesh out problem spaces into module titles, module aims and the intended learning outcomes of the module. Members completed a questionnaire tailored to each KCT theme. The questionnaire asked members to describe module aims and formulate module learning outcomes (MLOs) related to the problem spaces defined during the first workshop. For members who may have been unfamiliar or less familiar with module aims and MLOs, a worksheet with instructions and support was provided. The questionnaire supported the process of constructive alignment and contained a section on PLOs and members were asked to identify which PLO(s) their MLOs aligned with. During the second workshop, each KCT was divided into three groups - one for each problem space. Groups were given the initial concepts of the module aims and the MLOs prepared by team members individually for discussion and evaluation. Each group further developed the module aims and MLOs. After this small group activity, we held a plenary session of all KCTs, including the P1CT, to share and discuss the results.

After the second content creation workshop, members were asked which module they had a particular commitment to. On the basis of this questionnaire, we created sub-groups to further develop each module. Sub-groups worked remotely either in Microsoft Teams or via email depending on the approach preferred by the sub-group. These sub-groups also arranged their own meetings. Between and after the workshops, teams were supported by the facilitators to work on modules via email and/or in Microsoft Teams. The documents were edited using tracked changes and

comments. Where there was a lack of consensus, there were different approaches to supporting decision-making. In the Food theme, for example, team members asked facilitators for help to broker agreement and at certain points to propose solutions. In the Water theme, certain team members put themselves forward to facilitate agreement and gain consensus within a module. One member in particular had considerable expertise connected to the challenge and as a result was more heavily involved in writing the three modules than other members.

7.7.1 An insider's view of the content creation process

I was conscious in approaching TD content creation that when multiple disciplines are brought to bear on a unique challenge, there is no defined script. Methodologies can be adopted and adapted, but the process will be unique to the participants, the challenge and expertise being contained within the collective. Our goal in shaping a content creation process was to provide a starting point from which the KCTs could collaboratively propose and share across different KCTs how methodologies and conceptual frameworks can be utilised within the narrative of looking at problems. This was accomplished through the content creation process but also through townhall sessions at intervals within the process in which KCTs shared what approach they took to integrating content to reflect the PLOs and produce coherent and useful MLOs. Interviewees saw content creation as focused around the goals of supporting the student to: 1) understand the challenge and 2) design solutions and consider what successful implementation would look like and what the obstacles might be. Our process was bespoke but it closely resembled the collaborative learning approach. Baker (2015, p. 1) describes collaboration “as a continued and conjoined effort towards elaborating a “joint problem space” – “drive towards co-constructing (cognitive-linguistic) representations of a problem-solving situation”. In this form of

collaboration, within the field of collaborative learning (Dillenbourg, 1999), a joint problem space is co-constructed. Dillenbourg refers to collaborative learning as a field because at its broadest the term captures so many learning situations: “it is a situation in which two or more people learn or attempt to learn something together” (Dillenbourg, 1999, p. 1). And yet this describes the experience of being in the Alliance content creation workshops. In fact, we were all in the process of learning in the broadest sense of learning as employed within the field of collaborative learning: we were joint problem solving and learning was the side effect of this.

Pohl and Hirsch Hadorn (2008) contend that the starting point of TD research is to take into account the diversity of perspectives with the goal of interrelating scientific knowledge and case specific knowledge. In my experience, working with the KCT in this scenario, members arrived with two hats: their discipline and their lived experience. Interviewees spoke about how they each had their own lived experience of the problem space as well as their disciplinary expertise. I created an environment where members would be comfortable to express both perspectives. I would lead by acknowledging my own lack of knowledge or expertise on the problem space but valuing my ability to query statements or reflect statements back to the KCT. Once we gathered KCTs within the virtual space, we allowed them to discuss their perspectives. As we had consciously created a flat structure, with minimal or no leadership, there were points when discussions strayed off point, certain members spoke for longer than others and other members remained silent. As a facilitator in the Food KCT, I intervened sometimes to bridge responses or my colleague intervened in order to lead a discussion to finish due to time constraints. My role felt intuitive – to ensure that everyone was given an opportunity to respond or offer their thoughts. I also sought to emphasise the fact that I was neutral. I had no discipline, as it were.

The expertise that I was bringing was solely on TD. My perceived neutrality, lack of disciplinary expertise and role as the workshop leader, meant that I could identify when a KCT member was promoting a disciplinary perspective that could make a module mono-disciplinary. This meant that members did not have to conflict with each other but I could take the blame, as it were. For example, one KCT member who is a scientist was promoting a problem space that hinged on knowledge of food chemistry while another member was highlighting food history, culture and traditions. Another member with a background in media studies said they did not know how they could contribute. I served as a broker for these types of conversations which often spilled out into revisions made to the master word document in the Microsoft Teams site.

The biggest point of discussion within the KCT Food was how to shape modules so that they supported integration of all disciplinary expertise and disciplinary perspectives in particular arts and humanities. Our template served to create situations where certain interactions occurred. Baker (2015) describes these as epistemic processes and we structured the workshop “homework” in a way that participants were prompted to make clear their epistemic processes. Our process had parallels with common group learning (Rossini & Porter, 1979). The research problem was bounded. Then it was divided into areas based on the research expertise or choice of the group. Individuals analyse, then reconvene and critique the contributions. Then pieces are rewritten by a different individual and a non-expert reviews and this happens iteratively until the group agrees. The goal of working on a problem space together was to share disciplinary insights and expertise on the problem space. The immediate goal was to write three modules within the Food theme that drew together the expertise of the group; would give students a sufficiently deep understanding of the issues and disciplinary insights related to food as a

sustainability challenge; and would provide enough of a contextual foundation to roadmap any further learning students would need to address a challenge defined with extra-academic actors in the Capstone Phase.

Jantsch (1970) proposes that a systems analysis shifts our view from elements to how they interact. The focus is on interrelations. In their work on integration methodologies, Pohl and Hirsch Hadorn (2008) distinguish between a hard and soft systems approach. A hard system approach is when disciplines contribute their disciplinary model of reality as expressed through facts or variables. For example, an economist might give data on hunger or a molecular biologist might give information on nutrients. A soft systems approach entails modelling the disciplinary views of the world. The modules shaped as discrete problem space or as aspects of sustainability perspectives would have neglected the soft systems integration. Making space for disciplinary views means acknowledging that the disciplines affect how facts are viewed. This is a TD learning process for academics and is part of the process of writing TD content.

There was disagreement in the Food KCT about which framework would be used to support integration. This disagreement spilled out into email exchanges after the first workshop. This was very collaborative and positive but there was a split evident in the group and certain members formed a smaller sub-group to seek support for their perspective on how integration should be shaped. Both this sub-group and another individual emailed each other but copied me in on emails. It was clear that two distinct and equally valid approaches to content integration and structure had emerged and a decision needed to be made. The first approach was to shape modules as problem spaces. As one member had expertise in sustainability, my reading was that the

content was more closely aligned with how a sustainability expert would frame food as a problem space. This was an easier approach as it allowed clarity. This member had expert sustainability knowledge. Members within this small group could follow this knowledge and slot their disciplinary perspectives into it, from a hard systems perspective. Had we defaulted with a sustainability science view, we potentially would have neglected other disciplinary views within the group. The second approach was proposed by a senior member of staff with significant expertise (decades long) in TD research. He proposed a different approach more aligned with the ProClim framework which does not favour a disciplinary perspective but is arguably a deeper integration approach. It allows both hard and soft systems views: integrating both facts and disciplinary viewpoints.

I took a neutral position and observed the two 'factions', as it were, to debate this via email (they cc-ed me on all emails). As a result of my position, I was able to support them by giving more time to discuss the issue. Within the flat structure, working virtually and working within such a compressed schedule, a decision could not be reached. As this was taking place by email, and as we had only three days at that point in which to reach agreement, the group needed a decisionmaker. Eventually I stepped into the debate and reaffirmed that the goal of the modules was to integrate disciplines epistemically: both a hard and soft systems approach (Pohl & Hirsch Hadorn, 2008). I explained how the ProClim approach supported this and the group agreed to this approach with some adjustments to include MLOs from the alternative approach. The result was that the group agreed an integration approach that structured three modules as follows – broadly in line with the ProClim (1997) approach for knowledge integration in TD: The Food-Health-Environment Nexus (corresponding to knowledge about what is (systems knowledge); Food Systems and

their Transformations (corresponding to knowledge about what should be (target knowledge); Socially Just and Sustainable Food Systems (corresponding to knowledge about how we come from where we are to where we should be (transformation knowledge)). The basic content for these modules derived from the two workshops. The first draft module content was written by two members of the KCT separately. After I resolved the disagreement within the group on the integration approach, this content was edited and adapted by one member. The KCT members reflected on this content and commented via email and then amended/co-wrote via commenting on the final word document posted on their channel on Teams. As there were a very large number of comments and proposed changes from KCT team members on the Teams word document, I offered to mediate those and reflect all input as best in the final MLOs. This took a few hours but no other member wanted to do it. It was my opinion that no other member had the objectivity to do this. Six members of the KCT volunteered to teach or coordinate teaching/learning of the modules (two members per module based on their own preference) and appraise the final MLOs after my review. Appendix 7 presents one of the final Food modules as an example of integration. The other KCTs and P1CT followed a similar process with one or two facilitators volunteering to go through all comments on the document, connect viewpoints and represent the majority of views, where possible. KCTs asked facilitators to help with this process and attend a final meeting of the KCT to agree final content.

7.7.2 Supporting the KCTs

The KCTs accomplished a remarkable feat – to write a complete master’s programme within three weeks. However, as this chapter sought to illustrate, this feat was not accomplished without significant support from facilitators. This support was logistical,

organisational, emotional, epistemological and pedagogical in the broadest sense of the term as it relates to development or creation of an educational artefact. The KCTs required encouragement, facilitation, administration, management and the skills of a negotiator and educational scientist with knowledge of innovation and TD. This was apparent from the volume of communication to and from KCTs but also surfaced in the interviews carried out with ten KCT members. The findings from these interviews will be explored in the following two chapters: Chapter 8 and Chapter 9.

As outlined, KCT members had not met and had different local arrangements regarding the terms of their engagement. Significantly, KCT members for the most part did not have any direct local management within their institution regarding their role within the KCT i.e. the nature of their role, their deadlines/meeting times/KCT colleagues' contact information and roles etc. The majority of interaction the KCTs had with the Alliance came through me. This came about only because I took the action to email the members dates of the Content Creation workshops. As a result, I became their *de facto* contact point. My role as their central contact point initially evolved organically but then became a *de facto* position as I had presented the Curriculum Design Blueprint and spoken about TD at two townhall sessions. While I was not in a leadership role on the master's, I found myself in a position where the KCTs contacted me on an almost daily basis for support and communication. As the Alliance project was so busy and we were all working remotely during the pandemic, I responded to their requests and concerns. I made my project director aware of this and he supported my approach and management philosophy. In a prior role as head of faculty of media and communications, I managed approximately 24 part-time untenured staff. While this obviously takes time, my experience was that the majority of academic staff I managed worked best when they felt part of a likeminded

community and when they were listened to. This feeling of solidarity can compensate for a lot of otherwise dissatisfactory work conditions: precarity; minimal or suboptimal resources; student behavioural issues etc.

I was keenly aware – and I shared my perspective with PMT; my local project director and manager; and WP3/4 – that the academics recruited to the KCTs could also be experiencing uncertainty and precarity. They were expected to produce a master's programme in three weeks with a group of strangers from different institutions online in a global pandemic during the summer months. Perhaps as importantly, they were taking part in an experiment. We were attempting to do something we had never done before and for which we had created an untested blueprint. In fact, their participation was the test. We had some guiding structure but we were aware we had missing parts. We wanted a curriculum that integrated a broad range of disciplinary perspectives on a challenge. We defined failure as MD (a lack of integration), but we did not have an explicit methodology for integration that we were uniformly rolling out within each workshop. We were aware of the lack of direction or exemplars within the literature about how academics could integrate disciplinary expertise in curriculum content. We had a loose framework to lead discussion based on our own discussions as a group (WP3/4), the experience of our Dutch colleagues in supporting disciplinary curriculum creation and my knowledge of the literature on integration and problem-solving methodologies in TD research (for example ETH Zurich). For these reasons, my recommendation was that we (in this case, I) should have an open-door policy for KCTs, albeit a virtual one.

There was an opinion within PMT that the KCT should be subject to minimal management from the Alliance. However, while interviewees described contacting

each other directly during late winter 2020/early spring 2021 (at this point I was no longer working in this role), they gravitated towards me as a conduit for almost all contact while I was in situ. According to my notes, during July 2020, for example, I received an average 20-30 emails individually per KCT Core member. These ranged from ten for a relatively inactive member up to 80 for a more active member. These emails sometimes required meetings to discuss an issue or question in more detail. From my own notes, I recorded that during one week in November 2020, I received 55 emails from KCT Core members. In addition there were approximately ten messages on Microsoft Teams. The queries from KCTs were generally reflective of the types of queries I had from KCTs since their inception. Given all the queries listed, I would refer these as best as I could when necessary to the requisite project manager/director or we would discuss the queries within WP3/4 and often make a group decision about how to handle these.

Queries and requests for meetings in the whole related to:

- TD: how to integrate different disciplines, concerns over representation of disciplines and composition of groups;
- How the KCT structure supports this/enacts this/could be evolved to ensure more effective TD;
- Programme structure: ideas about, concerns regarding or feedback on programme structure, concerns about coherency across the programme;
- Suggestions and questions regarding how staffing and roles would facilitate TD, the programme structure, the KCT structure;
- Information about other KCT team members – contact details, requests to join meetings with members;

- Resourcing of the KCTs and resourcing their role (I referred these back to their own university project managers and/or directors);
- Acknowledgment of their time spent on alliance work and recognition of same;
- Teambuilding and interpersonal – both one-on-one and group meetings to keep members motivated, get to know them, establish trust, inquire about satisfaction with process, offer support;
- Their commitment to or availability for teaching the programme;
- Emails relating to module coordinator roles, how these were decided, how the KCTs should review them; if there will be facilitation for the same; if there will be KCT facilitators; if there are deputies; if there can be different roles; who is on the team; can teams be changed; can they share duties; how do they connect to academic board; do they connect to PMT etc.
- Logistics – when are workshops on, should they go, what homework they need to do, what to do if they have suggestions, what they think of the workshops etc.
- To facilitate agreement when there was disagreement among the team on the direction of content;
- As above, teambuilding and interpersonal – both one-on-one and group meetings to keep members motivated, get to know them, establish trust, inquire about satisfaction with process, offer support;
- Their attendance at forums;
- Their attendance at workshops, how to facilitate/integrate their feedback if not present.

As these emails demonstrated, it was my experience that all members needed and benefitted from having a contact point, a head of “discipline” of sorts. Facilitation was an important role within the Content Creation Process, and one that will be discussed in Chapter 10, but the function I describe here was more akin to a group lead or director and it required expertise and knowledge of TD. It was something KCT members sought out and a role that they said added to their loyalty to and enjoyment of the process. What this also demonstrates is that to be effectively realised, TD requires changes in approach to academic roles, governance, management and resourcing in addition to epistemological changes. The conceptualisation of TD should begin at the most senior level within an organisation and a shared agreement at that level can and should filter through all system processes. I will return to this point in Chapter 10.

7.8 The master’s programme

The output of the content creation workshops was the complete master’s programme including module titles, aims, outcomes, indicative content and sample reading lists. The entire content creation process took place during the month of July 2020 and the full master’s programme content was created by 24 July 2020. The final 25,000 word programme proposal was prepared by the Alliance Project Manager with input from all work packages and was submitted for external review and programme approval at the participating Irish university in Autumn 2020. The KCT for the final phase – the Capstone KCT was not mobilised at this juncture and the MLOs for the Capstone Phase were written by members of WP3, WP4 and some members of the other KCTs who were already nominated by their institution to join the Capstone Phase KCT.

The programme framework and PLOs were structured to reflect the key Educational Principles (see Figure 7.8) in particular challenge-based learning and TD. All programme learning outcomes were present in all phases with the central idea that throughout each phase, the student would return to learning outcomes as they built their skillset to effectively manage challenges. This supported a challenge development arc over the course of the master's. This was conceptualised as moving from micro-challenges in the Preparatory Phase to TD analyses of societal challenges in the Flexible Phase and finally to students managing real-life challenges in the Capstone Phase in close collaboration with extra-academic actors.

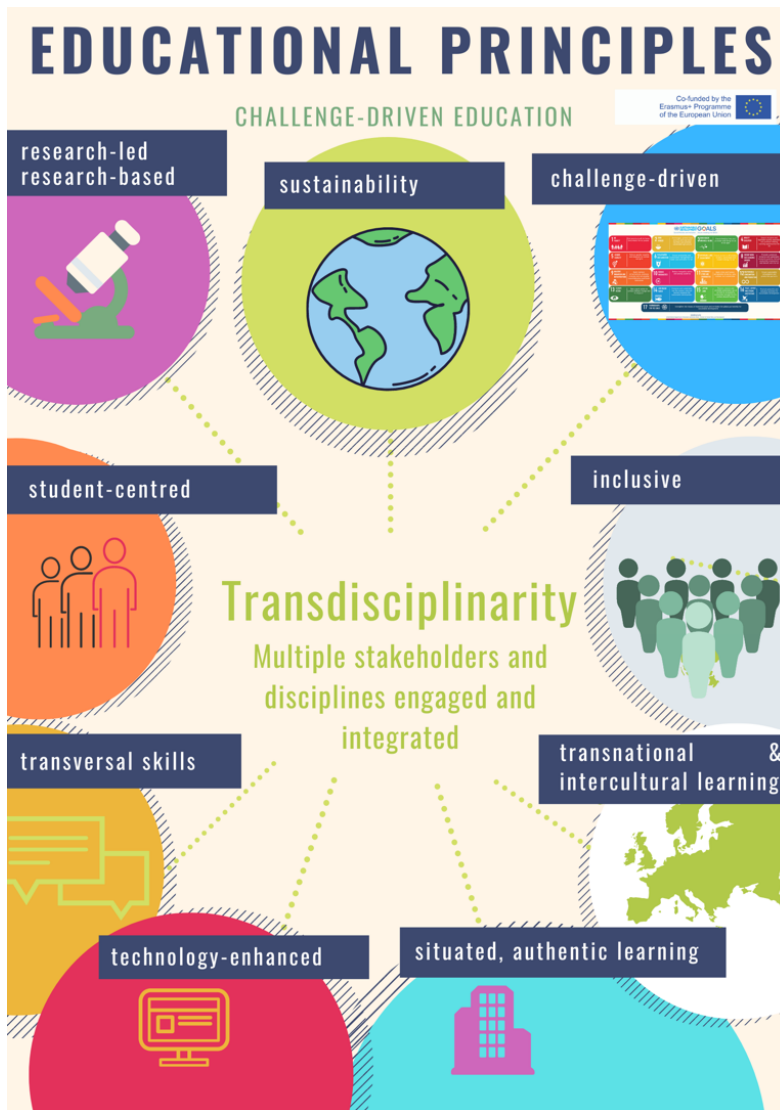


Figure 7.8: Alliance Educational Principles.

In P1, the P1CT designed content to be explored through micro-challenges. These micro challenges would be used as a tool to support the acquisition, application and testing of transversal skills developed in this phase, for example, stakeholder engagement, research methods or systems thinking. Micro-challenges would be presented by teaching staff in various ways for example through case studies. In P2 the Flexible Phase, students could choose from one of the thematic pathways i.e. Food, Water and Life & Health. P2 gave students the breadth of TD and MD

knowledge needed to contextualise and understand the 'big picture' of the real-life challenge they would focus on in P3. In P2, it was decided that teaching staff would provide approximately three challenges per thematic pathway and the students would choose which challenge they focus on. The KCT Core teams identified priority challenges within the broad theme they are working within i.e. Food, Water and Life & Health. For example, in Food, the challenges of food security, obesity and food safety were identified. In Water, the challenges of water extremes i.e. floods and drought; sustainable water management; and water quality were identified. In Life & Health, challenges such as obesity, addictions and infectious diseases were identified. This would support identification of a real-life challenge in P3 and extra-academic actors to collaborate with. The time pressure of programme approval precluded the KCTs from integrating extra-academic actors into the design process. Therefore the work packages had to postpone engagement with the KCT Expanded Network until the Detailed Content Creation Phase (November 2020 to September 2021).

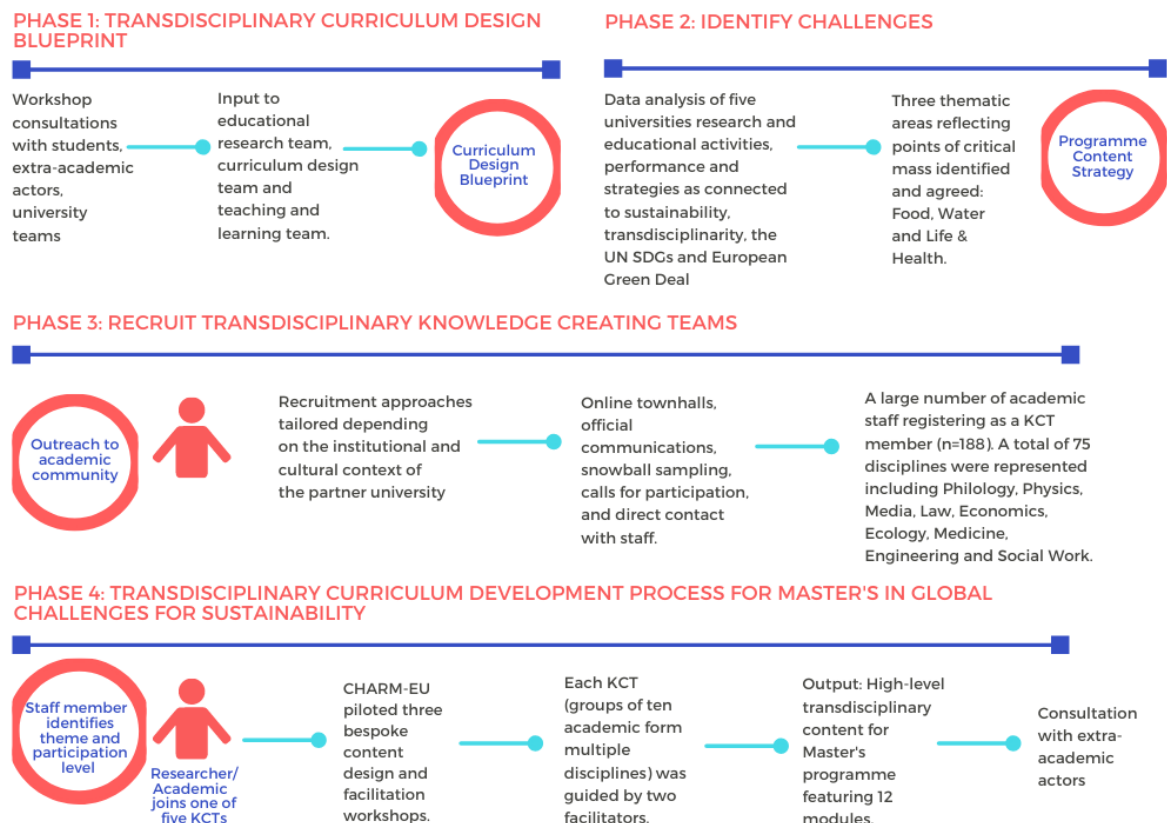


Figure 7.9: The final curriculum design approach.

7.9 Conclusion

This chapter described both the meso context for the program theory and the resources provided. Whereas Chapter 4 presented the context from a policy perspective (macro context), this chapter presented the context of the institution (meso context). This chapter also sought to describe the resources provided and delineate the boundary between these resources (curriculum design blueprint, content creation process, KCT structure) and the complex Alliance that created these. The curriculum design process reflected a program theory that sought to bring about change to address inhibitors of TD within universities: separation of disciplines; lack of

curriculum ideology, framework and design methodology; lack of knowledge and shared understanding within academic community; lack of institutional leadership and resourcing. The Alliance sought to create the social and cultural conditions necessary for change at a meso-context level (institutional structure and vision and micro-context level (KCT structure) and provided resources intended to create responses that would lead to certain (successful) outcomes. We hoped mechanisms would ‘fire’ that would lead to positive outcomes. As a work package leader, co-leader, member of the PMT, facilitator and central contact point for the KCTs, I observed mechanisms firing and in this chapter, I also sought to share those observations. Chapters 8 and 9 present the findings as micro-context and responses to resources as evident from the interviews carried out with KCT members. Chapter 10 presents and discusses these findings as Context-Mechanism-Outcome (CMO) configurations.

Chapter 8 Micro-context and responses

You put some scientific people around the table. You have a lovely discourse. You write a paper apart from that. And that's all. And then you say goodbye. Well, it's a university sport. [iE1]

We can't be with an ego standing in the way of what is the correct information. [iI1]

8.1 Introduction

This chapter presents findings from the first set of interviews carried out after the content creation process, during which four KCTs were brought together to write a TD master's on grand societal challenges. While Chapter 7 examined the context within which this content creation process took place at a meso level, this chapter has two foci: to present findings outlining the micro context within which the content creation process took place (participant motivations and understanding of TD) and to examine responses to resources given to KCTs to support TD curriculum creation in the content creation process. Within the RE approach, this chapter asks 'What worked for whom?' and builds on our previous question (Chapter 7) 'In what circumstances?'. A preliminary analysis of this data in early spring 2020 informed the design and scheduling of the second set of interviews which took place in April 2020. These findings are presented in Chapter 9. Chapter 10 brings responses and resources together to discuss the resulting mechanisms that fired in the first phase and second phase and situated these within CMO configurations.

8.2 The first set of interviews: Establishing the micro-context

When considering the social and cultural conditions necessary for change mechanisms to operate, the project participants and their motivation to undertake such work and their interaction with the broader macro and meso context in which they are located are significant contexts to map. Figure 8.1 depicts the contexts within this program theory.

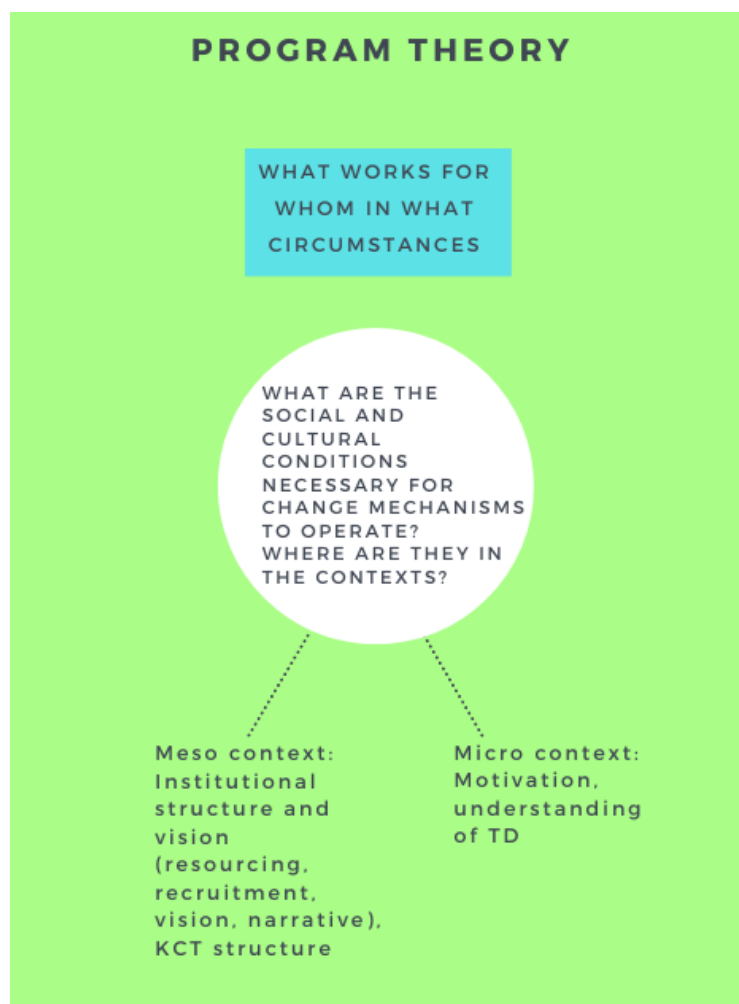


Figure 8.1: Diagram of the meso and micro contexts within the program theory.

