

# Path Integrity

## **Path2Integrity Training Curricula Version 1.0**

### **Deliverable D4.2**

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### **Path2Integrity**

**Rotatory role-playing and role-models  
to enhance the research integrity culture**



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## List of abbreviations

CAS	Complex Adaptive Systems
CFT	Cognitive Flexibility Theory
CK	Content Knowledge
CLA	Causal Layered Analysis
CoRe	Content Representation
D4.2	Deliverable 4.2
ECoC	European Code of Conduct for Research
EU	European Union
IMTPG	Interconnected Model of Teacher Professional Growth
OECD	Organisation for Economic Co-operation and Development
P2ILC	Path2Integrity Learning Cards
PCK	Pedagogical Content Knowledge
PK	Pedagogical Knowledge
RCM	Refined Consensus Model
RE	Research Ethics
RI	Research Integrity
V <sup>3</sup> SK	Values, Skills, and Knowledge
VUCA	Volatile, Uncertain, Complex, Ambiguous
WP	Work Package

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## Preface

This public report is the second deliverable in work package (WP4) “Training programme for educators: curricula for research integrity (RI)” of the Path2Integrity project. The main aim of WP4 is “to develop and run a feasibility test of the training programme for educators to foster RI”. This will be achieved through developing a RI curriculum for educators who teach the project’s target groups, which range from secondary school students to young researchers, and running a pilot testing of the training programme in a small, but diverse group of educators for its feasibility and acceptance (facilitators and barriers).

Deliverable 4.2 (D4.2) is a public report of Path2Integrity that aims to provide an overview of the first version of the training curriculum for educators at the end of the second project year. The report presents the main features of this training programme, including the underlying philosophy and theoretical underpinnings, contents and structure, methods and other practicum aspects of it. It should be noted here that an updated version of the curriculum is planned to be published later in the project lifetime, after the training programme has been tested and the lessons learnt from its implementation have been incorporated in the curriculum.

This first version of the Path2Integrity curriculum for educators was developed by the Charité team with the contribution of the consortium and advisory board members. The notion that prevailed during the development of the curriculum was to design a training intervention that will have the potential to trigger a meaningful and long-lasting change in the way educators perceive and approach the teaching of RI and subsequently on how their target groups, students and young researchers, understand and practice RI. This can be considered an imperative in the field of RI education, as the main aim of the RE/RI education is not only to help students acquire some knowledge and skills, but to inculcate in them values and have an impact on their way of thinking and behaviour. The curriculum draws significantly on modern approaches to education for the 21<sup>st</sup> century and up-to-date state of the art about the intellectual and moral development of humans as well as collective behaviour.

# 1. Introduction

## 1.1. Background

This training curriculum was developed as a component of the EU Horizon project Path2Integrity. The overall aim of the project is to enhance the culture of research integrity (RI) across Europe (and beyond) through formal and informal learning interventions. The main training interventions of Path2Integrity, including the Path2Integrity learning cards (P2ILC) and campaign, aim to reach secondary school students, as well as university undergraduate and graduate students, and early career researchers. These interventions are primarily based on the dialogical methods of storytelling and role-playing, and by engaging role-models (Prieß-Buchheit, Aro et al. 2019).

To enhance educators' competencies and confidence to teach RI effectively by using the Path2Integrity materials and methods, the project also offers a training programme for educators. The main purpose of the educators' training programme is to enhance their pedagogical competencies in teaching RI, with emphasis on the Path2Integrity materials and methods (Prieß-Buchheit, Aro et al. 2019). On this basis, this document presents the curriculum for the educators' training programme. The underlying philosophy and theoretical underpinnings that informed the development of the curriculum are described. In addition, the current contents, structure, methods and types of materials, and other practicum features of the curriculum are outlined.

## 1.2. Underlying philosophy

The philosophy that underlies the curriculum stems from the interplay between what the RI educators need, as this was captured by the Path2Integrity needs assessment, the relevant literature review that was conducted and the RI experts' interviews conducted by the Path2Integrity team, as well as what the students need to thrive in the volatile, uncertain, complex, and ambiguous (VUCA) world with increasing diversity that characterises the 21<sup>st</sup> century (Woodson 2013).

The vision is to develop a curriculum that is contemporary, in the sense that it takes into consideration the current realities, and at the same time is future-oriented, meaning that the knowledge and competencies the educators obtain are sustainable and can be adapted to the different futures that may arise. A curriculum that has the capacity to empower and inspire the wide and diverse group of educators Path2Integrity targets, and subsequently their heterogeneous groups of students. Hence, a curriculum that offers educators a learning experience similar to the one they should provide to their students. All these are built around the Path2Integrity aspirations and goals.

To achieve these, we will strive for:

- Evoking a *holistic learning* experience through engaging all aspects of the learner, including mind, body, and spirit, to support educators become the most that they can be.
- Cultivating *adaptive expertise* in order to enable educators to apply the competencies obtained in a wide variety of contexts in a rapidly changing world with increasing diversity.
- Offering a knowledge base (scaffold) and creating the conditions to facilitate *emergent learning*.
- Fostering *advanced learning* in order the educators to attain a deeper and more comprehensive understanding of RI contents, be able to think about and reason with it, and apply it to multiple contexts.
- Enabling educators to have a *transformational learning* experience, so that the impact and outcomes of the training programme are longer lasting and more sustainable.

For this, a realistic approach to RI education, informed by systems thinking and complexity science, that promotes collaboration, reflection and reflexivity, and embraces educators' diversity is adopted.

### 1.3. Purpose of the training programme

The overall purpose of this training programme is to enhance educators' agency to teach RI effectively mainly through the use of the Path2Integrity materials and methods in an adaptive and sustainable way. To achieve this, it is expected that by the end of the training programme the educators will be able to:

- Navigate confidently through the Path2Integrity materials, including the learning cards, handbook of instructions, the roadmap for teaching RE/RI, the campaign materials and the European Code of Conduct for Research Integrity (ECoC).
- Understand and manage the cognitive and affective learning of their target audience relevant to the teaching and learning of RI.
- Use the Path2Integrity materials and instructional methods, namely storytelling and role-playing, to foster the learning of RI.
- Prepare, design and implement a RI session based on Path2Integrity materials and according to the needs of their target audience in the respective context.
- Assess the progress and results of teaching and their target audience's learning by using the Path2Integrity assessment methods and tools.
- Have edifying discussions with other educators, exchange and co-construct knowledge with them about the RI teaching contents, the materials and methods of Path2Integrity.

### 1.4. Target groups

The project's final target audience is comprised by secondary school students, university undergraduate and graduate students, and early career researchers. On this basis, the target group of this curriculum is RI educators who teach the above target audience, meaning educators in secondary schools and higher education institutions. In this project, as RI educators are considered those who already teach RI and want to advance their instructional toolbox with the Path2Integrity materials and methods, as well as educators who do not have prior experience with teaching RI, but have an interest in it (Prieß-Buchheit, Aro et al. 2019).

Despite the fact that the target group of Path2Integrity consists primarily of educators across Europe, hence the use of the ECoC as the underlying document for the Path2Integrity training materials, the curriculum is also aimed at non-EU RI educators. Overall, the project's training interventions aim to reach at least 150 educators, 80 secondary school teachers in three European countries and 70 university educators across at least 15 European countries and one non-EU country (Prieß-Buchheit, Aro et al. 2019). Some of these educators may participate in the Path2Integrity training programme.

The abovementioned conception concerns the training programme's target groups as these are described in the project's grant agreement. However, as the curriculum and accompanying materials are designed based largely on the scaffolding and constructivism approach and they do not focus on serving specifically the needs of the project's target groups, active participation in the training programme could benefit any individual who would like to enhance their pedagogical competencies in teaching RI, especially with using the Path2Integrity materials and pedagogical methods. This may include:

- Educators in secondary and higher education institutions.
- Professionals working in other settings who provide RI training to researchers and other stakeholders, including citizens.

In order to benefit fully from the Path2Integrity training programme and to have a more enriching learning experience, it is highly advised that the participants become members of the Path2Integrity

community that enables them to receive and provide support to other educators and to jointly co-construct knowledge about RI and RI education (Path2Integrity Consortium 2020).

## 2. Theoretical underpinnings

The 21<sup>st</sup> century poses unprecedented challenges to the education system and educators, as they have to prepare students for a world that is rapidly changing, increasingly interconnected and a future that is highly uncertain. The acronym VUCA, which stands for volatile, uncertain, complex and ambiguous, sums up effectively the characteristics of the environment in which educators have to perform. Volatile because of rapid and unexpected changes, uncertain due to the lack of predictability, complex as a result of the vastness of interconnectedness and interdependencies and ambiguous by means of the multitude of options and the potential outcomes resulting from them (Woodson 2013, Organization for Economic Co-operation and Development (OECD) 2018).

In the face of these adversities, we need to be open and as better prepared as possible for the future. For this reason, a curriculum designed either for student or teacher education must take into consideration these realities in order to serve the needs of the current society and the world that is emerging. On this basis, a large body of literature was reviewed in order to identify theories, frameworks, models and concepts in the areas of modern education, teacher professional growth, moral and intellectual development, and ethics and RI teaching and learning, in addition to new approaches to thinking about and understanding the world around us that may be pertinent to RI education. The intersections of the different approaches that were identified and were considered to be relevant to the teaching and learning of RI are presented in this section. Apart from informing the development of the curriculum, the theoretical underpinnings and relevant concepts and tools helped also to operationalise the ideas that emerged in an appropriate manner, meaning to turn them from abstract concepts to practicum approaches, processes and interventions.