The program theory (see Chapter 7) held that participants in this ‘live experiment’ would need to be open to change and keen to innovate. The town hall sessions undertaken in June 2020 emphasised that this master’s design was an experiment, designed and informed by policy, practice and the literature. The recruitment ethos reflected the program theory and the approach was influenced by both the practice-based experience of the WP3 team, the community of practice ethos and also literature on the success and failures of TD and ID (Fam et al., 2021; Frodeman et al., 2010). Participants were invited to express an interest in participating. Where there was more targeted recruitment, it was of individuals who were known to the home institution to be expressly open to TD and/or pedagogical innovation.

8.2.1 Understanding of TD

At the point at which the first round of interviews was carried out, the interviewees had little shared training or discussion of what TD was, but were immersed in a facilitated process to create programme content. To explore how effective both the design process and their experience of being in a KCT were, I felt it was important to benchmark their understanding of TD and the process in which they had just engaged in this first set of interviews. This understanding established context. Our hypothesis was that were we to provide the right environment for TD to be implemented and developed including the type of supports that have been successful in TD research environments (facilitation, creation of shared narrative, loose goal-oriented framework), then TD would happen. Our hypothesis was that the KCTs would learn by ‘doing’ and, as the next chapter describes, would coalesce around a shared narrative. Thus, this chapter sets for the benchmark for measuring what that is: what understanding of TD did KCT members have at the outset and how confident were

they in their understanding of TD and in what TD education ‘looks like’ from their perspective?

While interviewees had numerous reasons for engaging in TD curriculum creation and teaching – as listed in the section on System Innovation below – there was a consciousness too that TD, global challenges and sustainability were “hot topics” [iA1] that were in “fashion” [iH] [iF1].

The transdisciplinarity idea I had before the workshop was kind of this black or fashion word meaning everything has been connected with everything but this was one of the first times I did that with teachers. I mean we are researchers, but our focus is we were focused on design, teaching plan so it was the first time to work with teachers from other disciplines to me. And it was really nice. [iB1]

When asked what their understanding of TD was and what a TD educational programme would look like, the majority of interviewees expressed a lack of confidence in their definitions. They were uncertain what it was but had a feeling or hunch about it. This contrasted with the strong conviction they expressed in the need for educational change. When it came to implementing that change, they lacked confidence in their vision.

What transdisciplinarity was going to be? Yeah, I suppose, so, I mean, it wasn't - it wasn't set in stone, I suppose, but it was just like having multiple workshops with different disciplines to figure out. [iC1]

Like I knew that it was going to be bringing together, you know, these different aspects of addressing these global challenges... these really complex issues, but from, you know, these multiple disciplines to address these really kind of complex issues. And I suppose because these issues are so kind of multifaceted and that it does require more than just one kind of specialised subject or discipline in order to address them. [iG1]

The interviewees were also asked what they thought a TD educational experience would look like. Interviewees described the goal of the master's programme as preparing students for dealing with complex problems, listening to stakeholders and coming up with solutions that had a feasible chance of being implemented. At the end of a TD programme, students would be able to organise complex problems and prepare a working plan or design a working plan. For this, some interviewees described the need for students to acquire technical tools and human relationship tools. The TD educational 'experience' required "the participation of people from different fields with different goals in themselves" [iG1]. KCT members understood the process they were undergoing and the goal but struggled to express it. Some interviewees articulated the goal as not to develop disciplinary expertise per se but to teach them how to source and evaluate expertise from multiple disciplines and connect this expertise in a way that would help them understand and propose solutions to a TD problem. There was a commonly expressed view that students not only needed content knowledge but also tools to deal with both knowledge and the challenge. For instance as stated by [iD1]: "You cannot forget that you have to provide solid, basic tools and it is not enough to think on the challenge. You need these two."

8.2.2 Motivation to take part

In exploring the motivation of interviewees to take part, a number of themes emerged from the data. These are two global themes: 1) system innovation and 2) self-innovation. Regarding system innovation, interviewees sought to support the university to respond to changing societal and student needs through both a changed educational experience and a changed research experience, the reasons for which are outlined below. However, interviewees recognised that innovation depended on changing themselves, changing not only their individual practice as academics but also their understanding of what it is to be an academic and their role within the system. Crucially, innovation of the professional self and system were seen as closely intertwined. Interviewees referred to a “new way of thinking” [iB1] that focused on problem-solving and collaboration but this new way of thinking was at an epistemological, transversal, interpersonal and systemic level. One interviewee proposed that a new way of thinking should be “the main aim” of the alliance [iB1]. Each interviewee articulated reasons why the university system needed to change to modernise. The following section outlines these reasons.

System innovation

We're all at that point where things are changing, things are moving on. [iI1]

This can be a very, very interesting thing to come out of our ivory towers, which is the dwelling place of most university people. [iE1]

The majority of interviewees cited system change as one of their motivations to join the pilot. From their perspectives the university needed to change for the following reasons:

a. Solve complex societal problems

System innovation was needed, they said, because societal problems or challenges were rapidly evolving and required expertise from more than one discipline.

Interviewees shared a recognition that society, and societal challenges, were evolving so quickly that previous solutions, on which the system was built, were no longer fit-for-purpose. Interviewee [iB1] stated it as follows:

I think that the things that we need, the problems that we have solved until now - our past problems and the solutions I have to teach the students - I think they are not good. So it is not good information. Because the students are the new society - the citizens of the future - and they have to face new problems. [iB1]

The traditional knowledge architecture of the university was described by one interviewee [iE1] as a “closed to way to transmit knowledge”: “Perhaps I can find better words later, but that's one of my concerns that the university can get connected in terms of research and so on” [iE1].

The word ‘real’ was used repeatedly by interviewees: universities and academics needed to connect with the “real world”, to engage with “real-life” experiences, to solve “real problems”. Interview [iE1] said: “They [academics] are sometimes or

always far away from the reality or from ordinary life or from ordinary society”.

Interviewee [iB1] said:

I mean, research should also be to find solutions to real problems connecting with people. So theoretical is not useful. You need the basic knowledge, but always you have a real problem in your mind. I think science should be like this whole time. [iB1]

Each interviewee expressed the view that problems were embedded in the complexity of society and other disciplinary viewpoints were necessary to deepen their understanding of problems and to increase their chances of contributing to a solution.

Life is not easy. Any problem is not easy. Problems are complex and when we are divided into the Chemistry Department or the Geology Department - these are too narrow. The problems are more broad, more complex. Complex problems are a reflection of the society. [iD1]

A broader perspective included the human dimension, to come at it, as one interviewee said, from “the human angle” [iG1]. One interviewee described this as “to always really look for the realistic solutions in a framework that's plausible also for the stakeholders” [iJ1]. The system they said needed to open to others: “I always believe at a certain level academic life is really something in which we don't have enough feedback from others.” [iF1]. Interviewee [iC1] expressed a similar view:

You need to have knowledge from different disciplines to know whether solutions work. Basically. So I'm thinking about, like,

solutions to sustainability challenges. You would need different disciplines to find out what is a viable feasible solution from all sides. So that's the short answer. [iC1]

Interviewees described disciplines as having over-developed, putting knowledge into smaller and smaller “particles”. “We have lost the global meaning of it, and I must say that at least in our country, but I think it's everywhere” [iE1]. One interviewee [iI1] described it as “a bit like looking at a big elephant”:

We've all got, in higher education, where we look at individual parts of it. We never look at the sum of all of us. . .Whereas when you bring all the thinking and you bring all that creativity and you bring all that skill set to the table. You know, without putting people into, say, into silos or putting people into set delegated areas so much or making it so rigid. If you add more flexibility, you know that should lead to better outcomes. [iI1]

Better outcomes were seen as manifested in the dual role of academics: stewards of student learning and researchers. For example, all interviewees said that sustainability could only be addressed through the integration of multiple sources of expertise and that this mindset needed to be cultivated in students.

b. Respond to student needs and expectations

The interviewees were very conscious through their close engagement with students, that student expectations and needs had changed. These needs included transversal skills to enter the workforce, for example, communication skills, collaboration skills,

problem-solving skills or project management skills but also skills to evaluate different sources of knowledge and utilise this knowledge. Interviewees expressed the opinion that the university system was not adapting sufficiently to address those needs. The complexity of societal problems demanded new skills of both academics and students. This affected the role of academics and the educational content they provided to students.

Students and the mentality of students is completely different. You know, when I teach students at the age of 20, they are completely different. I'm not that old a person, but I can feel OK, they're thinking in the other way around. So that's why we need to change, actually, the content of the courses and the way of teaching. So for us, it's a bit, of course, of a struggle to do that, but we need to transform the way of teaching as well. [iA1]

Interviewees said students no longer viewed academics as holders of expertise. Access to information through the internet was seen as one lever for this change. If students could access content 24/7 from any jurisdiction, interviewees saw their own roles as disciplinary experts as significantly affected. One interviewee [iK1] described how having watched lectures from other universities online, students came to her lectures and queried what she said: "They don't trust us first. They don't trust us anymore. They verify all the time on Google what we say" [iK1]. Another interviewee [iB1] said: "They have their phone in one second they can find anything. What they need is actually skill". As interviewee [iK1] said:

In front of you, you're seeing students that have changed, but I understand that you know, like 10 years ago, it was a different type of student or maybe 15 years ago by different, but they are changing and then you have to change. [iK1]

Students were now preparing to enter a rapidly changing work environment for which, half of interviewees said, the traditional university education no longer necessarily prepared them: "I don't know what they're going to be - the jobs of my children. I don't know in 20 years how the world will be organized" [iB1]. There was a consciousness within the group of interviewees that students' needs demanded a 'work ready' mentality and ability: "You're making them [students] much more, I suppose, fit-for-purpose" [iI1]. [iA1] said: "What I feel during my course is actually students need something really practical and really up-to-date".

Interviewees expressed an element of frustration with the limited amount of real-life experience they could bring into their own programmes. This was achieved through introducing practitioners into class work or asking students to simulate real world professional tasks (for example, communicating research through various forms of media) but it was not a sufficient change to the educational experience to meet changing needs. They saw engagement with the Alliance as a means to innovate and design an educational experience that would meet expectations and address needs.

c. Reflect changing academic values

Beyond the need to be able to address societal challenges through their research and teaching, to connect with societal partners and other disciplines, to solve complex problems and to listen to and address student needs, some interviewees described a

feeling of personal responsibility to improve society through their work for example iJ1 said:

There's a group of people like me who believe that the world would be a better place if there were humanistic touches to science curricula and believe social or societal issues, as well as methodological issues would be addressed in certain cases in historical scenarios, and I think that this has taught me too. [iJ1]

The majority expressed the need for system innovation in terms of a duty i.e. what should be done even more than what needs to be done:

I think we have to go a bit farther. I mean what we produce in our university should have an application on society and everyday life and on the welfare of people and especially the understanding of people. [iE1]

One interview described this as changing the “personality of the system” [iB1]:

I think the problem of the academics... is that we are quite a closed group. And academics produce work that is mainly for academics, not so much for society.

Interviewees were inclined to see the need for change as value-driven in terms of professional and personal responsibility but also in terms of how they could develop students who were professionally and personally responsible and impactful.

Interviewees saw the connection between pedagogy and the development of these values. This meant a changing role for the academic from one who transmits expertise or knowledge to one who helps students navigate knowledge and develop the skills to bring their knowledge to bear on real-world challenges.

I think the important way is not to teach knowledge, to teach facts, to give information - because there is a lot of information. The information is creating new knowledge every time. So but to make a citizenship, I mean the people and citizens in the world to try to have this general knowledge and to think in this other way. [iB1]

This meant that academics also needed to change.

I think all of us we have to push and to learn about to learn... To go to someplace rather than to stay in our own routine. I hope that my contribution could be useful and I hope also to learn a lot from a personal point of view and also from the academic program of point of view in the work that we are undeveloped. [iD1]

I will explore this aspect of transversal competency development in students and academics in Chapter 10: Discussion. It highlights the link between system innovation and self-innovation in terms of opportunities needed for academics to develop skillsets to take part in both TD research and TD education. As Chapter 10 will describe, a significant outcome from taking part in the content creation process was that interviewees learned by doing and learned collaboratively. The workshops gave them an awareness of what competencies they might need to take part in TD. The

following section 'Self-innovation' describes how interviewees saw their own need to innovate as an important part of system change.

Self-innovation

In referring to the changes needed to make the third-level educational sector more relevant, interviewees referred to changes needed on a personal level as well as professional level. Sectoral change was referred to in terms of 'I' as well as "we". Interviewees saw the need to self-innovate to become problem solvers but also to be able to nurture the same set of broader transversal skills in themselves as they saw in students. The broader skills in being TD were described variously as "creativity" and "imagination" [iA1] but also the ability to identify knowledge gaps and go to others for that information or tools. Building collaborative networks with other disciplines was seen as a necessity but also a means to do this.

I think I can gain a lot from this in terms of not just as an academic as a teacher, but also as a scientist. You know, as opening up yourself to being, or you know, to kind of becoming more open to looking at things in a different way or a different approach and applying a different approach, either in my teaching or my research. [iG1]

Interviewees referred to the narrowness of their disciplinary expertise or their "partial view of reality" [iB1] and their desire to broaden or "open your mind" [iD1] to solve problems they encountered in the course of their research. They saw engagement with the project as a way to benefit from other disciplinary viewpoints and expertise to address their own one dimensionality: "I suffer from this that I can be too much focused on the scientific path. And actually, really, we do need to think, you know, in

other ways” [iG1]. They also saw engagement as something rewarding: “to keep me motivated and excited” [iI1].

The interviewees in this body of research spoke frequently of the need to listen, the need to have curiosity and the need to put one’s disciplinary prejudices aside to learn from others. Indeed, two interviewees who were more senior and had considerable expertise and experience in TD research spoke openly of how they were fully aware of how TD practice hampered their traditional academic progress, but that the pay-off in developing thinking and impact far exceeded the perceived loss in peer esteem. While the broader pool of interviewees were less confident in their description of TD in this first set of interviews, they described TD as a way to both innovate the system (including students) and innovate the self.

8.3 Responses to resources provided

This section provides an insight into responses to the resources provided to KCT members by the alliance before and during the Content Creation Process. The resources are material resources, HR resources or organisational resources provided to the participants before and during the first Content Creation Process. As outlined in Chapter 7, the following elements can be considered resources provided to the KCT members during the Content Creation Process:

- a. Identification of problem spaces
- b. Translating problem spaces into modules
- c. Time
- d. Facilitators

This section describes their responses to these resources. Chapter 10 coalesces these into mechanisms and aligns them within CMO configurations.

8.3.1 The Content Creation Process

a. Identification of problem spaces

As outlined in Chapter 7, the content creation process focused in the first phase on moving from a broad challenge area to a problem space, using those problem spaces as foci for module titles and then, as a group, co-writing module content that was TD and supported the module title. Overall, the workshops met interviewees' expectations and they found them to be both challenging and enjoyable.

Ahead of sessions, members were sent a questionnaire prompting them to think about what problem spaces might exist within a challenge area. Within the workshop, members worked remotely via a Padlet application to reach agreement on what these problems spaces would be and interviewees described this as a lever that forced them out of their disciplinary viewpoints. Interviewees found the problem space framework to be highly effective as a curriculum design tool. They said that as a framework it supported KCT members to move out of their disciplinary zone and into an integrative space. One interviewee described the process as being "forced to think" [iH1]. Interviewees also referred to problem spaces alternatively as problem spaces, foci or bubbles. They said that beginning with a problem space, allowed them to focus and for the right questions to be asked.

Interviewees commented that team discussions helped interviewees consider the context within which these problems reside, giving them perspective from outside their discipline.

From the initial couple of sessions, thinking about the economic influence and the social influence of why people make certain choices. you know, like that's something that made me just think I could learn a lot from this process, to think about my kind of subject of interest, you know I mean and what it is that makes me think of maybe the impact of your work. [iG1]

Foci or detailed problems or challenges were not only seen as a means to support integration of knowledge from different disciplines but as a way to ground integration and mitigate against the content becoming too abstract.

b. Translating problem spaces into modules

KCT members found the process of using the problem space as the basis for a module title and module learning outcomes challenging. However, they said the nature of this challenge further propelled them to think and create content in an integrative manner. The responses of different groups varied here. One group moved from problem space to a more focused problem rather than remaining in the problem space. Another group adapted the ProClim (1997) framework of TD integration: Systems Knowledge, Target Knowledge, Transformation Knowledge as a means to structure the three modules. However, linking problem spaces to module titles and subsequently co-writing module learning outcomes enabled KCT members to see each other's thought processes and to review the problem space iteratively. They

acknowledged that this was not a perfect process and, time permitting, they would have invited other disciplinary viewpoints. When the KCTs shared their content together in an online plenary, two interviewees said this encouraged KCTs to further develop their content to be more TD.

This first set of interviews was carried out between the Content Creation Phase and the Detailed Content Creation Phase and I observed that interviewees were cogitating on how they would move content from module learning outcomes into actual content i.e. words that would be spoken, material that would be distributed, academics or experts that would speak – and in what way. Many interviewees spoke at length about this and commented that taking part in the semi-structured interview allowed them to brainstorm how this would be done. Two interviewees articulated a belief held by many of the interviewees as they approached the end of the Content Creation Phase that they were creating a programme that actually no one academic could teach or that it was not convenient for most academics to teach. But the fact was, they believed, that this new design was more useful for the students. Obstacles to teaching lay in the structure that this programme needed to take. As content was provided in a TD – a map of interconnecting disciplinary insights, ideas and foundational information – it was challenging to fit the learning experience into a standard lecturing timetable. It was also challenging to assign one academic per lecture as content spanned multiple disciplines. One solution was that a panel of experts could be provided to cover a certain area of the curriculum.

Interviewee iB1 explained this pedagogical process:

We cannot actually teach a course on the society of water, as such, because that's not their goal. This is something which won't actually help them to have a view of how the social aspects would help. Actually, to understand engineering aspects or economic aspects. So this is where we have to forget about our disciplinary boundaries and somehow be able to put together courses which will help actually them to understand problems, which help them evaluate certain situations from different perspectives. And this is why at a certain point, we will not be able to do what we're used to, actually, in our teaching. [iB1]

There was a growing recognition at this stage that the program would have to be designed to support different student choices in programme pathways i.e. Food, Water or Life & Health, and the individual or group choice of challenge for the final phase. The need to have a flexible curriculum infrastructure was an ongoing theme throughout the interviews. One interviewee described the content creation as a process of convergence.

The approach to content creation taken by the work packages deliberately sought to strike a balance between flexibility and structure. The curriculum design blueprint provided a master's structure but did not guide how content would be chosen for the second phase of the master's. While interviewees said they sometimes grappled with the task at hand, they also became more comfortable with uncertainty.

Sometimes if you don't over-think these things and just see... let them play out. And I think that's what happened with the first group of

workshops, because sometimes you have to have that settling in and I think that did work for us. I just kind of think it wasn't overly orchestrated and I think that actually in itself was a benefit. [il1]

Overall flexibility was seen as an asset and a necessity in this mode of curriculum design. They embraced the iterative nature of the process while also emphasising the drawbacks of the time restrictions.

c. Time

Time constraints were referred to repeatedly in the interviews. Overall interviewees said the process required time: time to talk and time to think, both as a group and individually. Negotiating, communicating differences, reflection: all needed time. Time was needed to build agreement between all members of the relevant KCT. A lack of time was seen as a threat to the TD nature and that without time, it would be easy to revert to multi-disciplinarity. Interviewees repeatedly said this type of integrative work needed time. A lack of time mitigated against TD, against involving extra-academic actors, against allowing individuals time to think and reflect between sessions. A lack of time created the risk that modules would be MD rather than TD. Interviewees also commented that time would have been more valuably spent at the outset ensuring agreement on the curriculum infrastructure that organised and integrated content within their theme i.e. Food, Water or Life & Health.

The only issue that I would have done differently is... to spend more time on the initial agreement and to make it very clear that there was still an option to come back to it if the group all agree. But just to

prepare the flexibility and to make sure that there was flexibility enough in the process because of time constraints. [iH1]

The experience was very determined by the short time we had. And then we had to work, at least me, I didn't know exactly what was the road map. I was quite surprised at all the amount of work that we had to do in July. I didn't expect this, and I think we have not time enough to get some knowledge. [iC1]

The interviewees also found that a lack of time rushed decisions, for example, which content to include or how to integrate disciplinary perspectives.

While interviewees said that more time would have allowed both the inclusion of extra-academic actors and greater diversity of disciplinary viewpoints, the fact that everyone had to work via Teams due to the global pandemic also restricted time. Several interviewees said that the whole process would have been even more effective and less labour intensive if everyone could have met physically as a group in one location for a day or two and discussed the integration framework and their disciplinary input face-to-face and without the time pressure of virtual meetings.

It's better than we are not scattered over two weeks or so, but we have like three days together, intensively and then we have more opportunity to actually continue where we left off, and we don't need to have these conclusions at the end of the first workshop. Then we actually did not have conclusions yet. [iF1]

The online environment created a time limit on conversations and interviewees felt that these timebound events forced conclusions where conclusions had not naturally sometimes been reached. This could push major problems out to later in the process or mitigate against brainstorming when producing short-term deliverables became a priority. Both time and pandemic pressures did not just have repercussions for content creation but also the basics of teambuilding. As one interviewee put it: “We need to be a team first. In the team to create a real team”. [iD1]

As discussed in Chapter 7, last-minute changes to the timeline were outside the control of the work packages responsible for designing the workshops.

e. Facilitators

Facilitation was seen as key and interviewees saw the role of the work package members as facilitators to help the group reach consensus, particularly at the outset as the group was settling into natural roles. In one KCT, a natural facilitator emerged from members but not in all.

Maybe at the first workshop, we need some input... and then OK we were working on ideas, on gaps. But I guess from the second workshop, we could work let's say alone. I mean, we know what to do and just we need to be given tasks. As I mentioned some members were a bit, not aggressive, I mean, pushing too hard. And OK... collaboration can be a tricky thing to get right. Because you need to be able to respect each kind of individuals, if there's such a diversity there, in ways of thinking. And you need to respect each individual's way of thinking in each individual's approach and try to bring it

together in a way that we can all reach some kind of you know agreement or consensus in the subject matter and the design. And I thought maybe trying to strike that consensus and that balance was maybe a little bit tricky. [iC1]

Interviewees acknowledged that they saw the creation of this integrative curriculum as challenging and difficult but ultimately very rewarding. They said that reaching agreement on problem spaces and module content “to get everyone onboard” [iC1] was challenging.

For some, the lack of facilitation meant the process was more labour intensive and time-consuming for the KCT than would otherwise have been necessary.

They were taking a word out here or there getting, you know, getting into a right pickle over a certain term and you'd be 'You know we need to move on from this and we need to get the framework or the main concepts right'. And that's always the mistake of curriculum development. People are starting to sort of shift into what topics they cover, but it keeps telling you about the topics they know themselves. [iI1]

This could reflect the nature of how different work package leaders approached their role in the KCT or the composition and disciplinary spread of the KCT and the simple chemistry of different personalities. The role of the facilitator whether an educational scientist or member of the KCT could be explored in more detail in follow-up research.

8.4 Conclusion

This chapter explored the findings from the first phase of interviewees carried out at the end of content creation process. These had two purposes: to establish the micro-context (participants motivation to take part in the pilot programme) and to investigate the response to resources provided by the alliance.

The micro-context was that KCT members were system innovators. Several points of commonality emerged in KCT interviews regarding motivation to take part in the pilot. These are captured under the theme System Innovation and Self-Innovation. KCT members saw TD as a way to innovate the system in which they reside and to develop the competencies both they and students needed to take part in this process. The findings from the first round of interviews informed the focal points of the second round of interviews. There was a clear sense during the first round of interviews that interviewees were still getting their heads around their labour and the fruits of their labour. While they were clearly positive about their experience and were proud of and very satisfied with the master's programme, they were still gathering their thoughts on their interpretation of their own experiences at this juncture. Given that the whole process – from meeting each other to finalising the master's programme – took place over one month, this was to be expected. It was clear from the first round of interviews that time pressure was a significant theme in the Content Creation Phase.

It was also clear that there was a tension between structure and flexibility. While interviewees thought that flexibility was a necessary part of the process, their responses to certain questions suggested that there may have been too much flexibility in the approach. This may not have made the best use of the time available

for content creation. Time did not allow me to investigate this further in the first set of interviews and I noted that I would return to this in greater detail in the second set of interviews.

Findings from the first phase of content creation also demonstrated that interviewees had a very tentative understanding of TD and a broad and sometimes uncertain idea of what they wanted to achieve as a team – as opposed to what they were asked to achieve. I also noted that I would return to this line of questioning in the second set of interviews and ask interviewees how they would go about designing a programme like this, what worked and what didn't. Regarding a shared understanding of TD, we were under significant time pressure in the first phase and this mitigated against any form of in-depth training for the KCTs. They were thrown in at the deep end, as it were. I was aware that KCTs were to be offered a deeper introduction to both TD and CBL in the Detailed Content Creation Phase but I was also aware that there appeared to be several common threads in how different interviewees described TD. I was keen to see if their continued engagement as an independent group would influence this shared narrative.

As a result, I designed the second interview schedule to delve deeper into the 'how' aspect of content creation. How would interviewees have improved the content creation process? What worked for them and what did not? I also returned to the some of the questions asked in the first round of interviews. What was their understanding of TD? I also decided in the second set of interviews to further question interviewees about their experiences of being in the KCT. When asked about their experience of being in a KCT in the first round of interviews, their responses were high level and very brief. Many gave very brief positive responses. The second set of

interviews was carried out ten months after they joined the KCTs. This allowed them a much greater vantage point from which to appraise this new venture.

Chapter 9 Responses to resources

We finally, although it was complicated, we finally agree on the narrative beyond disciplines. So this is already one indicator of success. [iH2]

What would implementation look like if it was successful? You can solve the problem. [iA2]

9.1 Introduction

This chapter outlines the findings from the second round of interviews carried out at the end of the entire curriculum design process, which culminated in the detailed content creation process which ran from October to December 2020. The interviews took place in April 2021, eight months after the initial content creation process (July 2020) and approximately six months after the first set of interviews (September 2020). In this chapter, I seek to provide an insight into responses to the resources provided to KCT members by the Alliance. After September 2020, content creation was transferred to Work Package 4 Teaching and Learning Strategies with the goal of translating module content into timetables of planned learning activities and consideration for staffing approaches to these through teaching, facilitating or guiding these activities. That work falls outside the boundary of this thesis but interviewees reference it in some of their responses in connection to the broader design process.

9.2 The second set of interviews

The aim of the second set of interviews was to give interviewees an opportunity to comment on the general outcomes of the curriculum design and reflect on what they learned by taking part in the process. As mentioned in Chapter 8, the first set of interviews took place in close proximity to a very concentrated period of content creation. As a result, interviewees had little time to reflect on their involvement. They expressed this in the first set of interviews and this informed how I approached the second set of interviews. I sought to establish if their understanding of TD had evolved; what feedback they had regarding the content creation process. The central question I sought to investigate was if their participation in the entire process had worked for them.