### 2.1. Teacher education in the 21<sup>st</sup> century

In recognition of the fact that the current education systems have become largely obsolete, many education scholars, governments and organizations that support development and education around the world are working intensively to co-develop learning frameworks and models that will provide an orientation for modernizing the education system. Many of them share similar approaches and attributes. This sub-section presents one of them, the one that was considered to be the most comprehensive, and other key concepts from the field of teacher education that informed the development of the Path2Integrity curriculum. It should be noted here that the sections below do not provide a full account of the frameworks, theories and models presented, but rather put the emphasis on aspects of them that are considered to be of high relevance to the Path2Integrity curriculum.

#### 2.1.1. The OECD learning framework 2030

The OECD learning framework 2030, which was first developed in 2018 and is still in progress, aims to offer a vision and some underpinning principles to provide an orientation for the future of education systems. The framework's shared vision of the education is to support every learner to "develop as a whole person, fulfil his or her potential (self-actualization<sup>1</sup>) and help shape a shared future built on the well-being of individuals, communities and the planet (self-transcendence)". Towards this direction, the need for broader education goals, learner agency, the need for a broad set of knowledge, skills, attitudes and values in action, competencies to transform our society and shape our future,

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<sup>1</sup> Self-actualization, fulfilling one's own potential, and self-transcendence, putting your own needs aside to serve something greater than yourself, are at the top two places in Maslow's hierarchy of needs.

and principles for moving toward an eco-systemic change make up the framework's key aspirations (Organization for Economic Co-operation and Development (OECD) 2018).

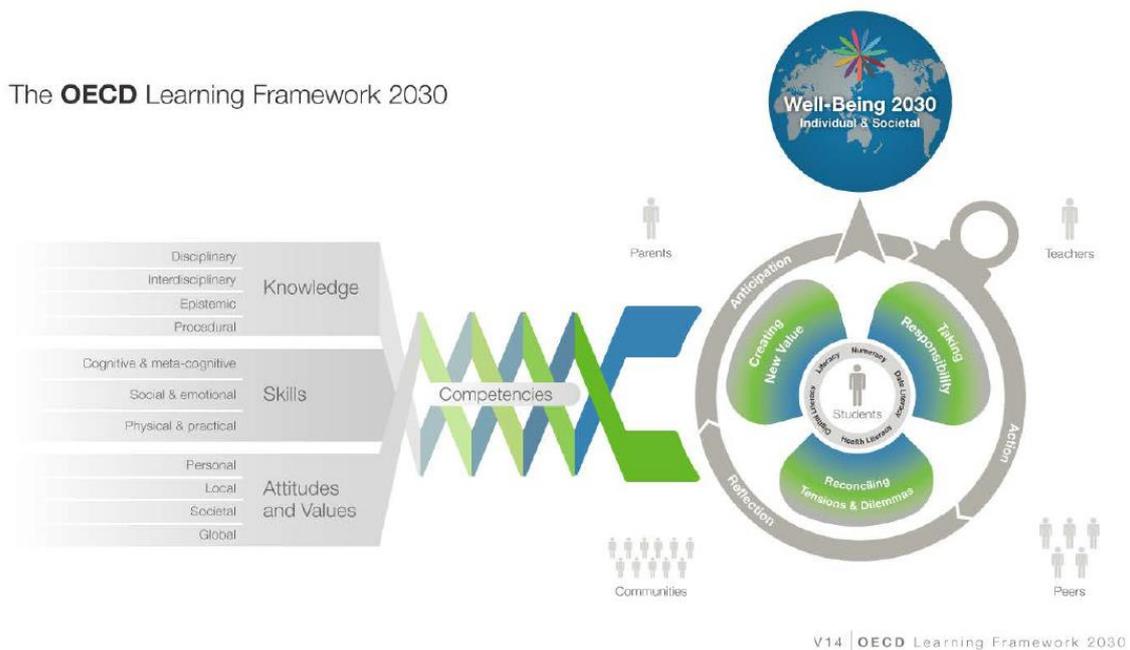
To be empowered to navigate through a complex and uncertain world, the role of learner agency is emphasised in the framework. It is important to highlight here that both students and educators are considered as learners, as they mutually learn from each other through their interaction. Agency, as described in the OECD framework, "implies a sense of responsibility to participate in the world and, in so doing, to influence people, events and circumstances for the better. Agency requires the ability to frame a guiding purpose and identify actions to achieve a goal". To support agency development, educators must adopt an ecological approach, meaning not only recognise learners' individuality, but also acknowledge the wider environment – teachers, peers, families, communities – that shape their learning (Organization for Economic Co-operation and Development (OECD) 2018).