The second set of interview questions focused broadly on outcomes of the content creation process. Interviewees were asked about their understanding of TD and whether this had evolved over the prior six months. I sought to investigate if interviewees experienced a growth in confidence in designing TD educational experiences. To this end, I posed questions regarding interviewees' definition and understanding of TD – to see if it had evolved. I sought to investigate if KCT members could now articulate how this understanding of TD would be implemented educationally through curriculum design, what skillset students would acquire in the process and what skills academics needed to take part in TD education. Interviewees were asked to recount the steps they went through in the content creation process, where their disciplinary expertise fitted in and where students' disciplinary expertise would fit in. They were asked what enabled or disabled their ability to make a TD programme and what changes they would make if they were entering this process again. Finally, they were asked how they were supported in the process, what

resources helped them to ensure TD and their general feedback on the KCT structure and the content creation process.

Interviewees were asked to keep a diary during the content creation process and they had all agreed at the outset of the research. However, the majority could not complete this task. The reason given unanimously was that the group found the time commitment needed to take part in the Alliance project to be greater than first anticipated. To compensate for this, I offered all interviewees a 15-minute slot at the end of the second interview for an open feedback session. This allowed interviewees an opportunity to reflect on their overall experience of the content creation process, the KCT structure and how it fit within the Alliance. Interviewees were very positive about their experience of taking part in the two interviews. They said the interview and its structure allowed them to reflect on their own practice and participation and supported their professional development and understanding of the key concepts developed in the content creation process: TD and CBL or CDE.

9.3 Responses to resources provided

9.3.1 The KCT structure

Response: Team spirit and shared narrative

All interviewees spoke of the importance of the KCT dynamic and structure in the curriculum design process. They said KCTs performed very well as teams. This helped the process of integrating multiple perspectives and the emergence of a shared narrative. One interviewee [iB2] expressed this emergence of a shared

narrative as a shift from 'I' to 'we': "I changed in the middle of the past six months. So I thought that it was the knowledge in the centre or the disciplines and the interaction of the disciplines in the centre. Now we think it should be the society in the centre." Interviewees affirmed that the qualities needed to function well within the KCT were the same as those listed in the first round of interviews: "an open mindset" [iC2] or "collaborative and inclusive and very listening" [iK2]. [iH1] said the KCT helped them "to look at trade-offs and agreements and to accept conclusions that are not the ones you would have individually from your point of view." [iB2] said:

From the beginning, we started working as a team because we were starting with the idea that we are constructing, we're producing something new. So it was not: 'OK, this is my part of knowledge. I want to put this part of the content because they want to be teacher of this'. No, it was not like: 'This is my discipline I want to introduce part of my discipline in this curriculum'. It was the other way around. It was: 'OK, this is the theme that should be important. There are a lot of things that are important to this. And from the different perspectives, we are adding new things.' This was nice because probably from the beginning we're thinking about a common challenge and this is the way we work, I mean for us. [iB2]

To iG2, team rapport was crucial:

I don't know what it was. Maybe we were all very open to the experience and learning from the experience and that kind of thing. We have a nice little group. You know it probably is because again, it

*goes back to that idea of trying or moving out of your comfort zone
and what you're familiar with. [iG2]*

This view was widespread among interviewees for example iF2 said: “I'm very happy with the human relationship. I mean the human way of relating to one another, and it's a good atmosphere. I think there is an enormous diversity.” Interviewees said they needed time and also time to build trust. iB2 said:

*What is important is to trust in the other. To build this community of
team work and this is what we have in the... team. I mean, we are
lucky because we have this feeling with the... team. We are
completely different but we have this sense of a team of we are doing
something together, we are trying to do our best as a whole group.
[iB2]*

This attention to and the importance of building relationships was seen as important to the process and was necessary also when building relationships with extra-academic actors. It was felt that extra-academic actors needed to be there from the beginning as the KCT was formed. The lack of time to do this at the beginning was seen as a missed opportunity.

9.3.2 Content creation process

Response: Defining TD (confidence/evolution in)

All interviewees said their understanding of TD evolved over the six months of working together in the KCT structure. They spoke of TD in common terms as

understanding complexity, understanding a problem from multiple perspectives and the inclusion of extra-academic actors. iD2 said being in the KCT affirmed what their “intuition” about what TD was at the outset. They could see that the rest of the group understood TD similarly. iB2 referred to their shared understanding of TD as an understanding of the need “to have a holistic mind... this predisposition to look to the problems as they are realistic that everything depends on everything and everybody depends on everybody.” iK2 said: “Now I understand this too puts a lot of people with different background disciplines in the same time to respond to the challenge”. iJ2 expressed this view of TD as “socially-engaged interdisciplinarity”. iC2 described it as “the idea that any challenges that you address cannot be tackled from one discipline alone and by one actor alone”. iG2 described TD as “to have this kind of deep learning and knowledge to allow them [students] to address these complex challenges or problems up first.”

Interviewees said their understanding of TD evolved through taking part in the workshops and discussing ideas with fellow KCT members. They also supplemented this with their own reading. The second set of interviews clearly displayed a convergence in their understanding of TD and they all acknowledged that their understanding had evolved. Interviewees emphasised the importance of extra-academic actors, for example, representative from professional or community organisations, companies, non-governmental organisations or governmental organisations connected to the challenge area and how their input was missed due to time constraints. For example, iB2 said: “I’m much more aware about the important role of society in this transdisciplinary approach”. iA2 said: “I got what is transdisciplinarity and in my view it is not taking the [disciplinary] content into the core, but rather to question a challenge and then connect all the other disciplines or fields

which are related... And the other thing is the key importance of stakeholders, which can be the society or even a company.” iD2 described their work as following “this intuition about these larger wider aspects of any problem in the society”. The interaction of disciplines, iD2 said, was to better understand the problem: “I think the key may be the engine of any transdisciplinary study is the desire to understand the things”. iD2 described TD as a blurring of people and boundaries: “I suppose it's people with different backgrounds coming together maybe to solve a certain central problem or coming up with solutions ... we identify core societal problems or challenges and then we get people with different multiple backgrounds and with different ideologies coming together to see if we could have a shared interest in solving what that societal issue or challenges. And that's the way I would see it... But the core issue is but there has to be blurring of people then boundaries.”

The language used by interviewees was highly normative for instance iB2 said: “I would like that the students will be able to be aware that they are part of the society and they are an active part of the knowledge so they are creating knowledge. They can detect problems and they can propose some solutions or part of the solutions in collaboration with other members of the society.” iH2 expressed this as: “To think differently; to solve the problem; to find solutions; to change the world too.”

The biggest challenge, one interviewee said, was that we are moving from an old paradigm of teaching to a new one. The old paradigm was seen as the disciplinary or multi-disciplinary approach where disciplines are put together without interaction. One interviewee described it as follows:

You know, thinking that you are at the top of the pyramid that so you are at the top of the knowledge - the academic/the university. And I mean, it is on the top and we are, we can define the problems and we can define the solutions of the problems. And now that change of paradigm means OK we don't have the truth. We are only another element. So if students, members of society, everybody can have this part of a role in this play. What is the problem? I don't know what is the problem about water in the South? Power in the North part of Africa? You have to ask that people that are living there I can just help. [iB2]

There was a view that because students already access so much knowledge on the internet, the role of academics is to enable students not just to filter knowledge but to use it. iH2 said: "When he [a student] comes to me, it's to design or to look at the problem, to look at the question. To think. Not to get information. So yes... the most important thing is to bring the mind, that mindset and the capacity in motion."

Approaching education from this perspective would engage students. [iH2] "The fact that it matches their concerns or the way they look at life and look at the world so to connect with what matters to them. And you see it immediately now in a classroom. You see it immediately when you when you lose them and when you capture their attention."

Response: TD curriculum design methodology

A notable evolution took place between the first and second set of interviews in interviewees' ability to articulate what a TD and CBL curriculum is. This was a significant outcome from the process and one that was highly valued by interviewees.

It signalled for them a sense of confidence and achievement. The following themes that emerged from the analysis of the data are those that were referenced most often by interviewees and on which they placed emphasis.

Interviewees saw curriculum design as focused around the goals of supporting the student to 1) understand the challenge and 2) to be able to design solutions and consider what successful implementation would look like and what the obstacles might be. The goal was to share how methodologies and conceptual frameworks can be utilised within the narrative of looking at problems. Interviewees believed this would make learning attractive to students and be of interest to them in a way that the traditional curriculum is not. iG2 described this role as: “Pulling together knowledge from different areas... to provide a deeper learning experience” so that students could assess a problem and find solutions. The methodology to support this optimally required a flexibility at multiple levels (content creation, staffing, timetabling) but also structural support from the institution.

The steps in their proposed curriculum methodology could be described as following:

1. The learning collective

Interviewees saw the need for the learning process to be viewed as a collective process. [iB2] said:

I think this is the different approach... the teacher is here and the student is below. This was going more in the vertical organisation. But in a horizontal organisation, that is giving the same power to everybody. I mean for everybody: to every member of the society and

the teachers and the researchers. We are a member of the society but the students are in society or the non-profit organizations...They are also members of the societies. [iB2]

The team therefore in the view of this participant would be comprised of students, academics and extra-academic actors.

2. Learning as becoming TD

Interviewees viewed the TD educational experience as a process rather than a series of milestones in learning or goals to be reached. The process of becoming TD rather than just the knowledge content should guide the design of the curriculum. This, iG2 said, would involve identifying the challenge and bringing together teachers from different disciplinary backgrounds to collaborate. iC2 said it was: “To kind of move away, move out of their kind of comfort zone and to try to collaborate and share ideas.” The collective would take part in this process with the goal of all becoming TD. iI2 likened this new view of the role of the academic to more of a mentorship role:

Your role as an academic or in leadership anyway, is to be able to listen. It's more like personal development. It's like human development. You have to be able to listen to everybody's perspectives. And it's like taking the rounded approach, and I think if you come with that skill set rather than, you know you might always have your own concept around with some topic. [iI2]

Learning was conceptualised by interviewees as an iterative process that was necessarily uncertain. This required that all team members (students, academic and

extra-academic actors) marry the intrapersonal with the interpersonal. For example, interviewees repeatedly said how important openness was or an open mind. They recognised that this learning process could not be planned, fixed and structured ahead of time. iC2 described this as follows:

That's what I mean with the sort of... you also need to be open minded and being able to sort of let that go. The students and I find that quite, well, a bit scary. So I mean, I suppose transdisciplinarity can also be a bit scary because you sort of need to let go of like you can't plan everything. You don't know the outcome of what will happen or what students will choose. [iC2]

This meant, interviewees said, that participants needed to let go of certainty. This was an intrapersonal process. One interviewee [iH2] described this as a sense of developing or possessing personal security:

If you are secure enough, you may accept that you may be different, in that there is no one that is right and the other wrong. Maybe this is even more important for students or professors because students are in the process of securing themselves. Not all teachers and professors are secure. [iH2]

Interviewees said that letting go of certainty was something that everyone who took part in the process needed to do: students and academic/extra-academic actors. For example, iG2 said:

I suppose you do have to move outside of your comfort zone, like move away from what you're familiar with. You know in terms of... I would look at a question or whatever, specifically from my own kind of background and perspective, you know the knowledge that I have. So I suppose being able to kind of move away from your comfort zone and try to think about whatever it is you're addressing from the perspective of multiple different subject areas. So that was a bit of a learning curve. [iG2]

3. TD as a learning process

Rather than transmitting knowledge, interviewees saw their role as creating the right learning environment for a TD process to take place i.e. a collaborative process, flat structure, diverse team, etc. This environment would allow the skills, qualities or competencies (these were terms used interchangeably by interviewees) to be developed. For example, iA2 said:

I think that's what we need to give them. An atmosphere where they can learn and practice how to communicate with people with different backgrounds right? To understand a bit of economy related to biology or related to society. So this is also a skill: openness. You know you need to be open for these new experiences. [iA2]

To interviewee iB2, the learning process was also about establishing a team:

I think this new way of learning is like to create this community, like a family like a team, so and if you create the team with the students and teachers, lecturers or other stakeholders. You only need to be in contact and to provide some time together.... I mean, you are like a coaching [iB2]

Success would be viewed in terms of how TD students were at the end of the process. iG1 said: "I suppose when you look at the end product, students have all of the skills and the training to be, you know, transdisciplinary thinkers in their approach to problems."

4. TD skills and competencies

Interviewees described TD in terms of skills and competencies that students needed. They used these words interchangeably. Interviewees saw the key skills for TD as the "ability to evaluate knowledge systems and what knowledge that might be available and knowledge that can be useful" [iC2]. iG2 proposed that the curriculum would therefore be set around the process of linking knowledge to find a solution to a challenge: "The idea of, I suppose, pulling together knowledge from different areas so to try and think outside the box and kind of provide this kind of more, deeper, I suppose, kind of learning experience." iA2 said: "I think, to have a global view of the processes right to be able to understand what you're talking about." The skill needed in all participants in TD was seen as the ability to understand each other, to integrate knowledge from each other. Interviewees noted that at different stages each group realised there was a need for an integration framework or methodology within their problem space e.g. Food, Water or Life & Health. Disciplinary knowledge was seen as

central to the process of TD because challenges and solutions needed to be rigorous and rest on valid, research-informed expertise. For example, iA2 said “We need a sort of disciplinary knowledge right? Because otherwise it's not, let's say not scientific, but not proven. I mean it's not valid.”

For example, one interviewee said students needed skills to be “collaborative and inclusive and very listening” [iG2]. Interviewees repeatedly emphasised the skill of communication alongside what iK2 described as the “capacity to do synthesis”, to understand and appreciate complexity. iH2 described this as follows: “The first is the capacity to listen. To listen actively to understand not only to listen, but to understand and to accept. Second is to accept then that views can be different. The intellectual way to look at what you are looking at can be different from yours.” The goal was expressed by iH2 as “to agree on the collective outcome to be reached”.

Interviewees did not define the term ‘complexity’ but all interviews used it frequently in explaining the goal of the master’s and TD. They described societal challenges as complex and the need to equip students to manage this complexity. They also said that students needed an understanding of complexity and needed to develop the skills to manage complexity. One interviewee referred to the work of Edgar Morin and complexity theory. Interviewees stated the need for the complexity of problems to be clarified from the outset and for all stakeholders to avoid the desire to reduce complexity. The engine of TD, one interviewee said, was to maintain the perspective that the problem is complex. If the goal is to reduce complexity, then you risk covering up knowledge that is needed to understand and solve the problem” [iD2]. One interviewee proposed that the process of defining the question would support this

[iJ2]. Another suggested that the complexity should be mapped at the outset [iD2] and students would then pursue different parts of this themselves.

While they were clear that becoming TD was a process, interviewees seemed to find it challenging to express this in the contemporary language and constructs of education e.g. skills and competencies. As noted, they used these terms interchangeably. As one interviewee [iK2] said: “I change my point of view. And I don't know how to design that as a skill, but, uh, I enlarge my point of view. And I don't know how to express that.” Interviewees who were in the KCT for the Phase 1 Content Team (P1CT) found it easier to articulate skills because the goal of this phase was to explicitly develop transversal skills chosen by the curriculum design team before the content creation process.

5. Challenge as a focal point and boundary for curriculum design

There was widespread consensus that the TD curriculum should focus on a defined challenge (interviewees also expressed this as a problem) and solution. The selection of the challenge was seen as central to the process. Interviewees said both process and content were derived from the collective choosing a broad problem space and then a challenge area therein. Two different approaches emerged within interviewees (depending on which KCT they were members of) but both approaches focused on creating a narrative to give the team a shared understanding of the context and complexity of the challenge area and then choosing either one or more challenge(s) with which to guide students through this content in more detail. For example, in the Food theme, the KCT followed the approach of ETH Zurich [target knowledge; systems knowledge and transformation knowledge] to integrate content from all

disciplines into modules and thereafter chose a narrower challenge 'Making nutritionally sustainably produced food available to everyone' to focus this content. Interviewees said it was important to set a boundary around the focus of the team. This meant that the focus was inevitably unique to the team involved.

Interviewees said that the learning process needed to be designed to reflect the fact that students would ultimately choose a challenge in the final phase. iC2 said this meant academics had to adapt and let the program evolve. IB2 said: ““You cannot have a guide because you are asking students to define their own challenge.” For iA2, this meant the content is somehow co-developed or co-created by the students:

But we need a frame so that's why it's hard because you cannot say day-by-day, this is the curriculum because the students are somehow forming this curriculum and schedule, you know, because they're picking challenges, so you shortlist challenges and then they'll pick one. Now we are thinking about maybe having the same challenge, but maybe the geographical place can be another one so you can talk about a European city. [iA2]

Setting a limit or boundary around the problem was seen as an integral part of the process but also ran the risk of neglecting crucial information. Interviewees pointed out the need to map knowledge but acknowledged that this may also preclude pertinent information. iC2 said: “In food, like, it's very hard to be generic or to generalize on a system without leaving out some crucial components. I mean you can't cover everything right now. So if you do the challenge in the last one, that would be your automatic filter.” Interviewees said it was a challenge to balance breadth of

knowledge with what was manageable in traditional lecture formats. For example, iC2 said:

I think it's mostly really narrowing down and really making decisions on what do we want to focus on, because what I see is that there's so many different challenges mentioned... But then, I'm like, you can't address all of this. Like I saw, for example, a lecture where it's about the history of food security and food systems and food – different concepts that don't necessarily connect to one another in one lecture basically. [iC2]

According to iA2: “Rather we are focusing on these challenges, so I think. And it's really hard. Because you need to keep the limits. So this is, this is the minimum. What can I deliver to students to be able to understand what I'm talking about when it comes to water?”

There was widespread acknowledgment among interviewees that students would each perhaps have a different curriculum at the end. This would be a reflection of the focus they took and their own disciplinary contribution. The task of academics was to provide the basic knowledge needed. One interviewee [iH2] described the process of students moving from being “...just passive receptors. Components. To being active designers. To be active in the way they motivate their brain. And particularly, at the moment, when most of them they know where to find information and data.”

However, they saw the need for some guiding structure for the learning journey. iC2's response was representative of interviewees:

You need to somehow have some structure, so that's a bit of a balance I think. Or maybe I don't have enough experience with really this sort of challenge-based learning and how that works, but what I have observed so far in courses is that I am always surprised by what people come up with when they are just let loose in terms of like thinking about a problem space and coming up with solutions etc. So maybe I should be convinced of what will happen when students just go freely and work on their problem spaces and challenges. But at the same time, there's just certain sort of methods and skills that they need to also acquire and. Yeah, that's what we are now. [iC2]

6. Extra-academic actors

The integration of extra-academic actors was seen as key to all levels of TD learning. Interviewees referred to extra-academic actors also as external stakeholders or societal stakeholders. iB2 said: "There are sometimes we are blocked because I think we need another overview. We need another approach. We need new mind, new insights, not someone outside the academia to say 'OK, yes, but you can consider this point...'"

All interviewees highlighted the lack of involvement of extra-academic actors and recognised that this was due to time constraints. Not only did the changed deadline for programme approval and external review preclude integrating extra-academic actors into the content creation process but interviewees also recognised that

connecting with and managing extra-academic actors needed a time investment from the Alliance. Extra-academic actors were needed, they said, to provide feedback and also to take part in the different learning activities. Interviewees stated that their involvement was integral to the TD nature of the educational programme: to help define problems and challenges and to provide the knowledge necessary for students to understand both the challenge and the solution. Interviewees felt that extra-academic actors should be involved in the plan and structure [iB2] from the outset to give perspective, to build understanding of the challenge [iK2].

9.4 Disabling contexts

The key challenges listed by interviewees related to the constraints of the system. These were the need to meet institutional requirements for programme approval (for example, the need to have module learning outcomes) and timetabling both staff and contact hours for students for a programme that may not have traditional lectures. However, when interviewees were asked about the key challenges to the process, they overwhelmingly cited time as a disabling factor. The requirement to carry out an external evaluation that would satisfy all Alliance partners meant the master's programme needed to be written within a very compressed timeline (July-August 2020). This affected the initial design phase. However, there also seemed to be a lack of time in the later part of the content creation process. The approach in the DDC phase was sprint design and interviewees said this was very demanding of their time. According to iI2 for example there was a lack of much-needed "thinking time". This thinking time meant time together in a block. For example, iD2 said: "It would be useful that we had a complete week. Isolated. The KCT. Working on this, thinking on this and without the possibility to do any other thing".

When the second set of interviews took place, interviewees were in the middle of designing learning activities and proposing staff to contribute to “teaching” the programme. Half of interviewees expressed frustration at what they saw as an increased and unsustainable draw on their time. They said this ran contrary to what they saw as their role and the principle of innovation. Their responses varied depending on the support they had received from their home institution to take part in the process. One interview [i12] spoke of the need for commitment from a staff member’s home institution: “To get something like this working, you’ve got to get commitment and you need to know what the commitment is from the outset”.

Interviewees had the opinion that the process of translating program content into learning activities and timetables needed more time and time should have been blocked off and decisions made with the support of educationalists. This falls outside the remit of this evaluation however it signals a point at which the interviewees unanimously felt there should be more support in management and also educational direction, the latter from educationalists in the form of best practice examples and CBL guidelines. They needed help from what they called educational experts. iB2 said: “They are educationalists. They are not specialist in my field and I’m not a specialist in their field but we need to work together and it’s a long journey.”

Additionally, they felt that facilitators should help lead decisions in the KCTs and that these should be clearly defined roles with time allotted for those roles. For example, i12 said: “A real facilitator is having chunks of time where you block off a week or you block off a month and the development happens in that space and in that time and everybody is on the one page and they’re all collectively working together.” They said

the first content creation phase took place in a clearly demarcated block of time and this worked better than having diffuse dates over a longer period. As mentioned in Chapter 8, optimally, the content creation process would have taken place in person. iG2 said:

It's very much like, you know, there's different people in place trying to give that knowledge or bring the people along and when you're working with people across five universities coming from five, you know, different ideologies for their educationalists or academics, or you know they might come for whatever kind of backgrounds. We're all very different, and that's good, but you have to really create the challenge or they have to create that for the thinking and the shared ideas to happen. That's not going to happen when people are really pressurised over six weeks period. [iG2]

Several interviewees pointed out the need for a role that gave an overall programmatic view of the master's. They expressed the view that there was no one in this position to view and manage the TD integrity of the programme. And this was a neutral role with TD expertise that had not been filled.

As mentioned, a prominent challenge was the need to structure content into module learning outcomes (MLOs) and related assessment in order to meet the requirements of institutional programme approval. iB2's explanation captures the broader sense from interviewees that the cart had been put before the horse. Real innovation was hampered by the preordained structures:

I think it should be like, for instance... probably you are going to think that we are a little bit crazy... but we are thinking the best way to perform our water thing [modules] should be to spend one month on a boat. Altogether, you know the students, the teachers and stakeholders. You know in a boat on the river and that makes stops in different cities and different places and to have real contact with the problems related with water because water there is a lot of issues related with it. And, you know, from the beginning of the trip and at the end of the trip, there is going to be a lot of learning activities and community activities and solutions to different problems. Of course, you have to organise them. The logistics part, but besides the logistics part and besides the basic concepts... [iB2]

The need to fit the process into the semester structure was a particular impediment. Interviewees were asked to submit a list of proposed lecturers but they struggled to fit the content approach into a lecture format. Interviewees pointed out that their content creation needed to be high level to allow students to navigate the problem or challenge space themselves. It was a considerable challenge to mould this to a 12-week structure and schedule academics timetables when staff resourcing models are often based on a number of hours per semester/per week. Institutional culture was also seen as a potential challenge. iE2 said that academic staff might be challenged by the lack of structure: "If you tell them they will be a coach or a mentor or guide. They won't get you. There needs to be training for teachers". These were seen as the constraints of the old structure albeit not insurmountable.

Interviewees had suggestions on how to resolve the issue: by having panels of experts and a coach role. For the short term, they recognised that they actually had to fit it into a university timetable. For example, [il2] said: “You can innovate but you need a baseline of comfort to be creative. Staffing and schedules etc. Then is it going to be 25 staff involved or just five at the same time? Do they have to be temporally at the same time you know? So it's really a quite a gargantuan design thing.”

9.5 Conclusion

This chapter presented findings from the second set of interviews carried out in spring 2021, approximately six months after completion of the content creation process. At this juncture, interviewees were immersed in discussions and online meetings regarding the practicalities of timetabling lectures and identifying suitable staff to “teach” the master’s. These interviews had been delayed due to a bereavement in my family in early 2021, but interviewees said they were appreciative of the time to reflect on what had been a very compressed and pressurised experience in Summer 2020 when the master’s programme was written in three weeks. This chapter outlined the responses interviewees had to the resources provided by WP3/4 in the content creation process: the KCT structure itself; the Curriculum Design Blueprint; and the content creation workshops. Their experience of participating in the KCT structure was very positive and findings from the second round of interviews demonstrated that interviewees developed trust and a sense of solidarity and team spirit over the course of the content creation process. This was particularly evident in how interviewees described TD. There was a significant harmonisation of definitions within the pool of interviewees in how they described TD. This coalesced into a shared narrative that emphasised the need for students to be able to manage complexity and develop

competencies and skills to work with differing viewpoints and diverse bodies of knowledge and expertise.

It was notable that interviewees described their own experiences within the KCT in similar terms to how they viewed TD learning, which they described as a process rather than a set of definable outcomes. While they struggled with the language of skills and competencies, they used these terms to describe what students needed to learn and found it difficult to express what students learned differently when they were in a situation where their own disciplinary language could not explain that learning. Their confidence in how to design TD curricula had increased significantly and they unanimously described the importance of basing the curriculum around challenges.

The findings indicated that interviewees believed not only that the KCT structure is effective but that students should similarly learn in a collective with academics and extra-academic actors, thereby removing the hierarchy of power that some interviewees felt exists in traditional lectures. Their responses indicated that they understood through participation in the KCT of the need to create a TD environment that supported the process of TD. The key challenges they experienced were the absence of extra-academic actors and the inhibiting qualities of the traditional programme structure. Interviewees had to write content to fit module learning outcomes and this was restrictive. Interviewees' responses to resources demonstrated that several mechanisms fired during the content creation process. These resources and responses will be paired and conceptualised as mechanisms in Chapter 10 as part of CMO (context-mechanism-outcome) configurations. I will then discuss the implications of these in greater detail in the context of the literature on TD education and European policy on higher education.

Chapter 10 Discussion

Realists do not conceive that programs 'work', rather it is the action of stakeholders that makes them work. (Pawson & Tilley, 1997)

In this thesis, by evaluating the case of a curriculum design process piloted by a European University Alliance, I sought to answer the question: *How can TD education be successfully created in a university?* In response, I argue that my findings present a clear picture of 'What works for whom in what circumstances?'. This chapter outlines these findings as CMOcs (Context-Mechanism-Outcome configurations). In this thesis, I sought to open the black box to expose the mechanisms of designing TD and CBL educational programmes. This is lacking in the literature on both TD and CBL education (Pearce et al., 2018; Gallagher & Savage, 2021; Leijon et al., 2021). In particular, there is a dearth of research into the process through which TD curricula are formed. I contend that opening the black box on this process can allow us to reflect on how changing practice at a grassroots level can inform changes the university can make at an institutional level and in policy at a European level.

Within realist evaluation (RE), the CMO configuration presents the findings of the research in themes. The purpose of this chapter is to outline the CMO configurations that emerged from the two findings chapters and explore these in relation to the central research question and the program theory presented in the case study at the centre of this research. I begin with a recap of RE as an analytical framework. I then present three CMOs that emerged from the findings. I will describe each component of the CMO: Content (Macro, Meso and Micro) aligned with Mechanism (Resource

plus Response) and Outcome before describing the CMO as a theme. In Chapter 11, I will explore the implications of the three themes for system innovation of the university.

10.1 RE as an analytical framework

As outlined in Chapter 5, data generation and analysis in RE depends on designing and testing CMOs or program theories (Dalkin et al., 2015). Pawson and Tilley (1997, p. 217) describe a CMO configuration as “a proposition stating what it is about a program which works for whom in what circumstances”. RE should result in a refinement of the program theory. This chapter will provide a rich description of the refined program theory through three CMOs. To recap, in this research I used a case study design to focus on a TD curriculum design process piloted by a European university alliance. I worked within two work packages that together piloted a content creation process and created a new organisational structure called Knowledge Creating Teams (KCTs) – multidisciplinary groups of academics who were recruited to create content for a TD, challenge-based master’s programme. Employing the language of RE, in piloting a content creation process and a new organisational structure, the work packages that led the content creation processes in the alliance created a program theory. Chapter 5 outlined RE and its component parts as utilised as an analytical framework in this thesis. Chapter 7 described the case, focusing on the resources provided by and within the Alliance within the curriculum design process. Chapters 8 and 9 outlined the responses to these resources from the interview data. Figure 10.1 recaps the case study and analytical framework employed to analyse the data. The resources were: KCT structure; Curriculum Design Blueprint and the facilitated content creation process.

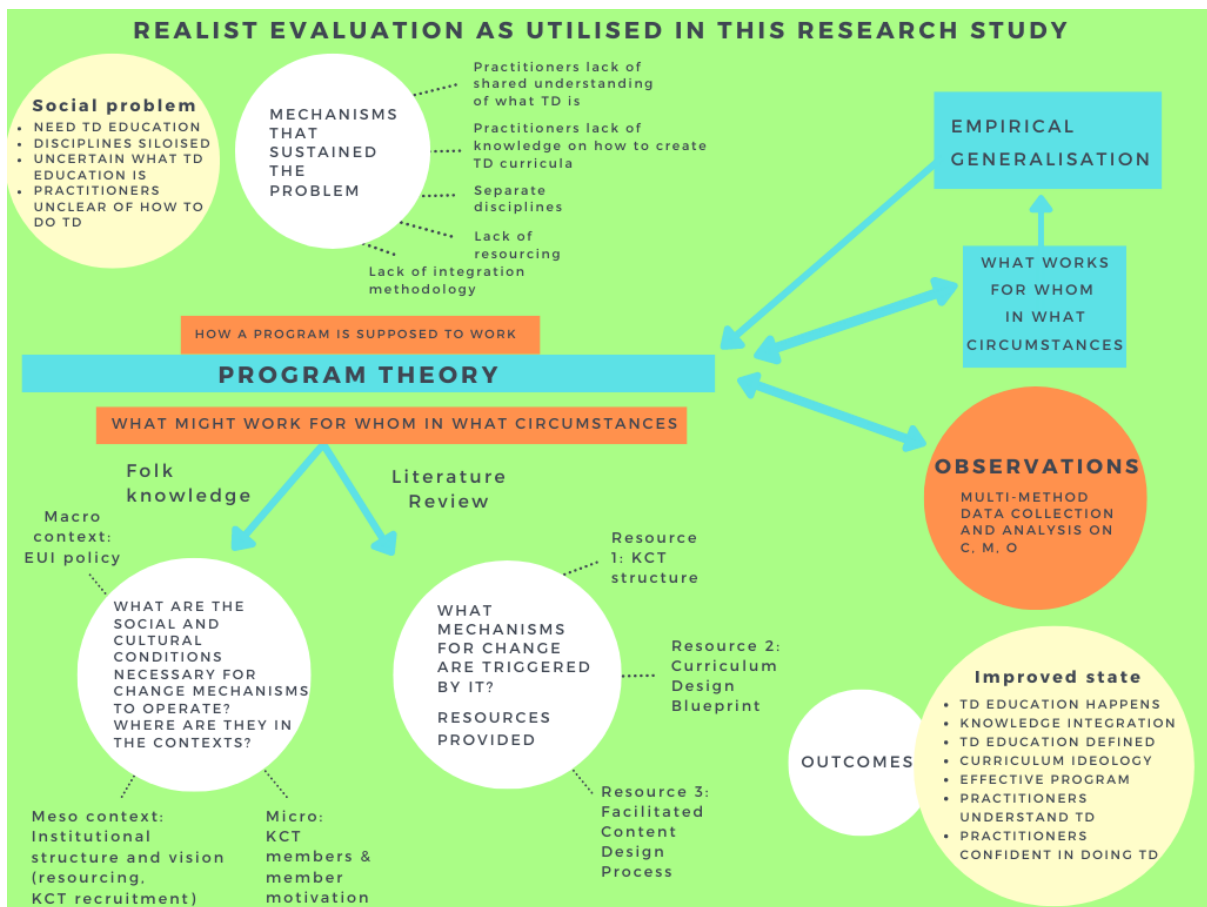


Figure 10.1 Realist evaluation as utilised as an analytical framework in this research.

Within this chapter, firstly, I combine resources and responses to identify mechanisms that fired in the first phase and second phase of the content creation process.

Secondly, I combine context, mechanism and outcomes to propose three CMO configurations to refine the initial program theory and draw empirical generalisations about what worked for whom in the circumstances of this case study. Figure 10.2 captures the three CMOs to be explored in this chapter.

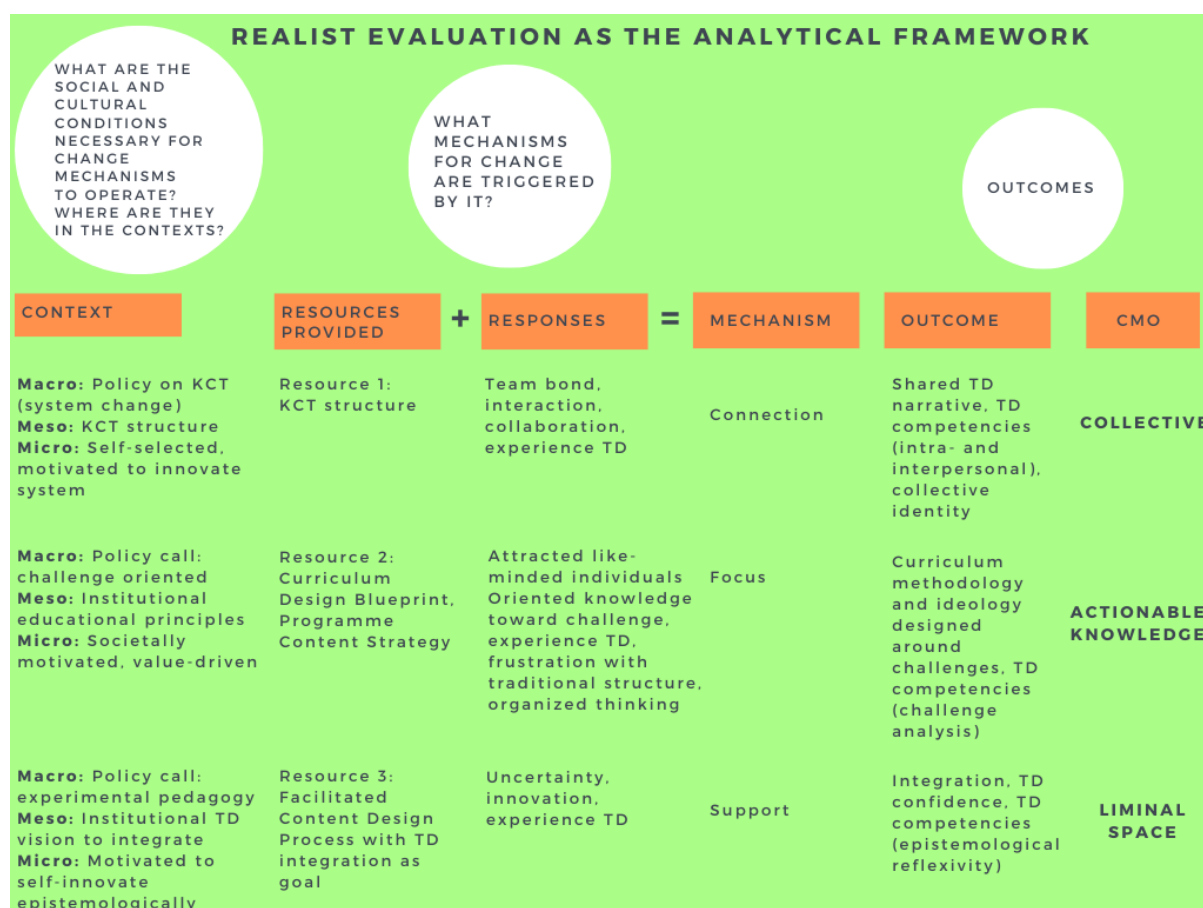


Figure 10.2 The Context-Mechanism-Outcome (CMO) configurations comprising mechanisms.

As discussed in Chapter 5, the concept of mechanism has been employed differently within RE (Marchal et al., 2012; Holmen et al., 2022; Dalkin et al., 2015) and there is concern about disaggregating mechanisms into resource and response. However, I found the disaggregation to be very helpful in identifying what interviewees perceived as resources. Isolating the concept of resource allowed me to think more broadly and openly about what exactly a resource was e.g. time, space, emotional support, facilitation etc. Pawson and Manzana-Santaella (2012) acknowledge the potential complexity of identifying effects of context versus mechanism. The RAMESES II Project (Wong et al., 2017, p. 2) provides a helpful and accessible definition of mechanisms as: “the interaction between program resources and the ways that

participants interpret and respond (or not) to them; an explanatory account of how and why program gives rise to outcomes; hidden, but still real shaped by and interconnected with context”. In this chapter, I conceive of the mechanism as that which is fired by the response to resources. The outcome is what was produced or evidenced as a result. As I categorised context according to three levels – macro, meso and micro – I carried that categorisation into the CMO configurations. The following section outlines the three CMOs that emerged from this research study with the relevant mechanisms defined therein.

10.2 CMOs

10.2.1 CMO 1: The Collective

You're learning the skills as you come together. I think it's part of the process. [il2]

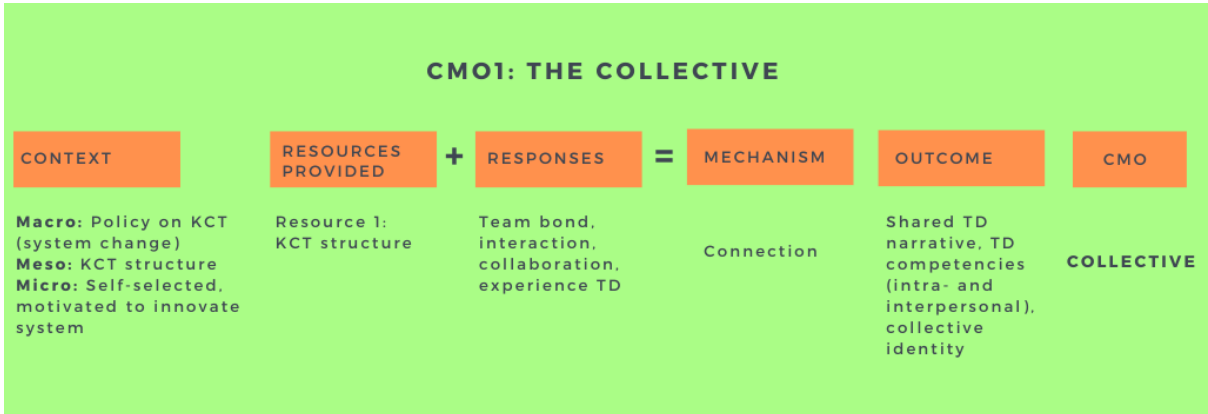


Figure 10.3 The component parts of CMO1 The Collective.

The first CMO outlined here is named the Collective. CMO1 captures the responses to a central resource provided to interviewees in this research study: the KCT structure. The macro context was that the KCT structure was proposed by the European Commission (EC) in the original EUI call. Knowledge Alliances are listed as innovation initiatives that universities should consider to “evolve and adapt to achieve their core mission: to educate students to be successful in a complex and interconnected world that faces rapid technological, cultural, economic and demographic change” (European Commission, 2022). The meso context came in the form of the WP3/4 which made a recommendation to the Alliance Project Management Team several months into the pilot to introduce a KCT structure in order to ensure that module content for the master’s was TD and not MD. The KCT structure was chosen to test a TD staffing structure and to provide the necessary spread of disciplines to support the creation of TD content. The micro context is the level of high self-motivation all interviewees described to innovate the system. My findings demonstrate that the KCT structure itself elicited overwhelmingly positive responses and a solidarity of purpose emerged. The mechanism therefore that fired within this CMO was connection.

Impediments to ID and TD are well-documented in the literature: the structure and separation of education into schools and departments (Vienni Baptista & Rojas-Castro, 2020; Charli-Joseph et al., 2016, McGregor & Volckmann, 2011; Chettiparamb, 2007) the instability and short-termism of ID and TD funding mechanisms (National Research Council, 2014), a lack of theoretical frameworks and curriculum ideology (Lyll et al., 2015). Solutions are also well-documented: changes in governance to support ID and TD work; improvement in ID and TD funding mechanisms and evaluation; support for ID and TD researcher training and skills

development; cultural change in academia; university to reward TD research through reducing teaching load, creating project grants and fellowships, providing residency programmes for visiting scholars. They need to recognise that high-impact publication is challenging (Gibbs, 2017; LERU, 2016; National Research Council, 2014). CMO 1 demonstrates that the KCT structure, as proposed by the EC, is a valuable additional proposal. The collective as an alternative structural proposal that is successful in facilitating TD education is an important finding in this research. However, it is clear that this structure needs to be resourced and supported within the university system. This parallels extant literature on successful TD research, which demonstrates that successful TD research hinges on creating and managing successful TD teams (Hollaender, Loibl & Wilts in Hirsch-Hadorn et al., 2008; LERU, 2016; von Wehrden et al., 2019). The KCTs were formal networks recruited to complete a specific task. I use the word network instead of team because the KCT is a flexible structure comprising teams. This utilises the strengths of the system. It takes the pillars of the university – its disciplinary depth and expertise – and provides a conduit for it to feed iteratively to societal challenges.

Universities are structured in disciplinary silos financially, physically and, to borrow a phrase from economics, in terms of human capital, and this can limit options to university provosts and strategists keen to make universities more flexible and responsive to society educationally. The KCT structure proposed by the EC provided a plausible and valuable alternative that protects the integrity of disciplines but allows motivated staff to be seconded to a timebound and nimble structure. Members of the KCT structure can come and go, unlike research teams, which are formed in response to time-bound funding opportunities. The KCT also supports cultural change within the academic community by bringing together academics who are similarly

motivated. Charli-Joseph et al. (2016) argue that collaboration within the university system can counterbalance resourcing constraints, lack of experience and 'silos'. The KCT structure was designed to be highly collaborative and, in their interviews, all KCT members said they saw this act of collaborating as integral to TD. The interviewees said they felt part of a team within the KCT structure and that they found the structure enjoyable. They enjoyed the time spent with KCT members and the spread of nationalities, languages, cultures and disciplines. They interacted with each other by email and as months passed they connected with each other independently to solve problems or discuss detailed content creation. It is difficult to separate the development of this team bond from the process they engaged in, but interviewees were motivated and expressed values that aligned with a more democratic approach to academic team formation i.e. a flat structure. They saw this as happening through the integration of multiple sources of expertise with equal standing and even representation (i.e. one discipline present). Interviewees saw students as members of this learning community or team alongside extra-academic actors in a flat structure. This developed clearly over the course of interviewees' participation in the KCT. However due to the constraints of programme approval deadlines and delays due to the global pandemic, it was only possible to include these stakeholders in larger workshops on programme design and educational principles in 2019.

The responses reflect findings by Decuyper et al. (2010) that team structure and organisational strategy successfully build team learning. The interviewees learned together and from each other. Interviewees reflected on the positive atmosphere of the KCT: they expressed team spirit, a spirit of a shared endeavour and interviewees engaged reflexively noting the intra- and interpersonal qualities and competencies necessary for themselves and others to function well within this loose structure but

also for the loose structure to function well. The KCT structure was an explicitly flat, multi-disciplinary structure with a very broad number of disciplines. The range of seniority, age and gender was wide. My findings indicate the KCT structure develops a sense within participants of a community of co-creators who are on a shared learning journey. McGregor (2017) argues that learning in TD means creating a community of learners and successful collaboration within TD means developing an understanding of and respect for each other's values. In order to create opportunities for TD education in universities, my findings suggest that academics also need to recognise and experience this sense of a community of learners in order to delimit a problem area and integrate varied disciplinary expertise.

My findings indicate that high levels of motivation and shared values from the outset positively influence the success of a team structure which fires a sense of connection and collective efficacy. As argued by Bandura (1993, 1997) collective efficacy is a potential successful outcome from network formation. A key indicator of the success of the KCT structure was the emergence of a shared narrative or collective narrative/identity (Wenger, Trayner & de Laat, 2011) on what TD is, how it can be nurtured in students and staff and what competencies are needed to be TD. There was a difference between the first and second set of interviews in the language interviewees used to describe their thought processes and work. There was a shift from 'I' to 'we' in their language. Collective efficacy arises from shared effort, beliefs, influence, perseverance, and objectives (Vassilev, 2014). My findings demonstrate that interviewees expressed a "cojoint capability to organize and execute the courses of action required to produce given levels of attainment" (Bandura, 1997, p. 477).

A sense of solidarity compensated for a certain precarity felt by some members about how their institution would recognise or resource their time. The Detailed Content Creation phase falls outside the remit of this research, but interviewees comments on this phase highlighted a theme that emerged in interviews related to precarity and pressure felt by interviewees who did not have clarity about how they were resourced. Members had differing levels of support from their institutions both in terms of time and financial resourcing. It was clear that where interviewees had their time for working on the Alliance clearly resourced/bought out and demarcated, they didn't express concern about how or if their efforts or time would be recognised by their home institution. By the time I carried out the second round of interviews, three interviewees expressed a high level of dissatisfaction and frustration at the amount of time demanded of them by the Alliance. They expressed the view that this was not communicated clearly to them at the outset. Likewise, three interviewees were critical of their home institutions as the home institution had neither recognised nor resourced their time. At the time of the second interview, they expressed the belief that they would have to withdraw from their role in the KCT. For example, il2 said: "But I really think unless they've protected time, that is, they're really not able to give the time that they need".

A further disabling context was the lack of extra-academic actors in the content creation process. As mentioned in Chapters 9 and 10, KCT members expressed the view that the master's content was not sufficiently TD due to the lack of contributions from extra-academic actors. This also presents a resourcing issue in universities and indeed within the literature on TD there is a discomfort with how institutions regard extra-academic actors underestimating the resources needed within the university to manage their integration; ensuring their time is fairly resourced; and ensuring that

their experiences and opinions are fully integrated and not treated in a tick box manner (Cockburn, 2022).

10.2.2 CMO 2: Actionable Knowledge

While the previous CMO focused on the KCT as a driver of potential change at a structural level within the university, this CMO presents significant outcomes at the level of a curriculum design framework and methodology and is entitled Actionable Knowledge. Argyris (1996) described actionable knowledge as knowledge required to implement the external validity (relevance) of that knowledge in the world. Although emerging from the discipline of management and business (Sexton & Lu, 2009), the term actionable knowledge has been adopted and used within environmental science (e.g. Mach et al., 2020) to describe knowledge co-production that is problem-driven and brings knowledge producers and decision-makers together.

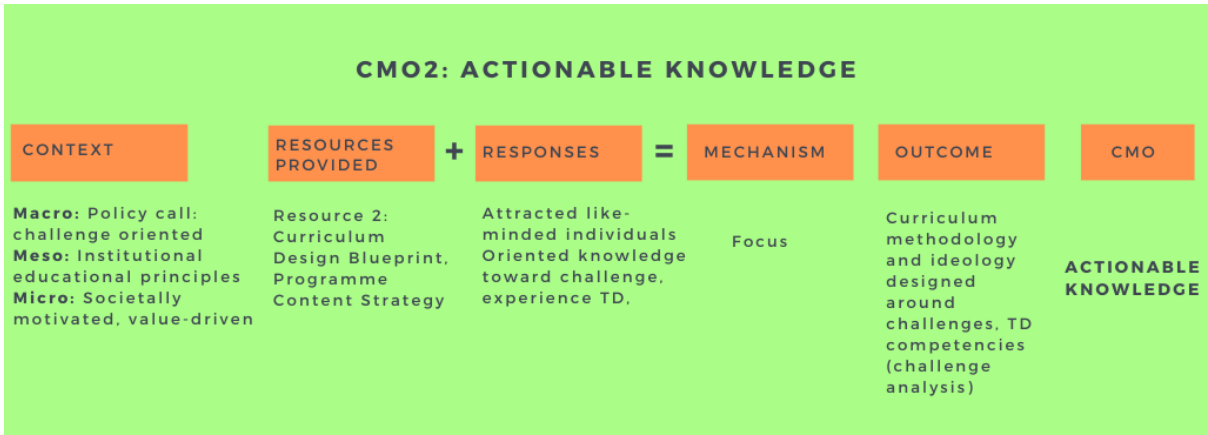


Figure 10.4 The component parts of CMO2 Actionable Knowledge.

As noted above, the lack of extra-academic actors in the content creation process was considered by interviewees as a serious drawback in terms of TD in this research exercise and in the Alliance content creation process. However, the framework of joint challenge identification was undertaken by a broad constituency through aligning policy priority areas with research and educational strengths of the universities. The macro context was that the policy called for a challenge-based approach. What supported a cohesive perception of ‘collective efficacy’ (Bandura, 1997) were institutional educational principles that were created by academic staff and extra-academic stakeholders. These educational principles were welcomed by interviewees as they were perceived to be aligned with a mission driven by this particular academic community in response to European policy. The Alliance’s Educational Principles reflected this challenge focus and therefore at the meso level of context the guiding value of TD emphasised that all processes, educational and organisational, would be centred on chosen challenges. The micro context was that interviewees were motivated to create societal impact, to work on ‘real’ challenges and to affect change. Their motivation was explicitly value-driven, as was the guiding principle of the Alliance as outlined in Chapter 7: “to reconcile humanity with the planet”. A clear curriculum ideology – defined by Lyall et al. (2015) as principles, ideas, beliefs and epistemologies – emerged and was articulated by interviewees. The primary guiding principle was that the challenge would lead both the content selection and integration and the pedagogic approach. As discussed in Chapter 7, the recruitment process and resultant selection of KCT members was an important context. I proposed the term *Self Innovator* to describe the common characteristics that the interviewees shared.

What this CMO suggests is that the challenge-focused policy created a successful context in which the mechanism of ‘Focus’ was fired. Using the challenge as the focal

point for curriculum design supported knowledge integration, defined as “a process of bringing together different forms of knowledge, which represent different perspectives and understandings of a problem or topic, to enable mutual learning and build a complete and more complex picture of the problem in focus” (Cockburn, 2022). The group learned as a group and this demonstrates common group learning. This is itself a method of integration: integration takes place as a learning process of the group (Rossini & Porter, 1979). The output reflects the common intellectual property of the entire group. In this process, there are no experts in any part of the process: the group is the expert. I observed as a facilitator in the content creation process that academics were primarily concerned with two aspects of the curriculum: ensuring a depth and breadth of disciplinary knowledge. The facilitated content creation process ensured that they understood this was the goal. The act of content co-creation is itself an integration methodology. Interviewees affirmed that the final master’s integrated disciplinary content to a satisfactory level. Assessing this content would enable integration to be assessed at a student level. Clear integration methodologies and evidence of their efficacy will contribute to compiling existing expertise (Bammer et al., 2020) and demonstrating disciplinary learning in TD, ESD and CBL. My findings suggest that team curriculum design supports integration in TD education in a manner that enables clarity of disciplinary input.

The Curriculum Design Blueprint allowed sufficient flexibility for the KCTs to take ownership and shape a methodology but the challenge-driven emphasis within each level of context succeeded in orienting all thought processes to a central challenge arc: beginning with a micro challenge in the first phase of the master’s; continuing with a selection of challenges in the second phase which could be studied; and in the final phase culminating with a real challenge, chosen and addressed in partnership with

extra-academic actors. KCTs in their responses listed the following elements that needed to be realised through the curriculum design: Collaboration; Extra-academic actors; Complexity; Integration; Challenge-focus; Impact-driven; Flexible; Student-centred. The majority of interviewees saw the challenge as the central point of the curriculum. The goal of learning was to gain [iG2] a “deeper understanding of a challenge or problem” or “real world kind of concepts or problems and doing it in a kind of a collaborative way across multiple different subjects, subject areas and disciplines.” [iH2].

Although disciplinary is important.... this is about effectiveness.

Maybe I don't use this word effectiveness but otherwise it's just an intellectual exercise. We need to add to this intellectual exercise an interest and motivation that translates into engagement and excitement and active thinking. [iH2].

This demonstrates the importance that interviewees placed on the principle of actionable knowledge.

In addition to actionable knowledge, interviewees regarded integration as necessary to give depth as well as breadth to the learning experience through integrating disciplinary expertise. Focusing on a challenge also created space for flexibility in what content was integrated. Interviewees recognised that a challenge is necessarily a loose design and that ultimately the choice of expertise to be integrated would vary depending not only on which experts were involved but also on the student journey i.e. which aspect of a challenge students chose to focus on. For example, iA1 described the process of choice as experienced by one of the KCTs:

It will take a lot of time to involve a lot of things. So we agreed: we have problems with water quality and quantity and then OK but we have sea level rise. We have seawater intrusion on the coastal areas. We have droughts and floods and climate change and then we have problems within cities which are not involved. Rural areas. Yeah, of course you cannot involve all of these things, but I think that's what this is about [the Alliance] because it's flexible. So we agreed to create module titles as broad as we can to be able to modify during the year the content so it can be a bit flexible. And adjust it to new challenges. [iA1]

It is widely discussed in the literature on TD research that the very nature of addressing complex societal problems with a diverse group of stakeholders means that each scenario will necessarily be unique (Neuhauser & Pohl, 2015). However, the deliberations and potential points of disagreement within KCTs about what content to include and how to structure that content into learning experiences (in this case modules) demonstrated that some integration framework is necessary after reaching agreement on a challenge and problem space. This affirms a widely held view within the literature on TD that both a clearly defined problem-solving methodology and integration methodology (Bammer et al, 2020; Hoffmann et al., 2017) are needed in TD so deliberations do not get too diffuse. The content creation process, including facilitation and management (as outlined in Chapter 7), provided KCTs with needed direction on how to integrate their disciplinary knowledge, for example, through the use of the ProClim knowledge integration methodology.

While there is a dearth of literature on TD curriculum design, the findings from this RE demonstrate that academics who participated in the KCT and content creation process defined success within TD education in a manner similar to TD researchers. Success is the activation of expertise to delimit a complex problem; manage contested problem definitions; articulate an appreciation that not everything can be known; understand and manage real-world constraints on handling a problem; and appreciate and accommodate the partial and temporary nature of solutions (Bammer et al., 2020). Participating in the content creation process as a facilitator also affirmed to me that the development of integration methodologies can be supported by opening the black box on TD curriculum design – by revealing the ‘relayed’ as opposed to the ‘relay’ (Bernstein, 2003) i.e. what is taught as opposed to how it is taught. To adopt the language of Bernstein, it is necessary within an epistemological and pedagogical space such as TD – which necessarily falls between and above disciplines – to analyse the principles that transform knowledge into curricula.