The education system should also equip students with a broad range of skills, so that they are able to apply their knowledge in an unknown and evolving environment. These include cognitive and meta-cognitive skills, such as critical thinking, creative thinking, learning to learn and self-regulation, social and emotional skills, including empathy, self-efficacy and collaboration, as well as practicum and physical skills, for example, using new information and communication technology devices. The need for a series of competencies to transform the world and shape the future is also emphasised in the framework, including adaptability/flexibility, creativity, empathy, growth mind-set, identity, integrity, open mind-set, perspective taking and cognitive flexibility, problem solving skills, reflective thinking and self-control. The Path2Integrity training programme will strive for instilling the development of these skills and competencies in the educators<sup>2</sup> with the expectation that they will exercise them in the classroom and, in turn, inculcate them in their students (Organization for Economic Co-operation and Development (OECD) 2018).

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<sup>2</sup> Similar attributes are also emphasised in the V<sup>3</sup>SK Model (Appendix 1), which was developed by the National Institute of Education in Singapore and aims to provide a teacher education model for the 21<sup>st</sup> century.



**Figure 1.** The OECD Learning Framework: Work-in-progress.

### 2.1.2. Teacher professional growth

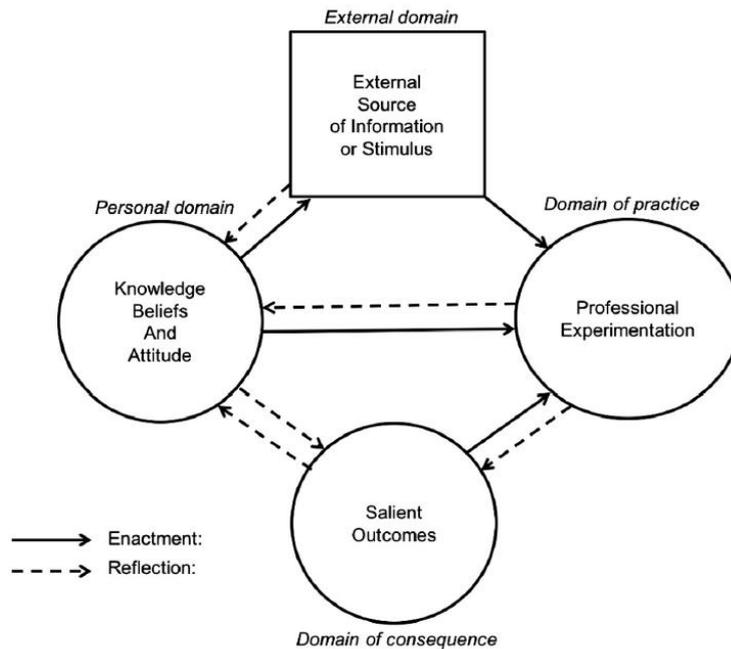
Adaptability, the ability to adjust to different conditions, becomes very pertinent to an educator who is to perform in a VUCA world. Adaptive experts are much more likely to change and expand their core competencies and thus restructure their expertise, in contrast to routine experts who continue honing their core competencies to perform with a greater efficiency over time. Adaptive experts seem to have more cognitive flexibility and stronger problem-solving skills. A model for teacher professional growth that supports well the development of adaptive expertise is the interconnected model of teacher professional growth (IMTPG) (van Tartwijk J 2019).

For a long time, it was considered widely that, when teachers change their knowledge, beliefs, and attitudes, this will automatically lead to improvement in their teaching practices, and thus to better student outcomes. However, in 2002, Clarke and Hollingsworth claimed that changing teachers' knowledge, beliefs and attitudes is not sufficient to bring changes in teaching practice. In particular, they wrote "teacher growth becomes a process of construction of a variety of knowledge types (content knowledge, pedagogical knowledge, and pedagogical content knowledge) by individual teachers in response to their participation in the experiences provided through professional development programme and through their participation in the classroom" and introduced the IMTPG model (van Tartwijk J 2019).

According to the IMTPG model, teacher professional growth derives from reciprocal relationships between four different domains which make up teacher's professional world: (1) the *Personal Domain*, which consists of teachers' knowledge, beliefs, and attitudes; (2) the *External Domain*, which contains external sources of information or stimuli; (3) the *Domain of Practice*, which involves professional experimentation; and (4) the *Domain of Consequence*, which contains salient outcomes related to classroom practice (Fig. 2) (van Tartwijk J 2019).

As the different domains are interconnected through the processes of `enactment` and `reflection`, often change in one domain is `translated` into a change in the other domains (translation pathways

or growth networks). `Enactment` is defined as something a teacher does as a result of what he/she knows, believes, values or has experienced. `Reflection` refers to “a set of mental activities to construct or reconstruct experiences, problems, knowledge or insights”. The model supports the development of adaptive expertise through its dynamic nature, the multiple entry points it provides and their interconnectedness. Teachers through iterative processes of change, initiated by any of the four domains, can continuously adapt their expertise by refining their competencies, trying things out in practice, assessing what works or not with students, revisiting their conceptions and misconceptions, and try again (van Tartwijk J 2019).