Disabling contexts

While the content creation process fired the mechanism of focus, and this can be connected to the context of the EUI call for challenge-oriented education, certain elements of institutional bureaucracy within Alliance partners were a disabling context. While the EC funded the EUI as a specific supra-national initiative, there was no supra-national mechanism to validate a programme. Therefore one of the Alliance partners, in this case the Irish university, had to act as the programme ‘owner’ and provide the approval mechanism for the programme, namely their own approval process. The programme approval timeline was set because the Alliance had to meet existing institutional deadlines i.e. academic council. This meant that the approval process began almost as soon as the programme was written. Approval happened in

early Autumn 2020 and the master's was open to application in early spring 2021. Therefore to meet the requirements of programme validation, interviewees had to produce a traditional programme design – module learning outcomes (MLOs), indicative content and reading lists (which interviewee iA1 described as “these administrative things”) – which they saw as hampering real innovation. While this was the focus of the Detailed Content Creation phase and as such was outside the remit of this case, it was a point of discussion for all interviewees. iJ2 described it as follows: “For me, for the last six months, transdisciplinarity has acquired a new dimension. It emerged as a pedagogical or didactic boundary object. It's something that we negotiate personnel work hours, themes, etc. etc. we manage.” iI2 said:

The only way I can describe that it's like being like the mad artist and I want to all this wonderful stuff. My teaching and my learning. We can't. We don't have that time and space. So we don't have the luxury of all that creative development because we are working within parameters and we need to be able to balance our parameters and our resources with our creativity and with our expectations and with our ideologies. You know they too have to meet somewhere. [iI2]

The parameters were set by both administrative structures and by time. Therefore, the five universities needed to work out who would teach the programme and where. The TD nature of the curriculum was such that a traditional ‘chalk and talk’ approach was not the goal. However, both the Alliance and KCT members had significant limits in terms of who would teach and how much a teaching team might cost. Students could register at any of the five campuses and were able to participate via hybrid classroom set-ups. Unfortunately, this second process of designing how the programme was

taught is outside this case but it does demonstrate that the EC should consider the length of the funding cycle to match a longer timeline that enables greater innovation in both design and teaching. Additionally, both the workshop facilitators and KCT members had to fill out programme requirements in terms of the Dublin descriptors (workload, level, learning outcomes, competences and profile) and all interviewees found this to be counter-innovative. It also led to a sense of uncertainty about how this programme could be taught and if the challenge-focused content was “correct”. As the majority of interviewees had no prior experience in TD, they expressed this feeling of uncertainty at several points during their interviews. However they also expressed the opinion that this experience of uncertainty was an important part of their learning process, as will be outlined in the next CMO.

10.2.3 CMO 3: Liminal Space

The final CMO ‘Liminal Space’ describes the importance of creating and supporting a particular environment or space for TD education within the university. The macro context was that this was an educational pilot as outlined in the EUI call and the experimental nature within the context of the policy was made clear to prospective KCT members at the townhall meetings. Even though the majority of this group had not experienced TD research or educational environments, they had a cursory introduction to the Alliance vision and definition of TD through the town hall meetings held to introduce the Alliance to the five partner universities and to invite participants. This formed the meso context for their participation. The micro context was that interviewees were motivated self-innovators and Chapter 8 described the interviewees motivations to take part in this pilot: to explore new ways of thinking at an epistemological, transversal, interpersonal and systemic level. The work packages within the Alliance repeatedly affirmed to PMT and KCT members the need for the

content creation process and the master's to be experimental. We were very clear that not only were we doing something we had not done before, we consciously and deliberately sought to do something that had not been done before. We were bringing everyone, ourselves included, into an experimental space to try something new.

The content creation process created a neutral epistemological and physical (albeit virtual) space that interviewees described as a space where they could safely experience uncertainty and reflexively assess their discipline's capacity to contribute to supporting the analysis and management of a challenge. When I use the term 'neutral epistemological space', I refer to our efforts to ensure that no single discipline was leading or dominating the discussion around a challenge and that all disciplinary perspectives were valued equally. The mechanism that triggered was Support. To support TD, we sought to create a space (physical/virtual/administrative) that brought everyone out of their disciplinary and institutional culture. It was a group of equals – regardless of seniority, gender, discipline, institutional ranking, language (although we worked through English) or nationality. Creating this flat team structure in a neutral space outside of everyone's usual institutional environment created the space where we could support a team approach "to solve a problem without recourse to a single theoretical paradigm" (Scott, 2017, p. 49). This is how I perceived of epistemological neutrality. In bringing together members of the KCTs we strove to create a balance of disciplines both in terms of maintaining only a single representative per discipline but also to balance STEM (science, technology, engineering, maths) and AHSS (arts, humanities, social sciences). The KCT I facilitated focused on Food and as I outlined in Chapter 7, I strove to create a space where every epistemology or 'school of thought' held equal footing.

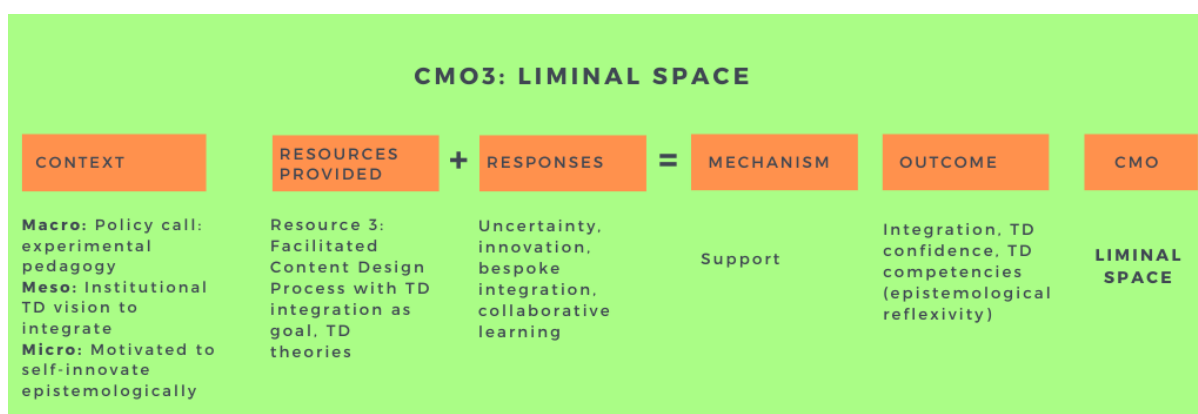


Figure 10.5 The component parts of CMO3 Liminal Space.

During this time, and perhaps heightened by the fact that we were working remotely and in the midst of a pandemic, we were eluding or slipping “through the network of classifications that normally locate states and positions in cultural space” (Turner, 1969, p. 95). My experience with the KCTs combined with how interviewees described their own experience of the process of TD content creation evoked the idea that we were all engaged in a rite of passage. The process adopted by the Alliance invited academics to enter this space, a “betwixt and between” as Turner (1969, p. 107) might describe it or a liminal space. This liminal space was an integrative space, where participants moved out of their disciplinary zone to a space where as one interviewee said, they were “forced to think” [iG1]. Once managed and supported to co-create a narrative, “an intense comradeship and egalitarianism” developed, “rank and status” disappeared and a new “modality of social relationship” developed that was akin to Turner’s definition of “communitas” (1969, p. 96). The first step was undertaken voluntarily by all participants to separate from the norm (pre-liminal); the content creation process was the crossing of the Limin or threshold entering the liminal stage (van Gennep, 1960). The TD collective can be viewed as “threshold people” whose attributes are “necessarily ambiguous” (Turner, 1969, p. 95).

Uncertainty is part of TD education – both for staff and students (Clarke & Ashworth, 2018). However, my findings indicate that these spaces (temporal and physical) must also be created with the understanding that TD (learning or, as within this fieldwork, curriculum creation) provokes a level of uncertainty and this experience of uncertainty, described by this collective as epistemological uncertainty, personal uncertainty and professional uncertainty, needs to be recognised and managed. Once engaged in this collective, the KCT members experienced uncertainty on many levels: they expressed concern about the quality of the content they were creating; they were worried it might lack depth; they were concerned they were leaving out important disciplinary information; they were concerned about the dominance of STEM over the humanities; they did not want to dominate with their disciplinary expertise and they worried that others might not understand them; they worried there was no common language. This required active management, which reflects similar findings in studies on TD research teams (Hollaender et al., 2008; von Wehrden et al., 2019). TD teams are composed of different viewpoints, expertise and ‘thought styles’ and as a result, parts of the process of integration can diverge as well as converge. It is a delicate process. In describing the management needs of TD teams, Hollaender et al. (2008) argue that while integration needs to be part of the project from the beginning, managers should be careful to allow dynamic development. Although the findings suggest that feelings of uncertainty about their role in the content creation process and what they were creating were common in the group, by the second set of interviews, this uncertainty had given way to confidence. The collective embraced this uncertainty as a necessary transition state in the process of TD.

Facilitation gave a balance to feelings of uncertainty. As I described in Chapter 7, my role mediating conflict and acting as a translator of sorts gave KCT members trust in the structure, the process and my role and ensured that trust with other group members was not weakened. The group were engaged in a leap of faith. Boix Mansilla et al. (2016) describe this as the creation of a favourable cognitive and affective environment that nurtures “a climate of conviviality” and the “social-interactive qualities” of individuals i.e. sociability, communicative styles, effective leadership (ibid p. 594). Traditional departmental structures and routines may not allow for these types of interactions and relationship development. This builds the confidence of not only students but staff to communicate their own disciplinary expertise and to develop the skills to connect that expertise to others to create actionable knowledge which involves developing competences in all participants (Hawkins, 2017).

In their work on the successful formation of ID research networks, Boix-Mansilla et al. (2016, p. 574) argue that it is necessary to create a platform i.e. “a dynamically co-constructed space with a set of rules and objectives that members develop”. This is a space in which researchers engage with each other to work on a common problem. Here, they “define problems to study, exchange expertise, build personal relations, project and maintain academic self-concepts, and yoke for status; what they create together constitutes a basis that shapes how they collaborate with each other—such as shared language, key concepts, tacit rules of interaction, group culture and identity, and collective mission” (ibid). The findings from data generated within the RE of the Alliance curriculum design process was that a successful group dynamic can also be created by developing an institutional vision/mission/principles and inviting academics or researchers to take part in this. All interviewees mentioned the attractiveness of the

experimental nature of the Alliance in addition to meeting colleagues from other institutions and cultures. Approximately half of interviewees cited the idea of working for, with and in support of Europe as an important factor. But it was clear from interviews, that the experimental vision, the TD aspiration (bringing multiple disciplines together to bear on complex challenges) really motivated interviewees. The similarity of motivation across all interviewees was one of the more striking findings considering the institutions were so different. These findings demonstrate that there are motivated self-innovators within academic communities who will respond to values-driven narratives that engage them in a collective with like-minded individuals to drive innovation.

Clarke and Ashworth (2018, p. 157) argue that “a shift from a hierarchical and hegemonic way of thinking and acting towards a greater plurality of ontological and epistemological framings” is observable in TD research environments and this was also achieved within the KCTs. A precursor to this is developing a shared understanding of each other’s language i.e. disciplinary terms and concepts.

McGregor (2017) describes this as really talking to each other and really hearing what the other is saying. The KCT structure and the content creation process laid the foundation for this process of learning to collaborate and the structure and process are interwoven. All interviewees described the process of this collaborative curriculum design as one of brokering and reaching agreement or “trying to find the balance with each perspective at each approach and each discipline” [iG1]. Interviewees referred repeatedly to the need to adopt a new perspective or “to see another’s thinking” [iC1]. The content creation process supported the development of a shared mental model and built trust by using discussion of problem spaces to communicate values and disciplinary contributions. It also provided time for KCT members to build a shared

understanding of the goals of the process and introduce terms and concepts from their own disciplines to each other.

As outlined in Chapter 7, conflict occurred within the KCTs, but conflict was epistemological: I observed that interviewees had different approaches in how their disciplinary knowledge could be integrated. This supports the literature on TD that epistemological conflict can occur in TD work (Cockburn, 2022; Hollaender et al., 2008), however literature on ID and TD highlights the need for conflict to be allowed and negotiated (Klein, 2018). In my experience as a facilitator within one of the KCTs, conflict had the potential to emerge at many given points in the dialogue on disciplinary integration and while some see conflict as a barrier to TD (for example Decuyper et al., 2010), the interviewees saw some conflict as necessary. Decuyper et al. (2010) describe this as “constructive conflict” and the maintenance of an equilibrium between conflict and harmony is important for learning. ID and TD work need time (Hawkins, 2017) and spaces, which are described in the literature as trading zones, networks of practice or boundary organisations (Bolger, 2021). This CMO draws out the need to create a neutral disciplinary space where conflict can be accommodated and facilitated. These findings demonstrate that the role of the facilitator within KCTs mitigated against conflict and supported the development of factors that positively affect team learning, for example, by building trust and protecting a flat structure. The facilitator also ensured, as Chapter 7 described, that no one perspective dominated and that individual members did not seek to promote their own views or lead decision-making. The resource of facilitation provoked a very favourable response and contributed to the possibility of writing this integrated curriculum in three weeks, working remotely. However, the majority of interviewees

said the process would have worked better had KCTs been brought together for a block of time – two or three days physically in a neutral space.

10.3 TD competencies

All three CMOs demonstrate that the KCT structure combined with the content creation process created an awareness among interviewees of the development of and need for competencies. The CMO 'The Collective' indicated the recognition of KCT members of the importance of collective competence development in staff taking part in TD education and research. Interviewees articulated TD competencies that some individuals may possess and others need to develop: communication, collaboration, disciplinary reflexivity, active listening and open-mindedness. This firmly supports the wide range of literature on the competencies needed to take part in TD research: to perform in a flat structure, to communicate, to problem solve and to collaborate (Pearce, 2021; Crosby et al., 2018). I would propose that TD education can be visualised as a U-shaped rather than T-shaped education process. The T-shaped professional (Oskam, 2009) refers to individuals who possess disciplinary expertise in one area (the vertical column) and the ability to adopt the perspectives of other disciplines (the horizontal column). The U-shaped individual has developed competencies in two pillars – knowledge integration and actionable knowledge – but the development of these pillars requires competencies, for example, collaboration, reflexivity, openness, flexibility and communication but also attitudes or dispositions (Augsburg, 2014). Interviewees affirmed the need for those participating in TD teams to possess these competencies and affirmed that TD education provides the environment in which these competencies can be developed. Within policy, competencies such as empathy, open-mindedness, sensitivity, social skills,

facilitation, knowledge brokerage and the ability to build trust are considered important competencies for TD research (OECD,2020). A key point referenced in OECD policy is that prior experience with TD is key to developing these and to successful TD research teams.

The findings in this thesis confirm that those who partake in TD activities develop a new awareness of the need for TD competencies and attitudes. Interviewees said that TD practice required individuals to possess the inter- and intra-personal and professional qualities to work with diverse groups of people, with diverse sources of information in response to diverse multi-faceted problems or challenges (Augsburg, 2014; Misra, 2015). But interviewees also stated that TD practice gave participants the opportunity to enhance and develop these inter- and intra-personal and professional qualities. This resonates with Augsburg's (2014) proposition that TD is a process of becoming rather than being and with literature in broader fields connected to TD practice, for example, team science. The National Research Council (2015, p. 98) report on team science identifies the following competencies as necessary for TD: team knowledge (e.g., task understanding, shared mental models, role knowledge); team skills (e.g., communication, assertiveness, situation assessment) and team attitudes (e.g., team orientation, trust, cohesion). Boix Mansilla et al. (2016) list the attributes that need to be present or cultivated on an individual and group level as: competency for deliberation and learning from each other and development of meaningful social relations with group members (ibid). Within TD education, competencies may also be described as meta-competencies (Nurius et al., 2017). In practice, the intrapersonal and interpersonal are connected in more recent work on TD which uses the term 'capabilities' rather than competencies to included value and beliefs: Misra et al. (2015) locate themselves within the science of team science and

describe TD as an orientation composed of “values, attitudes, and beliefs and conceptual skills and behaviors” (ibid p. 6). To them, successful collaboration in TD can be seen at three levels of orientation: intrapersonal, interpersonal, and intellectual orientation. Hawkins (2017) describes how important academic humility and self-reflection are for TD work including “a willingness to forgo the personal power-base often associated with traditional monodisciplinary hierarchical structures” (Hawkins, 2017, p. 66). Within the domain of research practice, certain TD approaches have emphasised the central role of the emotional or affective in TD. Cognitive emotion is the term Boix Mansilla et al. (2016) use to describe factors central to successful ID and TD research and ID/TD collaborations. These have three interconnected dimensions: cognitive, emotional, and interactional (Boix Mansilla et al., 2016). Engaging with a network means taking part in relationship and identity work (Vassilev, 2014). The U-shaped metaphor captures the breath of this work: to be able to integrated knowledge from other disciplines and domains and to be able to create opportunities to action knowledge, individuals and teams need a broad set of inter- and intrapersonal competencies.

If universities are to focus on the development of key competencies, a reorientation of learning processes is needed (Barth, 2007). As explored in Chapter 4, TD and ESD are closely aligned and both educational paradigms can be perceived of as processes rather than outcomes (Biggs, 2017; Fam et al, 2018; Klein, 2017; Barth et al., 2014; Hirsch Hadorn, 2002). In both fields (TD and ESD), there have been calls for the reconceptualisation of education to view learning as a process that is oriented around competency development leading to a new learning culture that aims to develop both factual knowledge (‘knowing-that’) and procedural knowledge (‘knowing-how’) (Gaard et al, 2017; Dlouhá & Burandt, 2015; Barth & Rieckmann, 2012; Barth et al., 2007).

The content creation approach emphasised a dialogue between content and process (Balsiger, 2014). By immersion in a TD curriculum design process, staff became aware of their own competencies and expressed an awareness of the need for competency development in both staff and students in order to support their ability to take part in the TD process. However, rather than engaging staff in staff development programmes, the formation of a KCT structure allows staff to develop awareness of their own competencies and develop competencies while increasing confidence in TD. This is similar to a collaborative learning model, which combines both a process and an outcome perspective on team learning (Baker, 2015). Within ESD, competence development of staff is seen as an essential prerequisite for a sustainability paradigm shift (Barth & Rieckmann, 2012) and these findings suggest that the development of KCTs support 'learning by doing' is a powerful mechanism for change in universities. Further research could explore how the participation of staff in KCTs influences or permeates the broader institutional culture. For example, Barth & Rieckmann (2012) found that ESD facilitated the personal competence development of the participating academic staff and changed their teaching practice, but also that it influenced the general organisational development of the university. The role of facilitator supported a triological approach: "learning as a process of knowledge creation which concentrates on mediated processes where common objects of activity are developed collaboratively" (Decuyper et al., 2010, p. 121).

As I argued in Chapter 3, the list of competencies sought to be developed within TD education can appear nebulous and over-ambitious. Is it possible that many of these competencies are or should be developed in the workplace or, for example, through personal relationships or simply life in any community? CBE has potential but is an

area where further research and input from the educational science community is needed to tackle the perception of CBE as ill-defined (Davies, 2017; Lozano et al., 2012; Norris, 1991). The need for educational science to research CBE both as policy and practice will be explored in the concluding chapter.

10.4 Conclusion

Much scholarship on TD within universities has focused on the development and evaluation of research (Chambers et al., 2022; Vienni Baptista & Rojas-Castro, 2020; Laursen & O'Rourke, 2019; Hoffmann et al., 2017; Pohl et al, 2017; Bergmann et al, 2013, Bammer, 2008; Bammer, 2005). This thesis sought to build on literature exploring TD educational practice (Gibbs, 2017; Fam et al., 2018) by 'opening the black box' on curriculum creation through a RE of a TD content creation process piloted by a European university alliance to create a sustainability-focused, trans-institutional TD master's programme. The RE approach allowed me to "focus on which combinations of circumstances provide the most compelling possibilities for change" (Pawson & Tilley, 1997, p. 107). This chapter presented the CMOs that emerged from the fieldwork as global themes (Braun & Clarke, 2013; Holmen et al., 2021): the Collective, Actionable Knowledge and Liminal Space. It is difficult to completely disentangle CMOs within RE – they necessarily affect each other. For example, the successful establishment of a collective is not solely attributable to the KCT structure but also to the content creation process, the role of the facilitator and the original policy call, which was echoed in the language of the Alliance educational principles and its guiding mission. However, within RE, outcomes are not inspected simply to see if programs work but are analysed to discover if the conjectured mechanism context theories are confirmed. Pawson and Tilley compare actual

outcomes with success indicators and ask: Did the program theory work? In this thesis, I would argue it did, and I return to this point in Chapter 11.

As Sterling (2004) argues, driving educational change to support TD fields such as sustainability means tackling both educational paradigm and provision. This, he writes, is a double learning challenge. If we remove structural constraints, ID or TD models of education may still run counter to intellectual as well as organisational culture (Charli-Joseph et al., 2016, Dlouhá & Burandt, 2015). ID and TD will not be nurtured and systematised by structural changes alone, for example, reorganising disciplinary departments, freeing staff time or creating resource flows for university-wide modules and programmes. This thesis argues instead for institutions to focus on grassroots initiatives by building and resourcing neutral epistemological and physical (or virtual) spaces for networks of motivated academics to co-create TD education experiences. These will also have the potential to build TD research opportunities and develop relationships with extra-academic actors. The EUI presents a step change in this regard and signals to the sector that the emphasis on TD will increase alongside greater incentives for HEIs to drive European integration and intellectual economies of scale. The academic community would benefit from actively and critically engaging with these policies and educational shifts but from an evidence-informed position utilising educational science to support critical engagement and enhancing institutional autonomy in decision-making.

Chapter 11 Conclusion

What is valuable for society is not always the same as what is valuable for science. [iC1]

We're going to move to the new paradigm like the other Phoenix. It's like a metamorphosis... We are moving and we are in the middle. I mean I'm quite sure that this is going to be the future for learning and the future for research. [iB2]

11.1 Introduction

Twenty-first century TD is a normative exercise. It is an orientation of knowledge to solve problems – societal problems; and it is this space – the problem space – that is the locus of TD. This orientation introduces a new paradigm into education, wherein society (in this thesis, referred to as extra-academics actors) has an active role in shaping and realising curricula beyond the Triple Helix model through TD challenge-based learning.

This thesis examined the product of a European policy that sought to create a new university model, a trans-institutional European University that is TD in its nature. This model would draw on the strengths of universities to pilot a new type of TD education approach that brings multiple stakeholders together to define, analyse and work towards solving societal problems and in doing so provide a new generation of Europeans with the competencies to handle complex societal challenges. I used a case study approach to examine how Knowledge Creating Teams (KCTs) were

formed to create a TD curriculum through an innovative content creation process. Chapter 10 outlined my findings as three thematic CMOs. Within this concluding chapter, I seek to answer the research question: *How can TD education be successfully created within a university?* The answer to this question resides in system innovation. I will answer the question from the three perspectives to reflect the three themes that emerge from these findings: macro, meso and micro. I begin with a brief reflection on my journey through the research process and on the concept of system innovation and its meaning within higher education.

11.2 My doctoral journey

I entered the doctoral process first and foremost as a practitioner and I finished the doctoral process in a role I did not know existed before I began: I am an educational scientist. I first encountered this term when it was used by my Dutch colleagues within the Alliance. These colleagues referred to themselves as educational scientists because they had a master's in education sciences (as it is called at their home university) with a focus on primary or secondary level education and were now working within educational innovation at their university. I am now employed by a Dutch alliance of universities to research the development of CBL and TD within the alliance. My current role is within a School of Education and within this school my expertise in higher education sits alongside expertise in primary and secondary education. My role is the embodiment of the motivation that first drew me to the doctoral programme as outlined in Chapter 1, to shine a light on a terrain within universities which now I can call the sum of its parts: the knowledge architecture, how the university operates as a whole within and in relation to society. This is arguably a place that no-one owns, at least not intellectually, and yet it is the only place where

the university as a community of scholars can act in unison. This thesis is about strengthening that space.

11.3 A new vision of system innovation

The quotation that opened the introductory chapter in this thesis is taken from an article written by Richard Wohl in 1995 entitled *Some observations on the social organisation of interdisciplinary social science research*. It presented a list of the impediments to ID: disciplinary structures, administration systems, academic careers. In 2014, the United States' National Research Council produced a similar shortlist to Wohl (National Research Council, 2014) and were you to speak to university leaders more recently, as I have through my previous roles, you would find that these perceived impediments to ID and TD persist today. In Wohl's article he quotes former President Conant of Harvard University who wrote the following in the university's 1951/52 annual report:

... my own attempts to bring about greater integration have for the most part failed. I am now convinced that the only cross-departmental collaborations that are effective are those that arise spontaneously by almost the accidents of the personalities of the various faculties. The role of the administrator is to help such "grass roots" movements, but there is little that a president can do to stimulate them. (Wohl, p. 375)

The problem, Wohl claimed, was not philosophical or organisational but social. Formal organisation and legislation were not the cure by themselves. Change from above, he believed, would not produce the productive conversation, the good will, the

communication or the “collaborative enterprise”, the fertile seeds with which ID and TD work is sown.

Over 50 years ago, in 1970, Jantsch, as outlined in Chapter 2, used the terms system and innovation to describe the changes the university needed to make to become responsive to societal problems. He proposed a conceptualisation of the university as a multilevel, multigoal, complex, interconnected system (Jantsch, 1970). Jantsch argued that we should consider the nature of the problems of universities as systemic. I concur with Jantsch and Conant that discussions about university reform that focus on the universities’ operational problems or solely on didactic or isolated curricular innovation are limited. Indeed, as Jantsch argues, the role of policy is to provide a systems’ view and to conceive of and recommend changes at a systemic level. His recommended systems approach considers science, education and innovation as “general instances of purposeful human activity” (ibid, p. 406) that already interact dynamically within society. Thus within this case while I set my boundary around a limited number of components, RE allowed me to thread these to the systems within which they sit, the contexts that influence mechanisms to trigger or not. This is especially important when considering how to create TD education. TD education is concerned with triggering the latent mechanisms within the university that are its interconnectedness. TD is the opposite of disconnection. TD brings us to a paradigm that looks not at the universities’ silos but what does and can interconnect them both within the university and outwards to actors outside the university. TD is about firing those mechanisms, triggering the power within the system. This firing (Pawson & Tilley, 1997) or releasing powers (Bhaskar, 2008) has the potential to create innovation i.e. change to realise a new idea.

My own perceptions of innovation, prior to undertaking this research, were that it is a concept 'owned' by the discipline of business (Baregheh et al., 2009). I understood it as a concept that is tied to the marketplace, to maintaining competitive advantage, increasing value – a process of constantly renewing to ensure corporate survival and constant growth (ibid). Innovation within business has been described as “the application of new ideas to the products, processes or any other aspect of a firm’s activities” and is seen as crucial to growth and renewal in organisations (Rogers, 1998, p. 5). Bessant et al. (2005, p. 1366) argued that unless an organisation “changes what it offers the world and the way in which it creates and delivers those offerings”, its survival and growth are at risk.

Social innovation theorists provide an alternative conception of innovation as “any novel and useful solution to a social need or problem, that is better than existing approaches (i.e., more effective, efficient, sustainable, or just) and for which the value created (benefits) accrues primarily to society as a whole rather than private individuals” (Phills, Deiglmeier & Miller, 2008, p. 34). At the simplest level, innovation is a new idea (Pol & Ville, 2008) but one that is enacted. Jantsch employed the term social innovation, likening it to the self-renewal of society or society’s response to itself, its implementation of changes to address problems. However, the term social innovation has been criticised as overly generic, vague and lacking empirical substance or empirical usefulness (Pol & Ville, 2008). Within this thesis, I conceived of innovation as the search for opportunities to change or act within a system, in this case the university as a system, in response to motivation within and external to the system. In this thesis, innovation is the self-renewal of the university or the university’s response to itself. And in this concluding chapter, I return to the original research question with these terms in mind: *How can TD education be successfully created*

within the university? I would argue that my findings demonstrate that a university can achieve system innovation not by adding on to the system or dismantling and reconstructing the system but by playing to its strengths.

11.4 How TD can education be successfully created within a university: macro level

This fieldwork was made possible by a paradigm shift in European higher education policy that resulted in the EUI. I have sought to argue in this thesis that the EUI marks a departure point for European higher education policy and it signifies a changing landscape for higher education in Europe (Gunn, 2020; Jungblut et al., 2020; Cino Pagliarello, 2022). This departure has the potential to bring about greater change to the sector than previous educational policies within the Lisbonisation of higher education. The EUI appears to have “ideational coherence, political commitment, and a hybrid type of governance” that combines top-down policy with a bottom-up approach (Cino Pagliarello, 2022) of which the KCTs examined here are a concrete example. Within just over three years, the EC, through the EUI, has directly funded 41 transnational EUIs with a minimum of three partners *from* three member states at a record total budget of €272 million (European Commission, 2021). In 2020, the EC changed the original wording of the EUI call and it now states that European university alliances “must create a European inter-university ‘campus’, where... transdisciplinary and transnational teams of students, academics and external stakeholders tackle big issues facing Europe (such as climate protection, democracy, health, big data, migration)” (European Commission, 2020). This is the first explicit call for TD at this level and it indicates a drive for renewed integration but also a drive

forward for change that has been described as the Quintuple Helix model. The Quintuple Helix moves the vision of system change beyond the university-industry-government model (Triple Helix) to system change that has the potential to promote “collective interaction and exchange of knowledge” through five interacting helices: (1) education system, (2) economic system, (3) natural environment, (4) media-based and culture-based public (also civil society), (5) and the political system (Carayannis, Barth & Campbell, 2012, p. 5). This captures the expansive nature of the EC call for European Universities, which promotes a team-based approach to education through teams that comprise academic and extra-academic actors and students. The findings in this thesis, while focused on a limited number of interviewees, nevertheless demonstrates that there is a willingness within the academic community to embrace this team-based approach to curriculum design and teaching that fundamentally shifts the curriculum ideology from one that is discipline- and university-based to one that is shared with society at large. Society becomes a contributor of curriculum content in the form of lived experiences and ‘real world’ expertise. Interviewees commented on their limitations as disciplinary experts and the multiple contributions needed by extra-academic actors in order to create a successful TD learning experience [iC1] [iF1].

Additionally, the policy on European Universities has the potential to create harmonisation at a supra-national level which is a changed approach for the EC. Already, the EUI mechanism means a, potentially, faster exchange of best practices through the formation of transnational alliances that themselves need to solve differentiation in national regulations on degree recognition, thus tackling the failures of Bologna. A renewed emphasis on mobility in the EUI also signals an economic strategy of greater integration in skills and human capital. We should consider this as a signal of where the EHEA is heading with funding to match: “moving from relatively

short-term project collaboration to a more programmatic, long-term, integrated level of collaboration” (Jungblut et al., 2020, p. 412). This “networks of networks” is an innovation that has the potential to succeed where other attempts at a European university have failed (Gunn, 2020): it does not need a campus (it integrates multiple campuses); it spreads funds across a breadth of members states; it sidesteps “the difficulties of launching a new entity in a sector where history, esteem and status are paramount” (ibid, p. 22); it is not seen as a threat by universities because existing universities can bid for the funding. And European universities, like all universities globally, are constantly under pressure to seek additional funding. In 2019, 54 alliances applied and 17 were chosen. In 2020, 62 alliances applied and 24 were chosen. These 24 alliances involved 65 higher education institutions from 26 member states. The cumulative total of HEIs applying for funding if alliances have a minimum of three HEIs per application (though many have five or more) is over 300 within three years. My experience within the Alliance was that this funding was applied for very willingly by partner universities and the cross-border difficulties in degree or credit harmonisation were taken on with significant commitment at the most senior level.

11.4.1 Connecting the policy implementation-feedback loop to educational science

These are stealth changes that have potential to bring about significant cultural change – and these should be approached as opportunities but also threats. The nature of the policy and the funding mechanism, I would argue, almost completely sidesteps member states creating a potential disconnect between state policy and higher education. Likewise, the higher education sector should exercise caution regarding the potential use of TD within policy as a narrative to lead private-public

collaborations thereby “increasing the legitimacy of the private sector to intervene in a policy field that has traditionally been the domain of public governance” (Cino Pagliarello, 2022, p. 159). The EUI has explicitly asked the sector to test models for future universities and this funding is an unprecedented opportunity for the sector to take the reins, as it were, in counterbalancing the knowledge economy narrative and practice.

The EC has stipulated that results should be fed back to the EC, which through progress reports is closely monitoring developments in EUIs across Europe. This is an opportunity for EC policy and funding to be influenced by the higher education sector but this should be informed by policy sciences and educational sciences. This opportunity can be maximised by connecting the university educational science community to pilot evaluation: a powerful tool to direct this narrative. Connecting these EUIs to educational science research is crucial for the sector on many levels, not least that a high degree of reflexivity and caution is required when implementing European higher education policy on behalf of the broader university community.

It is imperative that this review includes an examination of EC funding structures and how these are implemented within HEIs and states. Institutions vary in how they resource or support staff to take part in educational innovations. This differentiation was evident in the KCT team. As mentioned in Chapter 4, implementation of the Bologna process is perceived as fragmented due to the differing resourcing abilities and willingness of member states to implement higher education policies (Cino Pagliarello, 2022; Gunn, 2020; Veiga, 2019; Neave & Veiga, 2013). A weakness in the EC approach is the ‘short-termism’ of innovation funding. A potential solution is that the EC funds European TD educational missions as a spoke of research

missions. This could be realised by including an educational dimension into the EC's challenge or mission-based research funding calls thus ensuring that educational innovation is a constant cycle that feeds back into EC policy.

11.4.2 Rethinking the Dublin descriptors at a European level

Within the institution, as the findings in Chapter 9 evidence, KCT members found the current programme approval and teaching administration structures (timetables, teaching contracts) to be counter-innovative. While the latter falls outside the boundary of this case, the former was a significant constraining context in creating innovative programme content. The key constraint was the need to fit content into the Dublin descriptors (programme learning outcomes, module learning outcomes and constructively aligned assessment). While the template of module learning outcomes served beneficially as a structure to frame and collate content within a short time frame, interviewees found that it limited innovation. The very nature of TD as a learning process is limited by the current tradition of the Dublin descriptors because a competency-based framework is most suited to this type of learning. TD happens at multiple levels. While knowledge mapping is an integral part of this, the need to produce Dublin descriptors to get programme approval are counter-intuitive. Dublin descriptors are based on the logic that you can map what will be learned. In TD, the process of finding out what needs to be learned is a key part of the learning.

Additionally, across Europe, different states have different approaches to programme approval and the interconnection between programme approval and quality. To innovate the shape of educational programmes to accommodate new learning approaches such as TD or CBL, the EC and HEIs should re-examine the logic and

structure of their own programme approval processes and work in collaboration with European quality agencies to explore alternatives that provide greater ability for educators to innovate without sacrificing rigour and transparency. Students can play a key role in this as stakeholders. This interconnection leads us to consider what changes can be made at a meso level.

11.5 How TD can education be successfully created within a university: meso-level

As a practitioner of strategic institutional academic development, I found the greatest obstacles to ID and TD were the absence of support (moral, workload and financial) for academics who wish to carry out ID and TD work and the misperception certain segments of the academic community had about TD. To create the liminal spaces needed for TD and to bolster the potential to create TD networks within universities, these two issues need to be tackled. This section first discusses the resource implication of the three thematic CMOs within universities. I then discuss how the perception of TD can be strengthened within the university.

11.5.1 Resourcing TD education: academic and extra-academic roles

KCT members, in their interviews, reflected that how they were supported had an effect on their perceived ability to contribute meaningfully and their motivation to do so. Absence of support can range from moral support e.g. recognition of an academic or researcher's commitment in their home discipline; financial support through buy-out of time; or career development support, recognising contributions through promotional processes. While the KCT structure provides an alternative structure that is less of a

draw on financial resources, it nonetheless, as with all TD teams, needs to be resourced and supported by administrative and structural mechanisms (for example, governance) (OECD, 2020). One of the potential challenges to using the KCT structure within universities is that within current models, staff need to be resourced to enable buy out from their home school or department for a portion of their time. While this approach to staffing TD education is flexible, it requires a core institutional funding stream, which may be made available in some nation states but not others, and it may be made available in some institutions but not others.

Likewise, extra-academic actors need to be supported. The findings indicate that KCT members valued the input of extra-academic actors and found their absence from the content creation process to be a significant hindrance to TD. Both the EC and universities need to recognise that collaboration with extra-academic actors needs to be managed holistically and sensitively. It takes time to develop relationships with extra-academic actors and as the KCT members needed to be supported to join and participate in the content creation process, so too would extra-academic actors. This requires a significant time commitment from the university and needs to be resourced. The OECD Global Science Forum report 'Addressing societal challenges using transdisciplinary research' affirms these findings in their recommended actions for supporting TD research (OECD, 2020). Universities need structures and mechanisms to build trusted long-term relationships with external actors. They need to commit core resources to the development of TD skills, methodologies and practice development.

11.5.2 Strengthening institutional perceptions of TD

In my experience as a practitioner and my interactions with staff across the five university partners within the Alliance, there can be a mistrust and misperception about TD that reflects the criticisms of ID and TD in the literature: that TD lacks academic rigour, disciplinary depth, and is lacking an evidence base for both its practice and its contribution to student learning and disciplinary development. As I argued in Chapter 3, these criticisms are not without justification. There can be a lack of awareness within universities about what TD is and universities can build trust and strengthen engagement through communication and professional development opportunities (OECD, 2020). The KCT members interviewed for the purpose of this research said they had been involved in TD activities previously without understanding that this was TD practice. For example, one interviewee (iF1) remarked on how they had been involved in international collaborations within their research and had an awareness of the skills involved without understanding that these were TD and could be linked to their educational practice. The findings demonstrate that the KCT content creation process was a successful TD professional development mechanism but it needs to be facilitated by educational scientists with a background in TD.

These findings indicate the need for both the development of alternative staff roles and the alternative development of current academic roles within universities to facilitate but also to productively develop TD education. I will return to the second point within Section 11.6. However this section addresses the first point. TD can be strengthened as an educational practice and in the institutional awareness of its existence, potential and growth in policy by situating TD education within the discipline of educational science. There are four reasons for this claim: First, expertise

is needed from educational science to bolster the potential of TD education and practice. Second, CBE needs to be overseen within universities by educational experts. Third, to support optimal disciplinary integration, TD needs facilitation by integration experts. As with TD research, TD education needs team members that have expertise in integration and implementation to draw the most effective contributions from the whole team (Bammer et al., 2020). Fourth, academic staff need opportunities to develop TD competencies and this expertise needs to be available internally. These point to the need for the development both of new TD roles within the university and further development of educational scientists with expertise in third-level education (policy, pedagogy and discipline). Education as a discipline needs to be resourced and developed by universities firstly to support and actively research the appraisal and implementation of European policy. Secondly, educational scientists are needed to research the emergence and practice of TD and ESD. Thirdly, educational scientists are needed to research and support the implementation of CBE. This requires educational scientists who possess the skills and research ability to work in a cycle of constant innovation. The EC could consider funding a network of educational innovators across European universities with nodes present in each. As stated, TD is about the relayed as much as the relay. When what is taught is a collective endeavour, it does not mean that disciplinary oversight and rigour is sacrificed.

TD practitioners and integration experts

TD is a new approach to collaborative knowledge creation that is an expertise in its own right that spans epistemology (Darbellay, 2012) and education. What we see in the field of TD is the need for individuals with a depth of research-informed expertise who can support TD and ESD but who also provide a much-needed evidence base to develop these fields of education. This is not apparent in the study of higher education

as an extant field (for example, Altbach, 2014). There is an emergent literature reflecting the success of collaborations between educational scientists focusing on third-level education and other disciplines (e.g. sustainability) or third space professionals (for example, Van den Beemt et al., 2022). Likewise there is evidence of the development of educational science focused on higher education pedagogy in particular CBL and ESD (Holmen et al., 2020; Van den Beemt et al., 2020). While third space roles are needed to support the relationship between extra-academic actors and the university, the role of facilitator, integration expert or educational scientist is of a different nature to a third space professional. These roles are not those of academic developers, a field that emerged in universities in the 1990s (Buyl, 2017). Academic development is diversely defined and carried out, which has led to criticisms that academic developers are a new category of ‘experts’ in universities supporting a neo-liberal model of public sector governance (Barrow & Grant, 2012). There is a perception that the field lacks disciplinary depth and is characterised by epistemological fragmentation (Buyl, 2017). It is often separated within institutions from the discipline of education and this is a weakness. What TD needs is akin to the strength of disciplines i.e. tacit agreement about a “valid way of obtaining, disputing and sharing worthwhile knowledge” (Buyl, 2017).

11.6 How TD education can be successfully created within a university: micro level

Andreas Schleicher, Director of the

k Directorate for Education and Skills, made the following statement in 2019:

Education is no longer about teaching students something alone; it is more important to be teaching them to develop a reliable compass and the navigation tools to find their own way in a world that is increasingly complex, volatile and uncertain. Our imagination, awareness, knowledge, skills and, most important, our common values, intellectual and moral maturity, and sense of responsibility is what will guide us for the world to become a better place. (as cited in OECD, 2019, p. 2.)

The findings in this thesis suggest that some members of the academic community support the claim that a new normal in education means that academics may need to, as Becher and Trowler (2001) suggested, search for different identities and roles in which to survive sectoral change. While Becher and Trowler argued that this was an unwelcome change that threatened the integrity of academia, this thesis suggests otherwise. KCT interviewees saw this need to evolve and change as very positive and some interviewees (iA1, iB1, iC1, iK1, iJ1) proposed that this would mean changes to the role of academic as teacher - to mentor, guide or coach. This role would be multi-faceted:

1. Academic as content expert in a TD/CBL team. The TD/CBL team creates a knowledge map connecting disciplinary knowledge to a challenge and drawing a boundary around the knowledge that they can feasibly cover within the time period of the programme.
2. Academic as mentor or coach to guide students in understanding this content map.
3. Academic as mentor or coach who develops their own transversal skills.

4. Academic as mentor or coach who can work within a team that maps transversal skill development for students.
5. Academic as mentor or coach who nurtures and maintains a network of connection to extra-academic actors and connects students to these extra-academic actors.

The teaching of teachers and the lack of suitable curriculum models are barriers to successful TD (Klein, 2008) and these point to staff development needs. As I argued in Chapter 3, CBE is weak in this regard. The literature on CBE demonstrates that there is a dearth of educational research and practice-informed research to give clarity on what a competence is, how it is developed and how it relates to disciplinary competencies (Norris, 1991; Barth, 2007; Frank et al, 2010). For example, ESD competencies have been described as competency in foresighted thinking; in interdisciplinary work; in cosmopolitan perception; transcultural understanding and co-operation; participatory skills; planning and implementation; capacity for empathy, compassion and solidarity; in self-motivation and in motivating others; in distanced reflection on individual and cultural models ESD (Barth et al., 2007). Alternatively, ESD competencies have been conceptualised elsewhere as: systems-thinking competence; anticipatory competence; strategic competence; normative competence; interpersonal competence (Wiek et al., 2011). This is an encyclopaedic catalogue of learning goals beyond the current capabilities of most academics. Given its focus on the language of problem-solving, competency development and association primarily with ESD, it may be challenging to source staff for TD educational programmes from two perspectives: firstly, staff may not want to be involved in an uncertain process within which the fit of their disciplinary skillset is unclear. Secondly, despite their disciplinary and research expertise, staff may not themselves possess the

competencies needed to develop TD competencies in students. If the TD learning process is seen solely as one of shepherding students through a self-directed group learning process, perhaps as proposed by Pearce et al. (2018), tutors or coaches are more suited to TD educational settings. But this presents the challenge that TD is disconnected from research expertise and disciplinary depth, which are key pillars of TD. If TD is perceived as a pedagogic tool to develop soft skills (communication, collaboration, innovation, problem-solving) or as a means to cultivate active citizenship in a segment of the population, it won't be granted the intellectual status of disciplines. This has ramifications for funding and resourcing alongside longevity and learning excellence.

11.7 Limitations

As outlined in Chapter 7, the case study drew a boundary around the content creation phase as the program theory. However the output (the TD master's) was affected by work carried out during the Detailed Content Creation Phase and due to scheduling, it was not possible to include this process in the fieldwork. This limited the data generation to the content creation process only and a more holistic view of programme design would have been preferable.

A major limitation to both the master's design and my research was that the Alliance was unable to include extra-academic actors in the content creation process. As highlighted in the findings chapters, this limited the extent to which this process could be defined as TD or co-production which "seeks to connect researchers with diverse societal actors to collaboratively and iteratively produce knowledge, action and

societal change” (Chambers et al., 2022). The addition of extra-academic actors would have added to the results of the evaluation.

A further limitation was that I did not have full access to how institutions resourced staff within the Alliance. While some staff had clarity and transparency on the resourcing of their time, many didn't. I was also employed by the Alliance. I was concerned therefore that asking interviewees questions about their resourcing and institutional support would put us in a difficult situation. Some interviewees were reluctant to discuss the details of how they were resourced and others may have perceived my questioning as invasive. As I was employed by the Alliance, I needed to balance my role and responsibilities as a colleague with that of my role as a researcher. With this in mind, I refrained from directly questioning interviewees regarding their resourcing. I also did not ask direct questions about the political impediments to TD work within their institutions. My position within the project was advantageous because interviewees were familiar with me and we had established trust. This created an environment where interviewees were comfortable to speak openly and shared their “private views”. However, an outside researcher could potentially have pursued a line of inquiry about institutional support and political impediments without my limitations. An investigation into how finances are managed within these projects across various member states is a fertile area for further research. Likewise, the cultural and political differences between institutions were evident from my perspective as a practitioner. However, given my role, it was not appropriate for me to discuss these either in interviews or in this thesis. Section 11.8 discusses recommendations for further research in more detail.

As outlined in Chapters 5 and 6, there are limitations to utilising RE as an analytical framework. I chose RE due to its use in public health within real world contexts for the evaluation of complex, multi-actor or multi-systems activities (Wong et al., 2013; Porter & O'Halloran, 2012). RE is a rigorous approach but the process of building CMOs is flexible and open to interpretation and subjectivity. In terms of openness to interpretation, RE brought to mind Grounded Theory i.e. while this openness supports reflection and creativity, it can also create uncertainty and almost overwhelm the novice researcher.

I had considered Activity Theory (Engeström, 2000) initially as a methodological frame for this research. An activity system emphasises “a variety of different viewpoints or ‘voices’ as well as layers of historically accumulated artifacts, rules, and patterns of division of labor” (Kärkkäinen, 1998, p. 31). Activity Theory proposes the use of the activity system as a methodological tool to shape the research design and subsequent analysis. This framework or activity system is constructed as a tool to organise the visualisation and analysis of actors and activities. Given the nebulous place of ID and TD within the system of universities, an activity system would have allowed me to draw attention to contradiction or conflicts that might act as catalysts (Kärkkäinen, 1998). It would also have supported me to evaluate the historical origins of the activity system, for example, policy and the history of the university. Activity theory also emphasises the development of expansive learning and transformative agency and these harmonised with my ambitions. However, activity theory describes and unearths the process of curriculum design as opposed to evaluating it. And as a participant in this complex Alliance, I sought to evaluate our program theory in order to contribute to the development of TD within higher education.

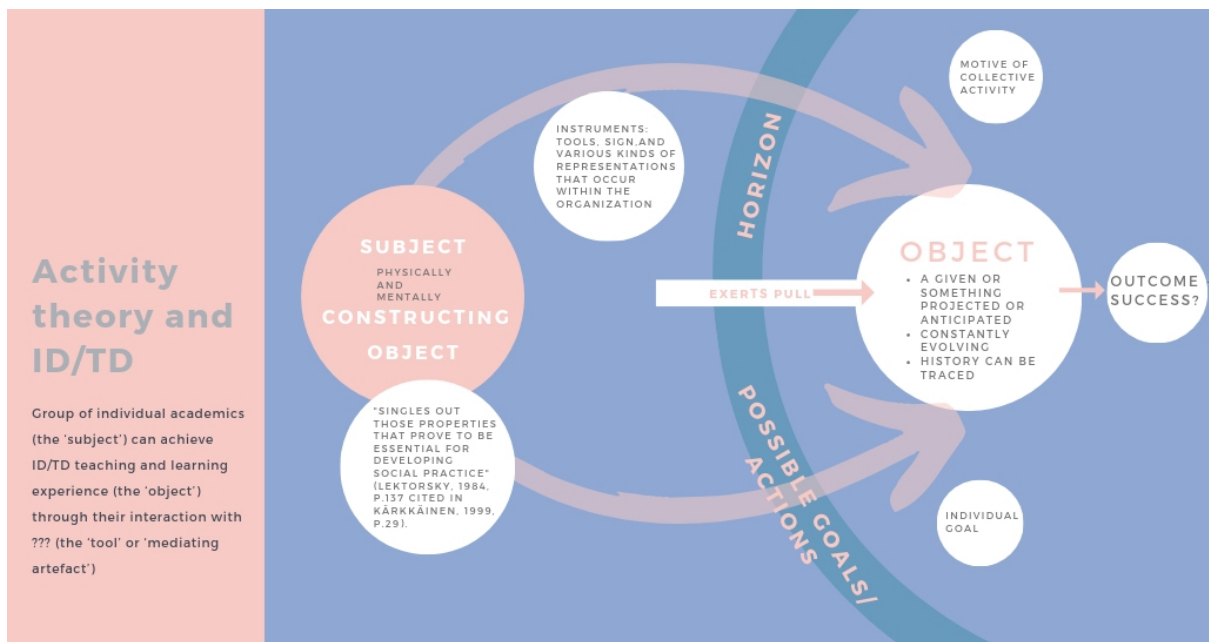


Figure 11.1 Author's illustration of the application of a potential research methodology Activity Theory.

I also considered phenomenography as a research orientation (Marton, 1981, 1986). Phenomenography was created and developed substantially in higher education and it marries well with the methods I had chosen (e.g. interviews) (Akerlind, 2005, p. 318). However, phenomenography focuses on how people perceive or experience specific phenomena and again this was at odds with my motivation for undertaking the D. Ed., which was to learn how to do TD as well as feed into creating an evidence base on how to do TD. It did not harmonise with my critical realist stance which led the choice of research methodology. Given the focus on policy and policy implementation, a theoretical framework such as that provided by Pierre Bourdieu (1977) or Alain Touraine (1988) would have illuminated power relations and the different set of actors interplaying within the system however the focus of this thesis was a set of recommendations for practice. I would like to return to Bourdieu and Touraine in future work exploring TD as a narrative in European policy.

11.8 Did the program theory work?

What this thesis sought to do above all else was to test a program theory. As described in Chapter 5, a program theory is a holistic endeavour designed to affect change. It comprises program activities that are understood to cause (or contribute to) outcomes. The fieldwork in this thesis sought to illuminate both the processes within this program theory and the conditions that had the potential to affect these processes. In RE, the proposition is that if both processes and conditions are right, the program will work. In this thesis, the program theory posited that this curriculum design process utilising KCTs to create a TD challenge-driven master's work would work. It visualised an "improved state" (see Figure 5.3) as follows:

- TD education happens
- Knowledge integration occurs
- TD education is defined
- Curriculum ideology is formed
- An effective program is produced
- Practitioners understand TD
- Practitioners confident in doing TD

The findings in this thesis provide evidence that this improved state was achieved with the exception of the integration of extra-academic actors in the content creation process. The goal of the Alliance was to create a TD, challenge-driven master's programme that integrated knowledge from academic and extra-academic actors. The Alliance program theory comprised the following steps: form KCTs; design a flexible structure that mobilised KCTs based on self-motivated participation in thematic clusters; and provide a facilitated co-created curriculum design process and

curriculum blueprint. Through the content creation workshop approach described in this thesis we sought to bring academics together to integrate their disciplinary expertise into a TD curriculum. One of the biggest indicators of success for this master's programme is that the interviewees said integration happened and their understanding of and ability to create a TD educational programme was achieved. An additional indicator of success therefore is that we observed that the KCT structure enabled KCT members to experience TD themselves. Both structure and content creation process became a space within which collaborative learning took place. Within this space, they developed a shared understanding and confidence in TD competencies and TD itself. The KCT structure formed its own collaborative learning environment within the loose structure of facilitated content creation. The teams experienced collective efficacy notably present in the emergence both of a shared TD narrative but also a shared articulation of a TD educational methodology. They opened the black box.

We can see from the exploration of context within this thesis, that European policy was crucial to this process. It provided the funding and the impetus for the Alliance formation. It provided the idea for KCTs and challenge-driven learning. This reflects OECD (2020) recommendations for policymakers at all levels (national and supranational) to create and fund policy to support TD. However this thesis also gives an insight into the need for universities to match this funding and support for their academic staff and for staff to engage with and support extra-academic actors. Likewise as the OECD report recommends, the private sector needs to be incentivised to partake in this work.

Additionally, findings indicate that, as anticipated in the program theory, all KCT members interviewed were highly motivated to take part in this educational experiment. This is an important context and should be considered carefully if other practitioners seek to execute this program theory in a different context or institution.

11.9 Recommendations for further research

The main trajectory of these findings points to the need for further research on TD education in particular curricula: how they are formed; who forms them; what learning goals are contained within them; what content is chosen and how; and how curricula are evaluated/assessed/taught. In particular, TD education would benefit from research into the role of academics and extra-academic actors in TD programmes. The contribution of educational science as a discipline to this development holds potential. As mentioned throughout this chapter, and thesis, two aspects of TD education are fertile ground for further research: the role of competencies or capabilities in TD curriculum design and TD learning; and the integration methodologies used by those creating TD curricula/learning experiences, and integration methodologies used in student learning (Pearce et al., 2018; Bammer, 2020; Cockburn, 2022). Both these areas of research can also contribute to ongoing research within the field of TD research e.g. Laursen & O'Rourke, 2019; Klein, Hoffman, Mitchell & Fam, 2021.

This thesis focused on the experiences of only one stakeholder group in TD – academics within KCTs. These findings both supported and reaffirmed the literature on TD that there is a need for further research on the experiences of all TD participants (Augsburg, 2014). It is important to support this with an investigation of

the experiences of extra-academic actors and students in TD and KCTs. For example, how do extra-academic actors experience participation in TD education? How does their participation influence curricula? How much are they influenced by sectoral agendas? These questions marry well with further research on the competencies all stakeholders need to take part in TD and CBL. In particular, research into how students perceive and experience TD is important.

TD education would benefit from a TD approach in terms of how it is researched. Research into TD learning goals, competencies and participant experiences connect with research into collaboration, facilitation, communication and innovation. Disciplines such as psychology, business and the performing arts are producing insightful research that can bolster TD practices and inform TD educational research. HEIs could consider anchoring research in educational science but connecting other thematic research areas and disciplines into university TD educational practices.