**Figure 2.** The Interconnected Model of Teacher Professional Growth (IMTPG).

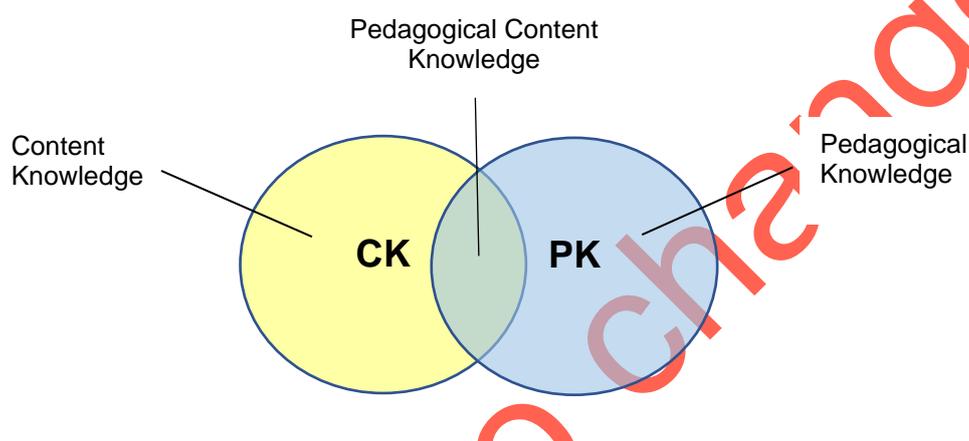
The Path2Integrity training programme will strive for cultivating educators' adaptive expertise through operationalizing the IMTPG model. This will be pursued through offering a programme that triggers changes in all four domains based on an integrated approach that is theory-, practice- and reflection-oriented.

### 2.1.3. Pedagogical content knowledge

The main focus of the Path2Integrity curriculum is to enhance educators' pedagogical competencies to teach RI. On this basis, the concept of pedagogical content knowledge (PCK), the pedagogy of a specific subject matter, becomes very pertinent to the development of the project's curriculum. The literature about PCK provides very useful knowledge and insights about what such a curriculum should cover and strive for.

The term PCK was first coined by Lee Shulman, a teacher education researcher, in 1986. Shulman argued that subject matter knowledge (or content knowledge) and general pedagogical knowledge are essential foundations, but not sufficient to provide teachers the means they need to teach a particular subject matter effectively. In his view, effective teaching of a specific subject matter lies at the intersection of content and pedagogy, as it enables teachers to transform and communicate particular subject matter in ways that support and promote student learning (Fig. 3) (Rollnick M 2017).

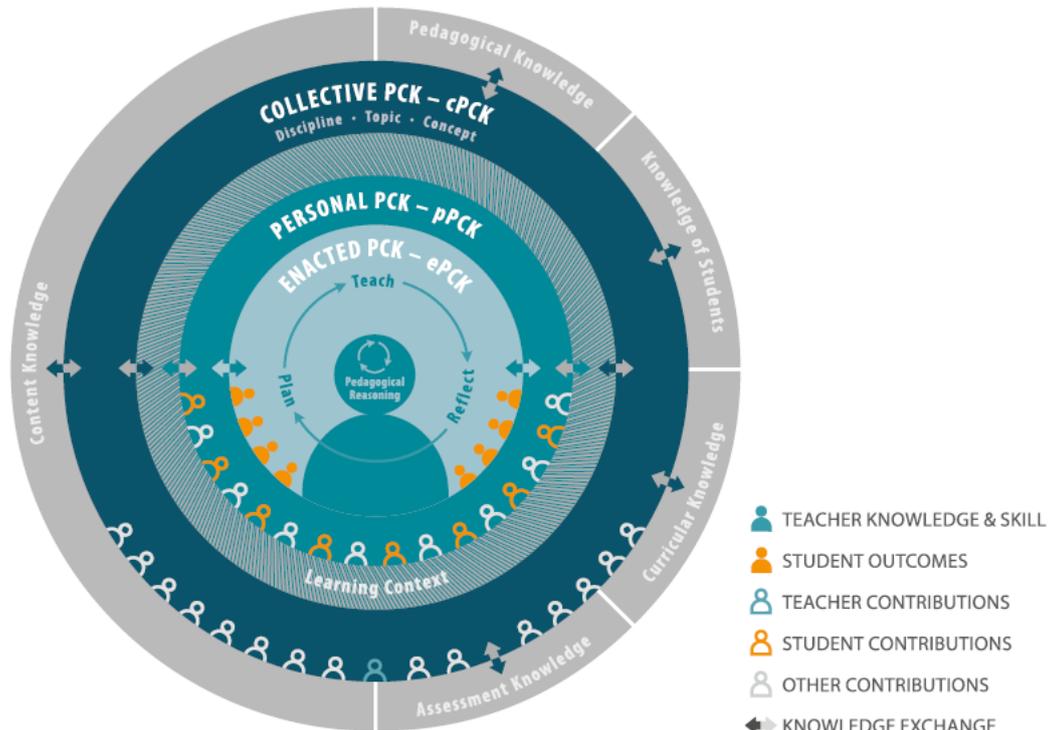
Lack of PCK or lack of awareness of inadequate PCK challenges teachers (even capable and experienced ones) who have either rich knowledge of the subject matter or strong pedagogical skills to teach a specific subject matter effectively. This is also supported by the findings of the Path2Integrity needs assessment for the teaching of RI. Experienced teachers with extended pedagogical knowledge reported that they face challenges to teach RI effectively because they lack a broad and deep understanding of the subject matter. Likewise, RI experts with thorough knowledge of the subject matter experience difficulties to teach the subject matter effectively due to the lack of adequate teaching strategies that are known to work in RI education. However, none of the educators interviewed, even the ones with a long experience in teaching RI, could specify and articulate in a concrete way and on a deeper level the factors that hinder the effective teaching and learning of RI. This is what PCK aims to make explicit.



**Figure 3.** Pedagogical content knowledge (PCK) rests at the intersection of content knowledge (CK) and pedagogical knowledge (PK).

PCK, according to Shulman's initial conception of it, comprises of two key components, that is, knowledge of useful forms to represent and formulate specific subject matter, such as schemes and analogies, and knowledge of students learning regarding that same subject matter, such as students' conceptions or misconceptions and learning difficulties. Throughout the years, many educational scholars have worked on Shulman's initial model of PCK and expanded it. In 2017, educational experts worked jointly during and after the 2<sup>nd</sup> PCK summit to develop a comprehensive PCK model, the so-called Refined Consensus Model (RCM), that provides a more ecological approach to building educators' PCK (Fig. 4) (Carlson J 2019).

According to the RCM model, extended content knowledge, pedagogical knowledge, knowledge of students, curricular knowledge and assessment knowledge are essential foundations for teachers to develop their PCK. The different knowledge bases are mediated and underpinned through the realms of *enacted PCK*, the knowledge attained through the teaching practice, *personal PCK*, the knowledge obtained through the educator's own teaching and learning experiences, and *collective PCK*, which is gained through interactions with other educators, peers or others. These knowledge bases are often established through more formal routes, such as teacher education programmes, and then strengthened over time and experience (Carlson J 2019).



**Figure 4.** The refined consensus model (RCM) of pedagogical content knowledge (PCK). The model describes the complex and multi-dimensional processes that shape and inform educators' teaching practices.

The knowledge bases of RCM are described as below:

- *Content knowledge* describes the academic content of a given discipline. Knowledge of RI in the case of the Path2Integrity training programme. This expertise requires to have discipline-specific knowledge, skills and competencies, such as an understanding of the nature of RI and how to provide explanations about it, as well as an understanding of specific domains within RI, of related topics and concepts within a domain, along with the relationship among the various domains, topics and concepts.
- *Pedagogical knowledge* includes “a range of pedagogical skills and strategies that enable educators to reach each student effectively”. This, for example, may include, knowing how to create a conducive environment for learning in the classroom, making clear what students are to do and achieve, and using strategies to engage students in collaborative learning.
- *Knowledge of students* refers to knowing and having an understanding of the student attributes, including their age, grade level, prior experiences, dispositions, developmental readiness, language proficiency, and cultural beliefs. Knowledge of students is perhaps the most important aspect of the learning context and a skilled teacher must draw upon this knowledge to facilitate learning.
- *Curricular knowledge* concerns the understanding of the nature of curriculum, and thus what to teach or not to teach about a specific subject matter at a particular stage. This requires the ability to identify *the big ideas*, the statements formulated to express the main concepts in the subject matter, that hold the subject matter together. Also, to know the *sequence of these big ideas*, meaning how these big ideas relate to each other and others in the subject matter and thus how to sequence them in teaching. Finally, the *prior concepts needed*, referring to an understanding of what subject matters are taught before and after and why it is important to teach that particular subject matter.

- *Assessment knowledge* refers to knowledge about the nature of different approaches and types of assessment and their appropriateness based on the teaching and learning of a specific subject matter in a particular context (Cogill 2008, Rollnick M 2017, Carlson J 2019).