The interrelationship between the academic community and global/European policymakers is a vital area of further research. The EUI is a significant development in European policy on higher education. While existing literature tracks the implementation – and thus flow of power – from policymakers to member states and HEIs, it does not explore the flow of power from HEIs, or communities within HEIs, to policy (Veiga et al, 2015). Both the EC and HEIs would benefit from this. As mentioned in the previous section, to be systematised TD education requires institutional funding streams. HEIs, the EC and EC member states would benefit from research into different funding models, quality mechanisms and administrative structures. In this regard, TD education could for example link with research into micro-credentialing and continuous professional development.

11.10 Conclusion

This chapter served to build on the findings and discussion chapters to explicate how the successful creation of TD education can be supported within policy, institutions and at the level of individual practitioners. This thesis contributes to creating an evidence base for TD education by opening the black box on curriculum design and focusing on academic staff in higher education as a starting point to bring about change to support TD (Barth & Rieckmann, 2012). These are identifiable gaps in the literature to inform whole institution approaches to educational change (Blackmore & Kandiko, 2012). The conscious focus I took was on how engaging grassroots within the academy can contribute in a resource-favourable manner to driving system innovation. Indeed, as this RE demonstrates, it is when the university and policy makers alike create spaces for the 'grass roots', that TD can successfully happen within the university. The key to unlocking these mechanisms for change lie in embracing favourable contexts and providing relevant resources within these rather than reengineering to create large-scale systemic changes. Simply put, one cannot have a TD university without a university and one cannot have TD without the strength of disciplines. The role of the EC is to work closely with the university community in creating an evidence base and resource stream to ensure the process of developing TD education is rigorous and impactful. The role of the university is to critically examine how and why this policy is implemented and to involve the breadth of disciplines within HEIs in this process.

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Appendices

Appendix 1: Ethical Approval (*)

* The original Ethics Approval Application is attached here. Highlighted text was requested in this original and could not be removed here.

School of Education, Trinity College Dublin
Application for Ethical Approval of Research Proposals

Title of Research	Transdisciplinary Education: From Policy to Practice
Researcher Name(s)	Gemma O'Sullivan
Trinity Email Address	osullig6@tcd.ie
Supervisor Name (if applicable)	Professor Andrew Loxley/ Dr. Jake Byrne
Supervisor Email (if applicable)	LOXLEYA@tcd.ie/ jake.byrne@tcd.ie

Category of Proposer (please tick) Student ☒
Principal Investigator (Staff)

Course of Study (please tick) BMusEd
PME
MEd
DEd/PhD ☒
ASIAP
CertC21T&L

Please indicate the level of approval required
(See Code of Practice for the School of Education Research Ethics Committee document on <https://www.tcd.ie/Education/research/ethics/> for description of levels)

Level 0 Level 1 ☒ Level 2

Has your proposal been submitted to any other Research Ethics Committee?

Yes No ☒

If yes, please provide details:

Gemma O'Sullivan - D. Ed. Candidate - Trinity College Dublin - School of Education

Declaration by All Applicants:

I have read and understood the School of Education's policy on ethics in educational research:

<http://www.tcd.ie/Education/research/ethics/>

and Trinity College Dublin's Policy on Good Research Practice:

<https://www.tcd.ie/research/dean/assets/pdf/TCD%20Good%20Research%20Practice%20Policies%20copy.pdf>

including requirements in relation to data protection in Trinity College Dublin as set out here:

https://www.tcd.ie/info_compliance/data-protection

I declare that the details provided reflect accurately my research proposal and I undertake to seek updated approval if substantive changes are proposed after this submission. I have consulted an authoritative set of educational research guidelines.

Applicant's Signature:

Signed:



Date

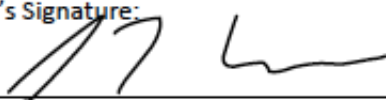
4/3/2020

Declaration by Supervisor (if applicable)

I have read this application. I am satisfied that it is in line with the criteria set out by the School of Education Research Ethics Committee in their published Code of Practice and application form templates.

Supervisor's Signature:

Signed:



Date

4/3/20

In instances where supervisors feel that their specialised expertise may be important, information for the REC to take into account (e.g. in relation to researching highly sensitive areas such as trauma/abuse), please submit an additional page with any relevant information.

Final Approval Signed-Off by a member of the Research Ethics Committee (for staff submissions)

Signed:

Date

SECTION 1 – DETAILS OF RESEARCH STUDY

1.1 Working title of proposed study

Transdisciplinary Education: From Policy to Practice

An exploration of how members of the academic (both teaching and research) communities experience the creation and implementation of a transdisciplinary curriculum.

1.2 Dates & duration of Study

The D. Ed. programme of study began in September 2017 and is scheduled for completion in 2021-22.

The fieldwork beginning and end dates are as follows:

Proposed Start Date: March 2020 Proposed End Date: April 2021

1.3 Please give a structured abstract of the proposed research (approx. 400 words).

State research aim(s) and objective(s), research question or hypothesis, as appropriate. Include background, research approach, design, data collection methods.

In European higher education and research policy (European Commission 2014, 2018; Department of Education and Skills 2014), the call for research and educational experiences tackling grand societal challenges is increasingly prevalent. The terms interdisciplinarity and transdisciplinarity are employed alongside an articulation of knowledge as a currency to produce impact. The role of universities is articulated as one that must address and resolve grand societal challenges. This language has been employed in the research and academic strategic plans of Irish universities (Trinity College Dublin, University College Cork) and most recently as the guiding principle for a new European University [REDACTED].

Tackling grand societal challenges or theme-based issues through the curriculum necessitates a transdisciplinary approach to curriculum design. A comprehensive literature review was completed and while there is a considerable tranche of work on interdisciplinary education the review suggests two avenues of inquiry: 1) there is a dearth of research into transdisciplinary education and 2) there have been repeated calls for further contributions to the field of interdisciplinary education to bolster and inform an incrementally increasing range of practice (Lyll et al. 2014) and to explore curriculum ideology. The fluctuating definitions of interdisciplinarity and a contended lack of theoretical frameworks to underpin its pedagogy (ibid., 2014) means it is an easy target for critics.

Approaching the research from a Critical Realist stance and using Actor-Network Theory as a paradigm, the proposed research explores the conceptualisation and implementation of transdisciplinarity at macro (policy), meso (institutional) and micro (academic practitioner) levels. The fieldwork will closely examine the development of a transdisciplinary curriculum for the nascent [REDACTED].

In its December 2017 Conclusions (European Council, 2017), the European Council called for initiatives to strengthen “strategic partnerships across the EU between higher education institutions”. This included “encouraging the emergence by 2024 of some 20 ‘European Universities’, consisting in bottom-up networks of universities across the EU which will

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enable students to obtain a degree by combining studies in several EU countries and contribute to the international competitiveness of European universities'."

██████████ was one of 17 universities funded by the European Commission to design, develop and pilot a challenge-based curriculum and innovative European University model. It is intended that this pilot will serve to inform the roll-out of ██████████ as an established European University.

██████████ Content analysis of European policy (macro) and European University (meso) documents (the scope of documents under consideration are all publicly available) will serve to inform the policy and institutional environment in which practitioners are situated. ██████████ seeks to develop, pilot and evaluate a joint skills and attributes based transdisciplinary research-based Masters programme along with the underlying framework needed to progress to a ██████████ campus. The tailored modules developed will address challenges around 'Reconciling humanity with the planet' and converge thematically with a number of the United Nations Sustainable Development Goals (SDGs).

The D. Ed. fieldwork will comprise tracking the participation of a group of academics who self-select to co-create modules in the (██████████) Masters programme. These actors will be engaged in the development of transdisciplinary learning experiences or curriculum development.

Transdisciplinarity has been defined as "the mobilization of a range of theoretical perspectives and practical methodologies to solve problems" (Nowotny et al 2003, p. 186). This ambition is also true of interdisciplinarity but one can identify clear differences between inter- and transdisciplinarity. Firstly, whereas in interdisciplinarity insights from other disciplines are integrated into the home discipline, in transdisciplinarity, the ambition is to create new epistemologies over and above disciplines to display the "solidarity of phenomena" (Morin 2008). For example, super concepts such as Systems Theory are utilised. Secondly, transdisciplinarity emphasises the integration of extra-academic actors into the knowledge creation process. Nowotny (1993) described transdisciplinarity as an approach that opens the sites of knowledge creation i.e. extra-academic actors are integrated into curriculum development.

It is for these two reasons that one could employ Piaget's description of transdisciplinarity as "a superior stage", beyond the stage of "interdisciplinary relations" (Nicolescu, 2010, p. 20). Creating a transdisciplinary curriculum entails a team-based approach to curriculum design that integrates extra-academic actors and brings a diversity of disciplinary perspectives and methodologies to bear on a societal challenge. CHARM-EU modules will bring together diverse practitioners to co-create module content for a group of students from across Europe who will access this material through a mixture of campus-based and remote learning. It is intended that this process is explored to identify obstacles, challenges and solutions to this unique form of curriculum design and to create a toolkit to team-based transdisciplinary curriculum design to inform further iterations of challenge-based curriculum design.

The fieldwork will comprise semi-structured interviews, workshops and diaries to chronicle the experiences of academics as they participate in this experimental process. Analysis of

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transcripts and diaries in addition to observation of workshops will enable influences, contradictions, tensions, challenges and goals to be analysed. The goal of the research is to inform policy and practice to support evidence-based transdisciplinary curriculum development in universities internationally. The desired outputs are an insight into transdisciplinary curriculum ideology and a theoretical framework to underpin its pedagogy.

Methodology

This study seeks to build a picture of how actors (academic/research staff) interact with the goals of this project to build a successful transdisciplinary curriculum. It asks:

1. What do participants understand by transdisciplinarity and how do they perceive creating a transdisciplinary curriculum?
2. How do they navigate their disciplinary expertise to co-create content with staff and students from other disciplines?
3. What process do they undergo to create a transdisciplinary curriculum and what does that entail?
4. What enables or disables their ability to create a transdisciplinary curriculum?

The research process will be marked by three stages of semi-structured interviews. The first semi-structured interview will take place at the beginning of the participants recruitment into the [REDACTED] project i.e. at the point that they commit to contributing to creating an element within the curriculum. Once participants commit to participate in this research project and complete consent forms, the first semi-structured interview will take place by phone. This will take place between March and May 2020. The curriculum design process will take approximately 12 months. A workshop on developing a transdisciplinary curriculum will take place in summer 2020. This provides an opportunity to conduct a second semi-structured interview, ideally in person. Thereafter, a concentrated period of curriculum design will take place. Participants will be invited to keep a diary for the period of concentrated curriculum design. Once the pilot curriculum has been finalised, participants will complete their final semi-structured interview.

References:

- European Council (2017) *European Council meeting (14 December 2017) – Conclusions*
Accessed at: <https://www.consilium.europa.eu/media/32204/14-final-conclusions-rev1-en.pdf>
- Lyall, C., Meagher, L. Bandola, J. and Kettle, A. (2014) *Interdisciplinary provision in higher education: Current and future challenges*. London: Higher Education Academy.
- Morin, E. (2008). In Nicolescu, B. (2008). *Transdisciplinarity: Theory and Practice*. Cresskill, NJ: Hampton Press.
- Nowotny, H. (1993) Socially distributed knowledge: five spaces for science to meet the public. *Public Understanding of Science* 2 (4): 307-319.
- Nowotny, H., Scott, P. and Gibbons, M. (2003) 'Mode 2' revisited: The New Production of Knowledge', *Minerva: A Review of Science, Learning & Policy*, 41(3), pp. 179-194.

Nicolescu, B. (2010). Methodology of Transdisciplinarity – Levels of Reality, Logic of the Included Middle and Complexity. *Transdisciplinary Journal of Engineering & Science* Vol: 1, No:1, pp. 19-38.

1.4. Please answer the following questions in relation to your proposed research. Questions (b), (c) or (d) will require detailed explanations if answered 'yes' and will be referred for additional scrutiny by the REC or Trinity REPC. Answering 'Yes' to (e) will require a separate application to the relevant HSE REC and must comply with HRB regulations regarding explicit consent.	Please tick	
	Yes	No
a. Does the research involve work with children (under-18) or vulnerable adults? If 'Yes', has appropriate Garda clearance (or equivalent) been obtained (include details)? Please provide the date of issue on the Certificate.		x
b. Could any aspect of the research give rise to any form of harm to participants, including the researcher(s)?		x
c. Could any aspect of the research produce information that could lead to criminal prosecution of the participants or others?		x
d. Is deception of the participants planned in any aspect of the research? If yes, provide details.		x
e. Does any aspect of the research involve patients (or their relatives or carers) or other users of health and social care services, the premises or facilities of such services, access to personal records or the participation of health or social care staff?		x

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For Level 1 and Level 2 applications ONLY

SECTION 2 – DETAILS OF PARTICIPANT SELECTION

2.1 Who are the proposed participants, e.g. teachers; students? Please indicate the method of sampling you intend to use and the approximate sample size

Approximately 15 members of teaching staff, three per partner university: [redacted] de [redacted] will be recruited. Recruitment is voluntary. The sample will be chosen purposively from academics (researchers; researcher-lecturers; lecturers) who decide to co-create modules within the Masters programme. Three participants per university will be chosen as this will ensure a sufficient sample size in the event of withdrawals. The target sample is 10 participants i.e. two per university.

2.2 What is your relationship with them? (If you are in a position of authority, for example, indicate how you will deal with the potential influences of such a relationship.)

I will have a distant working relationship with these staff as I am working as a researcher on the [redacted] project. I will not be in a position of authority but I will be in a position to influence the framing of knowledge that is transmitted regarding transdisciplinarity and interdisciplinarity. One of my functions is to work as part of a team to provide guidance on what transdisciplinarity is and what a transdisciplinary curriculum could comprise i.e. providing a literature review, best practice case studies etc. in a workshop environment. However, I will be working as part of a team and additionally I reflexively explore my potential role as a knowledge “framer” in my thesis. My DEd fieldwork will focus on how participants experience the process of creating a transdisciplinary curriculum. This is a practitioner doctorate and examining their experiences will allow me to reflect on the nature of my work as an educational researcher who seeks to support academics to develop their own curricula from a shared understanding of a common goal in this case transdisciplinarity.

2.3 Who is the gatekeeper(s) (e.g. school principal) for this study (if applicable)? What is the relationship, if any, between the gatekeeper and the prospective participants?

Non-applicable.

2.4 What are the primary location(s) for data collection? Specify address of classroom, participant's home, laboratory, place of convenience, etc.

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The primary locations are the participants' home universities. Participants will be located across all universities: ~~University of Cork, Trinity College Dublin, Queen's University, University of Limerick, and University of Maynooth~~. Recruitment is voluntary.

Additionally, the summer school/curriculum development workshop will take place at one of these universities. The data will be generated virtually, by phone and in person as it is intended that all participants will maintain a diary of their involvement in the curriculum development process as well as attend a curriculum development workshop. These will be further supported by semi-structured interviews to precede and expand on information garnered in diary format. As participants will partake in curriculum development workshops, it is proposed that the researcher makes notes on conversations and comments made at the workshops by the participants partaking in the fieldwork. It is hoped that these participants will also reflect on workshops in their diaries.

2.5 Describe exactly how participants will be recruited. Include what steps you will take to access the sample, specifying details of people who will be contacted, how they will be contacted, during this process.

The ~~Project~~ Project Management Team (PMT) is the primary management body. This PMT is made up of three experts per institution. All project members have been informed of the proposed fieldwork and have consented to the research in principle.

As part of the project, academics and researchers will be "recruited" (they are already employed by their home university) through the leaders of work packages within the overall project that is developing the curriculum for the pilot ~~Masters~~ Masters programme. The researcher will approach representatives from the five universities to nominate individuals as they are recruited. Their consent will be sought to be participants in the study.

2.6 Will the participants be from any of the following groups (tick as appropriate)

	INVOLVEMENT	
	YES	NO
Children under 18 years of age		X
Adults with learning disabilities		X
Adults with communication difficulties		X
Adults who are unconscious or very severely ill		X
Adults who have a terminal illness		X
Adults with mental illness		X
Adults suffering from dementia		X
Prisoners		X

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Young Offenders		X
Those who could have been considered to have a particularly dependent relationship with the investigator, e.g. those in care homes, students		X
Other groups who may be considered vulnerable (Please specify below)		X

2.7 If participants are to be recruited from any of the potentially vulnerable groups listed please provide details of:

- a) The extra steps taken to ensure that participants from any of these vulnerable groups are as fully informed as possible about the nature of their involvement
- b) Who will give consent
- c) How consent will be obtained (e.g. will it be verbal, written or visually indicated?)
- d) When consent will be obtained
- e) The arrangements that have been made to inform those responsible for the care of the research participants of their involvement in research

The Research Ethics Committee may require the applicant to contact researchDPO@tcd.ie to complete a [DPIA](#) in some instances.

SECTION 3 – DATA PROTECTION, DATA PROCESSING AND DATA STORAGE: FOR PERSONAL DATA ONLY

3.1 Does the study involve collecting, using, accessing or sharing personal data¹? If no please go to section 4

Yes x No

If yes please give details in the table below of the personal data (participant identities, contact details, signed consent forms, code keys that link personal data to other data)

Please specify details for all that apply and likewise for all media forms utilised (online, hard copy, audio etc.). Under the Data Protection Law the collection of personal data is to be kept to a minimum. Please indicate how the personal data being collected relate to the aims and objectives of the study.

Data Collected	Justification	Processing Activity
Participant names and contact details	Identification, so that we can apply matching codes across data sets.	Excel database, situated in a secure external drive in a password protected file. Participant names will be stored in an Excel spreadsheet with their pseudonyms. This information will be stored in an external hard drive to ensure it is maintained and labelled separate to the transcripts at all times.
Coding denoting pseudonyms	Identification	As above, Excel database on secure external hard drive.
Written consent	Legal basis for processing.	Electronic signed forms stored in external hard drive as above. Paper forms submitted to Ethics Committee. Access restricted to Committee Chair and Administrator only.
Audio Files	Audio Files will be retained until transcripts are completed and review by participants.	Audio Files will be pseudonymized on creation. They will be transferred to the transcription service and

¹ Personal data is information which can identify a person – in particular: a name, address, email, telephone number, an identification number, location data, an online identifier, or and IP address.

		organized by pseudonym. They will be retained on a personal computer that is encrypted. Both the folder and the files will be password protected.
Soft and hard copy diaries	Diaries will be maintained until they are transcribed and reviewed by participants.	Diaries will be pseudonymized on receipt and will be stored and delivered to the transcription service under pseudonym. They will be retained on a personal computer that is encrypted. Both the folder and the files will be password protected.

3.2 Does the study involve collecting, using, accessing, or sharing sensitive data²?

Yes No **x**

If yes please give details of the sensitive data collected. Please indicate below how collecting such data is relevant to the aims and objectives of the study

3.3 Who will control i.e. determine the purpose and way in which the personal and sensitive data is used and be responsible for this use?

The researcher i.e. Gemma O'Sullivan. Personal data is limited to consent forms.

3.4 Specify the name/s of any personnel who will have access to the personal and sensitive data? Please identify the affinities and roles of those individuals who are not employees or students of Trinity or their affiliated hospitals or institutes. For other personnel such as data inputters and transcribers see 3. 5 (Insert multiple lines for more individuals)

No sensitive data will be created, used or stored. Personal data is limited to consent forms and emails I will send as the researcher to interviewees. These will be downloaded and stored on the researcher's secure external hard drive which is double-encrypted and password protected. Access to consent forms will be limited to the researcher, the supervisors and, where necessary, the examiner. The consent forms will be submitted to the Ethics Committee and stored in a secure location. Data will be retained for 13 months after completion of the thesis examination process. Following this period, all electronic copies of the data will be deleted from all storage sites and all paper copies will be shredded

² Sensitive personal data means genetic, biometric and health data, as well as personal data revealing racial and ethnic origin, political opinions, religious or ideological convictions or trade union membership.

Personnel names	Data access to	Format available to these

3.5 Specify the name/s of any service providers such as transcribers, third party's carrying out analysis, data collection etc.? Indicate below the format in which they will receive the data i.e. original, anonymised, non-anonymised or pseudonymised. Please confirm and attach the agreement that is in place with the service provider

Personnel names	Data access to	Format available to these
<i>The transcription service is to be decided. I will use a service recommended by my supervisor and at that juncture will put in place a suitable agreement.</i>	<i>Audio files of semi-structured interviews and diaries</i>	<i>Pseudonymised.</i>

3.6 During and after the study, what steps will you take to protect the confidentiality of personal or sensitive personal data collected as part of the project? (e.g. Participant identities, contact details, consent forms, code keys that link personal or sensitive personal data to other data,). Please specify details for all that apply and likewise for all media forms utilised (online, hard copy, audio etc.)

Consent forms identifying participants will be kept under password in a separate documents folder on a secure external hard drive. Consent will be given by digital signing and sending the forms as many participants will be geographically distant from the researcher. All emails will be deleted after the form is securely stored. The file containing the digital forms will be uploaded to Blackboard ethics module where it will be securely stored and archived for seven years. It will be accessible only to me and the School Ethics Committee and administrator.

Data will be retained for no longer than is necessary. All records where participants can be identified e.g. recordings, diaries will be destroyed after all phases of data collection are complete and the data has been fully pseudonymised.

The audio files will be stored on a personal laptop that is encrypted, password protected and in a file that is password protected. All transcripts will be stored on a personal laptop for seven years after the examination period. This will enable the iterative exploration of data as further publications or connected research projects occur. Participants will be informed of this in pre-recruitment interviews and the attached consent form.

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Please note: Double encryption is required on all computers, laptops and mobiles devices. Personal data should not be stored on portable devices unless absolutely necessary and it should be stated here if this is necessary and why. Cloud storage of personal data require secure clouds as recommended by TCD and if cloud storage is used it should be indicated here.

Personal/sensitive data type and media format	Format	Comments on protection details
Consent forms	Original	Digital consent forms identifying participants will be kept by the researcher under password in a separate documents folder on a secure external hard drive. This is necessary in order to ensure that all personal information and corresponding pseudonym is kept in a location that is separate to the transcripts and audio files, which will be stored on an encrypted, double password protected personal computer. The file containing the digital forms will be uploaded to Blackboard ethics module where it will be securely stored and archived for seven years. It will be accessible only to me and the School Ethics Committee and administrator.

3.7 Please specify that you have a log and controls in place to record who accesses, changes, discloses or erases all personal data collected.

Data identifying the identity of the participants will only be accessible only to me and the School Ethics Committee and administrator.

3.8 It is recommended that all researchers and students complete GDPR training prior to working with personal and sensitive data. Please provide details of any GDPR training

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undertaken by those named in 3b.4. (e.g. Blackboard GDPR training module)
<https://www.tcd.ie/itservices/vle/kb/overview-GDPRtraining.php>

I will complete the Trinity College Dublin GDPR module (as above). I have enrolled on the module.

3.9 Indicate clearly when processing (i.e. pseudoanonymisation, anonymization, deletion) will occur and where. Please indicate who will be responsible for these processes and who will retain the key code if applicable.

All participants will be pseudonymised from the outset by the use of pseudonym. I, the researcher, am responsible for this process. As the researcher, I will have responsibility for protecting this information and I will retain the Excel spreadsheet with pseudonyms and corresponding identities on a secure external hard-drive. This will ensure that the pseudonyms are stored separate to the audio files and transcripts. All participants will be assigned a pseudonym from the outset. I will use the participant pseudonyms when observing participants partaking in curriculum and content development workshops. Participants will be made aware that their participation in workshops may be observed and I will include this information both in consent forms and in the Participant Information Leaflet. Any audio recordings of semi-structured interviews will be stored on a password protected personal computer and within a password protected file. A transcription service will be used but all interviewees will be labelled with their pseudonym at all stages of communication with the transcription service. All interviewees will be advised not to use the names of project participants or universities. If participants refer to universities, these will also be anonymised e.g. University A, B, C etc. The emphasis in the fieldwork is on participants' experience of the process of creating a transdisciplinary curriculum. All measures will be taken to protect the identity of participants but additionally, the project management team welcomes participants' participation in this piece of research and the [REDACTED] project is an experiment in education. As such all comments are welcome once they appropriately worded and communicated i.e. they meet acceptable standards of decency in communication.

3.10 Are there any potential confidentiality issues through identification of the study site?

Yes x No

All interviewees will be advised not to use the names of project participants or universities. The emphasis in the fieldwork is on participants' experience of the process of creating a transdisciplinary curriculum. All measures will be taken to protect the identity of participants but additionally, the project management team welcomes participants' participation in this piece of research and the [REDACTED] project is an experiment in education. As such all comments are welcome once they appropriately worded and communicated i.e. they meet acceptable standards of decency in communication.

3.11 Accepted best practice recommends secure retention of personal non-anonymised (of all the types listed previously) for 7 years. If there is any reason to apply for a variation from these guidelines, please give details and provide a justification.

Consent forms must be kept for 7 years, in the case of students these must therefore be retained by the supervisor. The Participant Information Leaflet must include information regarding the anonymization and destruction of personal and sensitive data and the implications of this i.e. once anonymised data cannot be withdrawn.

There is no reason for a variation from these guidelines. The only information that is personal and non-anonymised will be the consent forms. These will be kept by one of my supervisors - Professor Andrew Loxley - for seven years.

Personal/sensitive data type and media format	Format	Retention time, when it will be destroyed
Consent forms	Electronic	Seven years

3.12 If identifiable or pseudoanonymised data or material (photographs etc.) will be retained after the study is completed, is it stated on the informed consent form that this will be done and that material will not be used in future unrelated studies without further specific permission being obtained?

Yes ☒ No ☐

3.13 Researchers must allow the participant access to their data and transcript, if they so wish. Please give details of these arrangements also in the Participant Information Leaflet.

3.14 Data Subject Rights. Describe here how participants will be informed of what data will be collected (and why) and how they can exercise their rights? These include:

- right of access;
- right to rectification;
- right to erasure;
- right to object to processing based on legitimate or public interest;
- right to data portability;
- right to object to profiling or making decisions about individuals by automated means?

What measures will be put in place to ensure compliance with this obligation? How will you deal with any data subjects rights? Do you have a procedure in place if a data subject wishes to withdraw from the study for example?

NB: These rights exist until the data is anonymised. At that point, the data ceases to be personal data

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As part of the process for selecting participants in the study, subjects will be shown an information sheet and the purposes of the project will be explained during a telephone conversation or on-campus meeting, where feasible. The consent form which clarifies their data rights and the parameters of the study will be described in full. The voluntary aspect of their participation will be emphasised as will their ability to remove themselves and their data from the research process at any stage during the timeline of the fieldwork.

SECTION 4 : CONSENT

- 4.1 Best and common ethical practice involves ensuring informed consent is obtained from the research participants. How will you ensure informed consent is obtained from the research participants? Give details of who will take consent and how it will be done. Please attach a copy of invitation letter, consent form and participant information leaflet for each participant group.

As above, as part of the process for recruiting participants in the study, subjects will be shown an information sheet and a consent form which clarifies their data rights and the parameters of the study will be described in full. As participants will predominantly be located at their home campus i.e. around Europe, consent forms will be sent and signed digitally. Participants can send the consent forms to the researcher in a password protected file.

See guidelines on how to prepare these documents: and adapt [sample consent forms here](#) accordingly to suit your study and participants.

N. B. Please indicate if you have modified the consent form and/or the participant information leaflet template included in the link above?

Yes ☒ No ☐

If yes please highlight the changes made and why these were necessary.

The form was modified to remove all references to Health and Medical research.

NOTE: If data protection aspects of the template are changed substantially - this may need to be reviewed by Deputy DPO for Research: email: researchDPO@tcd.ie

- 4.2 What is the time interval between giving information and seeking consent? During this time prospective participants should receive a letter of invitation, PIL and Consent Form to consider. It is recommended that a period of seven days be provided for reflection. If less than this, please justify.