## 2.2. Systems, complexity, and futures thinking

Systems thinking is a very wide area that seeks to bring together many different ways of thinking with a view to providing a holistic understanding and interpretation of the world. Systems thinking stems from the recognition that each individual's understanding of the world is subjective and partial. Subjective because each person filters the real world through his/her mental models. This results to a different interpretation and internalization of reality, even for people who are exposed to and experience the same events. Partial, as each one of us can only see a fraction of reality, as the parable of the blind men and the elephant illustrates successfully (Systems Innovation (SI) 2020).

By being fixated on parts of reality, we miss understanding the whole. However, the increasing interconnectedness that characterises the 21<sup>st</sup> century stresses the need for a holistic understanding of the world. This comes in contrast to the more traditional and prevailing paradigm up to now, reductionism. The reductionist approach supports that in order to understand any complex phenomena, you need to reduce it (break it down) to its elementary components, and once you understand how these individual components work, you put them together and you can understand the whole. This presupposes though a clockwork universe, a universe that works like a mechanical clock. The modern world is rather governed by non-linear additivity. Thus, the reductionist approach renders us ill-prepared to understand and navigate through the modern world's complexity, as also the many crises the world is undergoing indicate. Therefore, being aware of complexity, attempting to understand and embracing it rather than avoiding it and oversimplifying things become essential and an integral part of developing interventions in the 21<sup>st</sup> century that are likely to succeed and have sustainable outcomes (Heylighen, Cilliers et al. 2007, Systems Innovation (SI) 2020).

Unlike most may think, we are not completely unprepared to face up to complexity. Complexity theory and complexity science that have been building up for decades help us obtain a better understanding of complex systems. Scientists already in the 1940s and 1950s had estimated that cracking and leveraging complexity would be the grand challenges for science in the 21<sup>st</sup> century (Weaver 1948). The last decades the development of technology and new scientific methods, such as computer simulations, have enabled us to analyse large amounts of data and thus to start understanding complexity on a deeper level. In the recent decades there has been a growing awareness that complexity penetrates all aspects of the world and studies aiming at understanding complexity in many different fields have been on the rise, including education, ethics, and RI to a limited extend (Pipere 2016, Saurin 2016, Young 2016, Castellani 2018, Gorman, Elkins et al. 2019).

At the heart of complex systems is the recognition that the whole is more than the sum of the parts, largely due to the interconnected and dynamic nature of complex systems. For this purpose, a complex system, unlike simple and complicated systems<sup>3</sup>, is not reducible to the elements that comprise it. If so, it loses the aspects that make it complex. Complex systems are defined as "large networks of simple interacting elements, which follow simple rules, produce emergent, collective, complex behaviour" by the Santa Fe institute, a leading institute in the study of complexity. Other key characteristics of complex systems include non-linearity (no cause-effect relationship), self-organization, adaptability and emergence. Because of these attributes that are inherent to the complex systems, their behaviour cannot be controlled and predicted either (except for the very short-term), but it can

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<sup>3</sup> The systems are categorised either as simple, complicated, complex or chaotic according to the Cynefin framework (Appendix 2). The framework provides also guidance about how to manage each type of system.

be influenced. The weather, forests, cities, economy, the ecosystem, and brain are some examples of complex systems (Mitchell 2018).

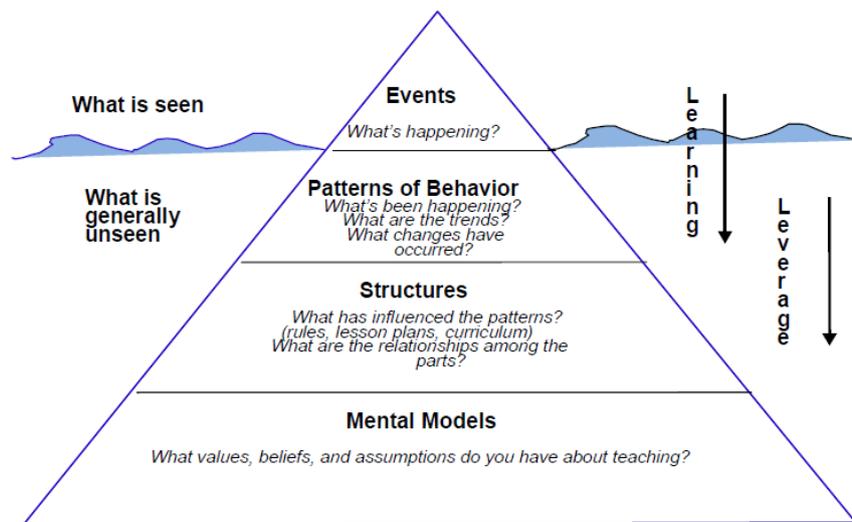
A very promising concept about complex systems is the leverage points. Leverage points are places within a complex system where a small change could lead to a large shift in the system's behaviour. Systems thinkers acknowledge that there is not a magic, silver bullet nor quick fixes to achieve systems change. They firmly believe though that intervening in system's leverage points at the same time on many levels could influence the system's behaviour towards the desirable direction in a sustainable way. Donella Meadows, an eminent systems thinker, developed a list of 12 leverage points to intervene in a system with an increasing order of effectiveness (Appendix 3). The higher the leverage point is in the hierarchy, the larger the change it can bring to the system, but also the higher the resistance to change that will be exhibited. Positive and negative feedback loops, the flow of information, the rules of the system, such as incentives, punishment, constraints, its goal and the mindset or paradigm the system arises from are some of the leverage points. The power to transcend paradigms, meaning "to keep oneself unattached in the arena of paradigms, to stay flexible, to realise that *no* paradigm is "true", that everyone, including the one that sweetly shapes your own worldview, is a tremendously limited understanding of an immense and amazing universe that is far beyond human comprehension". The ability to be aware of this and to transcend paradigms is closely linked to the concept of self-transcendence, to shift from ego-system to ecosystem awareness. Self-transcendence is also the pinnacle in Maslow's hierarchy of needs, as mentioned earlier, and therefore has the potential to facilitate, among other, one's moral transformation (Meadows 2009, Abson, Fischer et al. 2017).