Participants will be given two weeks to review the Information letter and give consent.

Final Consent checklist

4.3 Please complete the checklist below to confirm you have considered all ethical aspects of consent. (Note that the consent forms must accompany this application; any omission or inadequacy in detail will result in a request for amendments).	Please tick
I have attached the consent form(s) for <u>all</u> research participant groups which are accessible to the target participant audience (e.g. children, participants with literacy needs, etc).	x
Each consent form clearly informs possible participants that participation is voluntary and that the participant has the right to cease participation at any time without giving a reason and without prejudice	x
Each consent form gives assurances that the data collection (questionnaires, interviews, tests etc.) will be carried out in a sensitive and non-stressful manner.	x
Each consent form has full contact details of the researcher (and of the supervisor for student applications) to enable prospective participants to make follow-up inquiries.	x
Each consent form has full details, in plain non-technical language, of the purpose of the research, the proposed role of the person being invited to participate, the research instruments (e.g. tests, interviews, questionnaires) with indicative questions if appropriate and the expected duration of participation	x
Each consent form has full details of the purposes to which their data (in all their forms: text, oral, video, imagery etc) will be put, including for research dissemination purposes and requires informed consent for each purpose and each form of data	x
Each consent form explains how the anonymity, where appropriate, of the participants will be ensured and operationalised	x
Each consent form explains how participant data in all its forms (e.g. paper forms, recordings, etc) will be protected, including how it will be stored and for how long and how it will be ultimately destroyed.	x
Each consent form clearly states up to what point a participant can withdraw their data from a study, e.g. up until the data is irrevocably anonymised or until analysis or publication of the data findings.	x
Please include here any other comments you wish to make about the consent form(s)	

SECTION 5 – OTHER ETHICAL ISSUES INCLUDING RISK, BENEFIT AND HARM

5.1 Will individual or group interviews/questionnaires discuss any topics or issues that might be sensitive, embarrassing or upsetting. If Yes, give details of procedures in place to deal with these issues. Give specific names of counselling or other support services that might be offered to participants.

No.

5.2 Is it possible that criminal or other disclosures requiring action could take place during the study. If yes, please provide specific detailed procedures in place to deal with these issues and who will be informed if disclosures occur. Please list below details of any support services to be offered to participants (if applicable). This information needed to be also included in the participant information leaflet.

No.

5.3 Are there any circumstances that might give rise to security concerns for participants or researchers? If yes, please provide an account of procedures in place to deal with these issues and/or mitigate any risks

No.

5.4 Are there any conflicts of interest where data might be critical of working practices, people etc. If yes, please provide an account of specific procedures in place to deal with these issues.

Potentially. One of my supervisors is also working on the () project. He will only see material that is pseudonymised. We have identified the need to set a clear boundary between content produced by the participants in the fieldwork and content produced in our management of curriculum development workshops and meetings. All content produced for fieldwork will be stored on my personal laptop and protected by password. This will not be accessible to the project team. Additionally, all interviewees will be identified by pseudonym only from the outset of the fieldwork. The pseudonym classification will be stored in a separate location (secure external hard-drive) to the participant-generated content and will be password protected.

5.5 What (if any) is the potential for benefit for research participants? Please outline only the direct benefits

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None.

5.6 Will payment be made to research participants?

YES	NONE OTHER THAN MINIMAL EXPENSES TO COVER TRAVEL COSTS ETC	NO x

5.7 If you answered YES to question above, please specify for what purpose the payment will be made and the amount to be provided to each participant.

5.8 Are there any further ethical issues or problems which may arise with the proposed study and what steps will be taken to address these?

If you have any further comments or notes in relation to any aspect of your application (e.g. funding and relevant ethical issues), please outline them here:

Appendix 2: Email from Alliance Project Management Team inviting KCT members to participate in research

Dear colleagues,

We appreciate the time you made to attend two content creation workshops last week and for your hard work and commitment to creating programme content. We would like to take this opportunity to thank you and to ask if you would be willing to help us understand your experiences in the KCT Core.

For both workshops, we are modelling a new transdisciplinary team-based approach to content creation. The goal is to support the creation of transdisciplinary content – integrating as many disciplinary perspectives as possible into defining problem spaces and creating innovative module content to deliver a truly empowering learning experience to students on  pilot Masters in Global Challenges in Sustainability.

We would like to ask if you would be interested in volunteering to take part in three 30 minute semi-structured interviews that will take place over the coming months. These simply seek to ask you about your experiences of joining the KCTs, the content creation process and your understanding of transdisciplinarity, both at the outset and as we all progress in content creation. The first 30 minutes interviews will take place in the month of July; the second 30 minutes in Autumn 2020 and the third 30 minutes in early spring 2021.

These interviews will be conducted by Gemma O'Sullivan Work Package 3 Lead and Research Associate Trinity College Dublin and she has received ethical approval from Trinity College Dublin to carry out these interviews. If you are willing to volunteer, please let us know and Gemma will be in contact to give you further information and provide you with an Information Sheet and a Consent Form.

We already appreciate your time commitment and would like to emphasise that there is no onus on you to take part in this research.

Kind regards,

Appendix 3: Interview questions for round 1 and 2 interviews

INTERVIEW QUESTIONS	
GUIDING INTERVIEW QUESTIONS ROUND ONE	GUIDING INTERVIEW QUESTIONS ROUND TWO
Context - Micro Engagement with the project What motivated you to engage in the project? Context - Macro What do you understand the goals of the project to be? Understanding/conceptualising TD - benchmark before and after What did you understand by transdisciplinarity? What does it mean to practice TD? What is TD? What is the most important part of TD? TD educational/programme design How did you imagine a TD programme would be created? Where did you think your discipline would fit? What is a TD learning experience? How is it created? The workshop - resources and response Did your understanding evolve? Did things emerge that you didn't predict? Did you feel you experienced TD during the workshops? Was your experience different to what you expected? How did you use your disciplinary expertise in this situation? Did difficulties arise in this? Did the workshops challenge you? In what way? What would you have done differently? What obstacles did you anticipate emerging in workshops? Did these emerge? What obstacles did emerge? What would have helped? Past experience with TD - context - whom Have you worked with other academics or researchers from other disciplines in your teaching? Have you worked with other academics or researchers from other disciplines in your research? How has your teaching experience connected you to inter or transdisciplinarity? How has your research experience connected you to inter or transdisciplinarity?	Follow-up on TD conceptualisation What is your understanding of TD? Has this evolved in the past six months? What are the key elements of TD? TD implementation How would your understanding of TD be implemented? What would successful implementation look like? Curriculum creation What was the sequence you moved through to create a framework for the content? Can you describe that sequence? What enabled your ability to make a TD curriculum? What disabled your ability to make a TD curriculum? Did you make any changes to that sequence as you moved into the second round of workshops? What changes would you make to it if you were doing it again? Where did Challenge-Based Learning (CBL) fit into the sequence of content creation? Integrating disciplinary knowledge Where/how did your disciplinary expertise fit in? Where how will student disciplinary expertise fit in? TD skills What skills will students learn? What do students need to be able to "do" TD? What skills does the TD student have? What do academics need to be able to do TD? Have you acquired new skills taking part in this process? Have you identified further skills you need? KCT environment Was TD supported? How? What supports were you given? Was the environment different to others you have experienced? What were you able to do that was different? How was this supported by the work package team? What hindered it? What did you achieve as a team?

Appendix 4: Screenshot of MAXQDA demonstrating regrouping of codes aligned with RE construct Micro Context Motivation to do TD

Micro: Understanding of TD	0
> TD Definition First Content Phase	193
Macro: CHARM as influence to sign up	32
Micro: Motivation to do TD	6
Personal	6
Focus on a challenge or societal issue or ...	16
Solve a problem	13
Learn about/ do CBL	2
Modernise/innovate universities/academy	14
Something new/exciting	5
Fit-for-purpose education	6
Student needs	8
Students are different now	4
Show students connections with othe...	3
Show students a different way of doin...	3
Prepare students for rapidly changing...	7
Practical and problem solving	2
Give students practical or general skills	3
Link research and teaching	2
Research responsive to real problems	9
Efficacy of research	3
Need different disciplinary perspective	8
Complexity	5
Introducing academic background	10

Appendix 5: Interviewee information and consent form

Information Leaflet



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

We would like to invite you, as a contributor to the development of the [REDACTED] pilot challenge-driven Master's programme, to participate in this post-graduate research in the area of higher education curriculum development, as part of Doctorate in Education (D. Ed.) at Trinity College Dublin. You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before deciding to participate, it is important for you to understand why the research is being done and what your participation will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Your participation in this research is entirely voluntary and you may at any stage withdraw, from all or any part of the research process.

Researcher: Gemma O'Sullivan, School of Education, Trinity College Dublin

Research supervisors: Prof. Andrew Loxley

Research title: Transdisciplinary Education - From Policy to Practice

Purpose of the research: To inform curriculum development for transdisciplinary programmes by investigating the experiences of academics (researchers, researcher-lecturers, lecturers) in creating challenge-driven curricula within a trans-university structure.

Intended benefits of the research: European educational policy in the 21st century increasingly emphasises structuring learning experiences to equip students to tackle

global challenges. This, it can be argued, necessitates a transdisciplinary approach to curriculum development.

This research will hopefully contribute to the efficacy of transdisciplinary, challenge-driven education and the support structures provided to academics who are motivated to contribute to such curricular developments. The ultimate beneficiaries are students. It is also hoped that the research will contribute to the development of a curriculum ideology and policy to guide the future development of and investment in curriculum development within third-level education. This research seeks to gain a wider insight into the motives, viewpoints and attitudes of participants within the different dimension of the curriculum development process.

Duration of the study: It is anticipated that the fieldwork will commence in spring 2020 and continue until spring 2021.

Research methods: The fieldwork will focus on the experiences of academics who engage in the transdisciplinary curriculum creation process from the outset.

Transdisciplinary curricula necessitate the active involvement of “knowledge workers” from all sections of the university community. This study seeks to engage a broad spectrum of “academics” as defined above (researchers, researcher-lecturers, lecturers) to take part in chronicling their experiences through semi-structured interviews, diaries and workshops.

During the fieldwork period, you will be asked to take part in three semi-structured interviews: at the outset of the fieldwork, three months into the process and at the end

of the six-month fieldwork period. If you choose to participate you will receive an outline of the questions and topics at least one week in advance so that you can consider the topic under consideration. The interview will be audio recorded and will be approximately 45 minutes in duration. The interview will be transcribed, and you will receive a copy of the transcript should you wish to amend any aspect before it is included in the final report.

You will also be asked to keep a diary of your involvement in the [REDACTED] programme development during this twelve-month period. It is anticipated that this process should take no longer than 15 minutes per week during this period or one hour per month. This can be undertaken in a format best suited to the convenience of participants and will be in a format of their choosing – digital, oral recording or hardcopy. As with interviews, diary-keeping and communication will be organised on an individual basis to ensure that the timing and level of commitment suits your needs and timetable as a valued participant on this research project.

Additionally, you may be invited to take part in workshops, fora and/or summer schools as part of developing curriculum content for the [REDACTED] ARM-EU Master programme. If you choose to take part, you will be informed that you may be observed by the researcher (i.e. Gemma O’Sullivan) and a note taken of your comments and/or written/verbal contributions in these environments. Any notes taken by the researcher recording verbal statements and written material you produce will identify you only by pseudonym. This information will be kept in a secure, password protected external hard-drive that is the personal property of the researcher and is not connected to the [REDACTED] project.

Data management: You will not be identified in the transcripts, diaries or workshop observation notes, nor will your individual responses be discussed with others. Participation in the process will not disadvantage you in any way with respect to professional or collegiate relationships. You may withdraw at any stage from the process right up to when the transcripts will be used in the thesis, this is anticipated to be June 2021. A decision to withdraw at any time, or a decision not to take part, will not affect you in any way.

All participants will be pseudonymised at the beginning of the project. To further protect your anonymity, participants will be asked not to refer to their university or any partner universities by name. They will be asked not to refer to any staff member in their university or in partner universities by name. However if you do, the researcher will anonymise the information.

Semi-structured interviews that take place on Microsoft Teams or in person will be audio recorded. These will be stored on an encrypted, password-protected computer, within a password protected file. They will be stored by pseudonym. All pseudonym keys will be stored in a separate file in an encrypted external hard drive, under separate password protection. The computer and hard-drive used are [REDACTED] property of CHARM-EU or Trinity College Dublin and are not used in any [REDACTED] for the CHARM-EU project.

A transcription service may be used to transcribe all audio files, and these will be transported under password protection. All participant data will be pseudonymised. Recordings will be treated as confidential and will be deleted on transcription; you will not be identified in the transcripts and your individual responses will not be discussed

with anyone other than the researcher and her supervisors. Supervisors will only read pseudonymised transcripts and extracts.

All audio files, collected through semi-structured interviews or audio-recorded diaries, and diaries will be stored until they are transcribed for use in the final report, the target date for which is April 2021. Data will be retained for no longer than is necessary. All records where you can be identified (e.g. recordings, etc) will be destroyed after all phases of data collection are complete and the data has been fully anonymised. At this point, your data can no longer be withdrawn from the study as it is no longer identifiable.

It is anticipated that data will be used to complete the professional practice doctorate but also in publications during the period of the doctorate.

Research Dissemination: Research may be disseminated in the following formats: published academic journals and books and conference presentations. At all times when findings arising from the data generated is published, it will be anonymous, and the participants will be non-identifiable and non-traceable.

Should you have any further queries about the research please do not hesitate to contact me or my supervisors at any stage.

Researcher contact details

Gemma O'Sullivan

osullig6@tcd.ie

00 353 87 276 9031

Supervisors' contact details

Prof. Andrew Loxley loxleya@tcd.ie

Participant Consent Form



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

There are 12 sections in this form. Each section has a statement and asks you to initial if you agree. The end of this form is for the researcher to complete. Please ask <u>any</u> questions you may have when reading each of the statements. Thank you for participating. Please <u>Initial</u> the box if you agree with the statement. Please feel free to ask questions if there is something you do not understand.	
General	Tick box
I confirm I have read and understood the Information Leaflet for the above study. The information has been fully explained to me and I have been able to ask questions, all of which have been answered to my satisfaction.	
I understand that this study is entirely voluntary, and if I decide that I do not want to take part, I can stop taking part in this study at any time without giving a reason. I understand that deciding not to take part will not affect my future education.	
I understand that all information will be kept private and confidential and that my name will not be disclosed.	
I understand that I will not be paid for taking part in this study.	
I know how to contact the research team if I need to.	
I agree to take part in this research study having been fully informed of the risks, benefits and alternatives which are set out in full in the information leaflet which I have been provided with.	

I agree to being contacted by the researcher by email/phone/computer application as part of this research study. (Delete as appropriate).	
Data processing	Tick box
I agree to allow personal information about me to be shared with Trinity College Dublin for the purpose of education research, as described in the Information leaflet. This will be for the purposes of recording my consent only.	
I understand that personal information will not be shared with third parties, other than Trinity College Dublin, as described above.	
I understand that personal information about me, including the transfer of this personal information about me outside of the EU, will be protected in accordance with the General Data Protection Regulation.	
I understand that there are no direct benefits to me from participating in this study.	
I understand that I can stop taking part in this study at any time without giving a reason and this will not affect my future education.	

Participant Name (Block Capitals) Participant Signature

Date

Witness Name (Block Capitals)

Witness Signature

Date

To be completed by the Researcher.

I, the undersigned, have taken the time to fully explain to the above participant the nature and purpose of this study in a way that they could understand. I have explained the risks and possible benefits involved. I have invited them to ask questions on any aspect of the study that concerned them.

I have given a copy of the information leaflet and consent form to the participant with contacts of the study team.

Researcher name: Gemma O'Sullivan

Title and qualifications: Ms./BA Hons, PG Dip

Signature

Date

Three copies to be made: One for student, one for researcher and one for records

Appendix 6: Timeline of curriculum design activity in the first twelve months of the project.

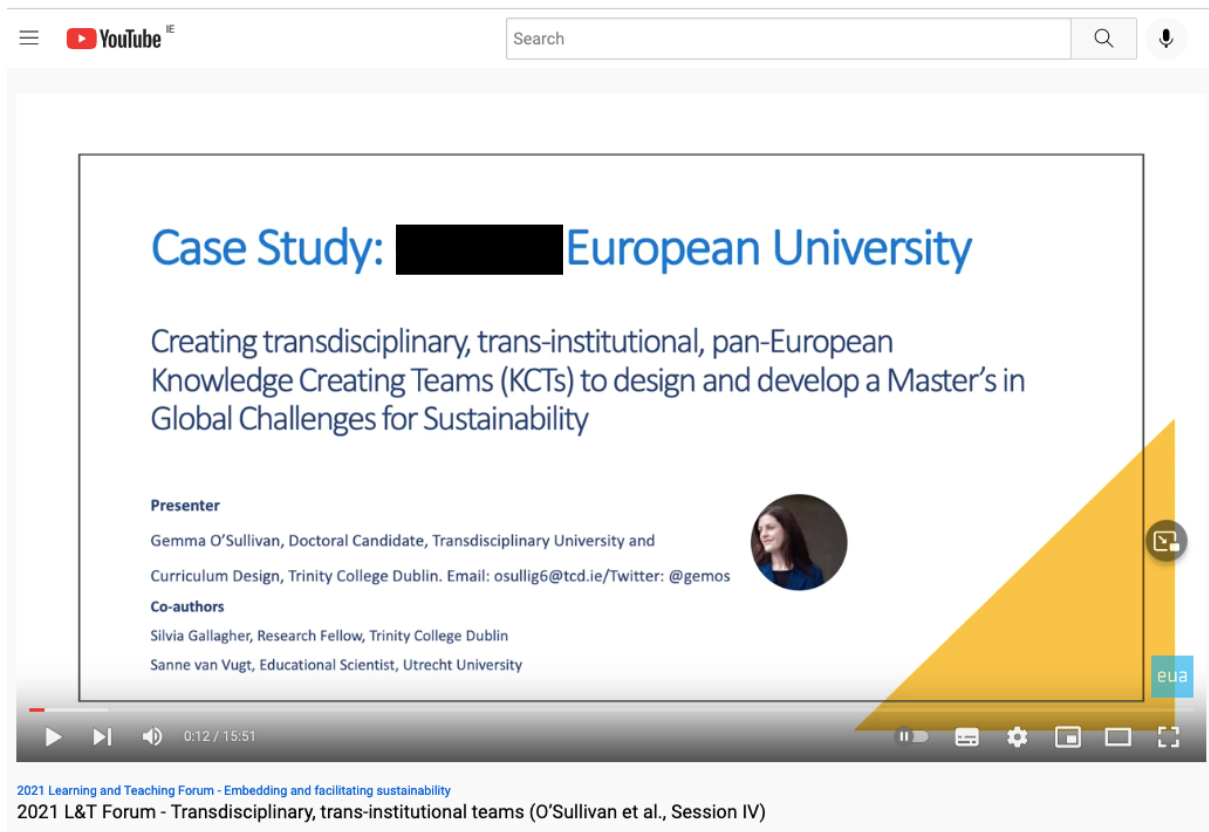
Timeline of curriculum design June 2019 – July 2020		
Date	Attendees	Purpose
Utrecht, June 2019	Project managers and directors from five partner universities and a selection of staff from partner universities joining WP3	To further develop the curriculum blueprint
Budapest, September 2019	Project managers and directors from five partner universities and a selection of staff from partner universities joining WP3	To further develop the curriculum blueprint and educational principles
October 2019	Student Needs' Analysis Workshop	To elicit feedback from students on the challenge-based approach and educational principles
Dublin, January 2020	Representatives from partner university leading WP3 and partner university leading WP4 including Principal Investigator (PI) and Co-PI from Irish university and project director from Dutch university.	To resolve and align deliverables in both work packages. New joint organisational structure produced. Timeline of WP3 WP4 co-led meetings created.
Dublin, February 2020	Project managers and directors from five partner universities and selection of representatives to WP3 from partner universities	WP3 & WP4 teams co-led two-day workshop meeting of all partners in Dublin February 2020 to ensure understanding of WP3 WP4 deliverables and outcomes of Micropilot (July 2020) have full input from all partners universities.
March 2020 – July 2020	WP3 (virtual) bi-weekly meetings	To create a Programme Context Strategy; further develop and programme learning outcomes; recruit KCTs
July 2020	Two content creation workshops (run by WP3 and WP4)	To write the module titles, learning outcomes and indicative content for the master's programme based on the programme learning outcomes

Appendix 7: Module produced by the Food KCT as presented in the final master's outline.

Module title: The Food-Health-Environment Nexus
Module learning aims: This module explores the social, economic and environmental drivers and consequences for (human and ecosystem) health and social justice associated with food systems. After this module, students will be able to: 1. Reflect on the multifaceted nature of the food-health-environment-inequality nexus taking into consideration influence from cultures, energy and society. 2. Describe the impact of food and its interdependencies as a result of social, cultural, historical, environmental, economic, medical and political factors. 3. Systematically analyse the connections between food and different health impacts (human health and ecosystem health); with health, poverty, and climate change; and the links with social and environmental dimensions of sustainability.
Module learning outcomes (mapped to programme learning outcomes (PLOs)) • MLO 10.1: Analyse the importance of diet in maintaining health and the impact of diet on diseases, including an appreciation of the multifaceted dimension of undernutrition and obesity. [PLO 3] • MLO 10.2: Define the environmental, social and health challenges (local and global) of food production, consumption and waste in terms of equity, justice, gender, different dimensions of sustainability, culture, geopolitics and other relevant dimensions. [PLO 1, 2] • MLO 10.3: Articulate a critical awareness of the changes in nutritional requirements throughout the life cycle of individuals and on how traditional and current discourses (including media) influence nutrition and dietary patterns (taking into consideration the impact of gender, culture, age, lifestyle etc.). [PLO 2, 3]

- MLO 10.4: Analyse how and why food is produced, prepared, narrated and consumed, taking into consideration the impacts of gastronomy, gender, age, lifestyle, religion and culture on dietary choices, and the subsequent impact on health. [PLO 2, 3]
- MLO 10.5: Assess the role of biotechnology in the future of sustainable food consumption and dietary health, including the societal, economic and environmental implications thereof. [PLO 1, 3]
- MLO 10.6: Critically discuss key research and evaluate the different dimensions and causes of food inequality and insecurity from a variety of disciplines and from socio-ecological and socio-economic systems perspectives, taking into account nexus between water, food, waste, energy, biodiversity, climate, health, poverty, etc. [PLO 2, 3, 5]
- MLO 10.7: Assess how (decisions around) the use of and access to water, energy and other (natural) resources are interconnected and impact food security from global to local levels. [PLO3, PLO4]

Appendix 8: Dissemination of research - Screenshot of video presentation of the Alliance case study at the European Universities' Association Learning and Teaching Forum 2021



The screenshot shows a YouTube video player interface. At the top, there is a search bar with the text "Search" and a microphone icon. Below the search bar, the video player displays a presentation slide. The slide has a white background with a blue header "Case Study: [REDACTED] European University". The main text on the slide reads: "Creating transdisciplinary, trans-institutional, pan-European Knowledge Creating Teams (KCTs) to design and develop a Master's in Global Challenges for Sustainability". Below this, there is a section for the "Presenter" and "Co-authors". The presenter is Gemma O'Sullivan, a Doctoral Candidate at Transdisciplinary University and Curriculum Design, Trinity College Dublin. Her email is osullig6@tcd.ie and her Twitter handle is @gemos. The co-authors are Silvia Gallagher, a Research Fellow at Trinity College Dublin, and Sanne van Vugt, an Educational Scientist at Utrecht University. A circular profile picture of Gemma O'Sullivan is shown next to her name. The video player controls at the bottom show a progress bar at 0:12 / 15:51, a play button, and various icons for volume, settings, and full screen. A yellow triangular graphic is visible on the right side of the slide, and a small "eua" logo is in the bottom right corner of the slide.

Case Study: [REDACTED] European University

Creating transdisciplinary, trans-institutional, pan-European Knowledge Creating Teams (KCTs) to design and develop a Master's in Global Challenges for Sustainability

Presenter

Gemma O'Sullivan, Doctoral Candidate, Transdisciplinary University and Curriculum Design, Trinity College Dublin. Email: osullig6@tcd.ie/Twitter: @gemos

Co-authors

Silvia Gallagher, Research Fellow, Trinity College Dublin
Sanne van Vugt, Educational Scientist, Utrecht University

0:12 / 15:51

2021 Learning and Teaching Forum - Embedding and facilitating sustainability
2021 L&T Forum - Transdisciplinary, trans-institutional teams (O'Sullivan et al., Session IV)

Appendix 9: Dissemination of research - Screenshot of video presentation of the Alliance case study at the 2021 *International Transdisciplinarity Conference* (ITD), “Creating Spaces and Cultivating Mindsets for Learning and Experimentation”

CASE STUDY: TRANSDISCIPLINARY, TRANS-INSTITUTIONAL KNOWLEDGE CREATING TEAMS FOR THE CREATION OF CHALLENGE-DRIVEN EDUCATIONAL PROGRAMMES

STEP 1: TRANSDISCIPLINARY CURRICULUM DESIGN BLUEPRINT

Workshop consultations with students, extra-academic actors, university teams. Formation of Curriculum Design Team and Teaching and Learning Team

Preparatory Phase: Transversal Skills
Flexible Phase: Multiple disciplines brought together in problem spaces
Capstone Phase: Real world challenges in collaboration with extra-academic actors

STEP 2: IDENTIFY BROAD CHALLENGE AREAS

Data analysis - five universities research and educational activities, connected to sustainability, transdisciplinarity, the UN SDGs, Horizon Europe and European Green Deal

STEP 3: RECRUIT TRANSDISCIPLINARY KNOWLEDGE CREATING TEAMS

Online townhalls, official communications, snowball sampling, calls for participation, and direct contact with staff. 188 registered as a KCT member (n=188). 75 disciplines.

- Staff member identifies theme and participation level: Core or Expanded Network
- Curriculum Design Team write programme learning outcomes

STEP 4: TRANSDISCIPLINARY CONTENT DESIGN PROCESS FOR TRANSDISCIPLINARY CHALLENGE-BASED MASTER'S

Phase 1: Preparatory (24/07/2020)

14 KCTs identified

10 KCTs identified

10 KCTs identified

Phase 2: Flexible (24/07/2020 - 01/08/2020)

Theme 1: Life & Health

Theme 2: Water

Theme 3: Food

Phase 3: Capstone (01/08/2020)

14 KCTs identified

- Three weeks (July 2020). Five KCTs in total. Two workshops with each KCT (groups of ten academics from multiple disciplines) guided by two facilitators from Curriculum Design and Teaching & Learning Teams. Microsoft Teams environment.
- Pre-workshop: KCTs complete critical content questionnaires identifying problem spaces, content areas, disciplinary perspectives, key skills and knowledge within challenge area. Facilitators collate.
- Workshop 1: KCTs agree problem spaces and modules titles within challenge areas and broad content strategy i.e. systems or challenge-based.
- Post-workshop: Working with PLOs and module titles, KCTs fill in questionnaire individually proposing module aims and modules learning outcomes. Facilitators collate.
- Workshop 2: KCTs draft module learning outcomes guided by two facilitators.
- Post-workshop: Share and rewrite as team via email and Microsoft Teams.
- KCTs attend online Townhalls to share content across all KCTs.
- Output: Full transdisciplinary, challenge-based Master's programme content produced.



AUTHORS: GEMMA O'SULLIVAN (OSULLIC6@TCD.IE) & DR. JAKE BYRNE (JAKE.BYRNE@TCD.IE) SCHOOL OF EDUCATION, TRINITY COLLEGE DUBLIN, IRELAND