### **2.2.1. Implications of systems, complexity, and futures thinking for the Path2Integrity curriculum**

As complexity permeates every aspect of the world, education and RI could not get away from it. Educators, whether they know it or not, are highly immersed in complexity. The dominant public view is that learning is in linear and direct relationship with teaching. However, the learning process is largely non-linear and dynamic, and learning is the result of emergence of the conditions provided in the classroom and the interactions that occur, what is called emergent learning (Sullivan 2009, Darling, Guber et al. 2016, Darling and Parry 2018). It is, therefore, impossible to predict and control educational outcomes, but one can strive to influence them towards the desired direction. Against this background, many recent studies attempt to explore how we can leverage the knowledge and insights complexity thinking offers to enhance teaching and provide a deeper learning experience. Some key approaches and aspects that have been identified and were found to be relevant to the aspirations of Path2Integrity are presented in the following sub-sections.

#### **2.2.1.1. Transformational change**

Systems thinking helps to move the focus away from events and patterns of behaviour, which are the symptoms of a problem, and toward the systemic structure and the underlying mental models (Fig. 5). For this reason, educational interventions informed by systems thinking have the potential to offer a transformational experience by challenging fundamentally the learners' deep assumptions and preconceptions, their core beliefs and values, schemas, mental models and mindsets, thus affecting the way they understand themselves, others, and the world. Transformational learning experiences can, in turn, contribute to other important educational outcomes, including enduring learning, conceptual change, knowledge transfer, i.e. application of learning in new contexts or on novel problems, professional aspirations, motivation and interest. A transformational experience may also inspire or even evoke the desire in the learners to become advocates for a systems change (Senge 2006).



**Figure 5.** An example of applying systems thinking on teaching.

To operationalise a systems shift towards the desired direction, tools from the field of futures studies can be helpful, such as the method of causal layered analysis (CLA) and theory U. CLA is “a theory and methodology to have a deeper and longer lasting change”, to create a transformative change in individuals, teams, organizations or larger systems. It seeks to “transform the present and the future through deconstructing and reconstructing reality at four levels”. The levels consist of litany (visible), systemic (causes), worldview, and myths-metaphors (Appendix 4) (Inayatullah 2019).

In addition to CLA, theory U is a useful method that can facilitate the shift from ego-system to eco-system awareness (Fig. 6). Moving down the left side of U is about opening up and attempting to connect with a world that is outside of our existing worldview/paradigm, a process of letting go of our old ego and self. Moving up the right side is about attempting to bring forth the new into the world, a process of let-come our highest future self. At the bottom of U these two selves – our current self and our best future self – meet and begin to listen and resonate with each other. As theory U indicates, three openings are needed to transform systems:

- Open mind refers to removing our old habits and looking afresh.
- Open heart is about developing the capacity to look at the problem not just from your angle, but that of the others.
- Open will describes the capacity to let go and let something new emerge (Scharmer 2015).

It is important to note here that futures thinking (also mentioned sometimes as foresight or anticipatory thinking), as OECD states too, has attracted attention and informed interventions in many sectors, such as the environment, energy, and transport, but it has been largely neglected in education to date (Organization for Economic Co-operation and Development (OECD)). It may be due to this realisation that anticipation is emphasised in the OECD learning framework 2030 presented in the beginning of this section, as part of the Anticipation-Action-Reflection cycle. In the anticipation phase of the cycle, learners try to foresee what may be needed in the future and then consider how actions should be taken today (Organization for Economic Co-operation and Development (OECD) 2018).

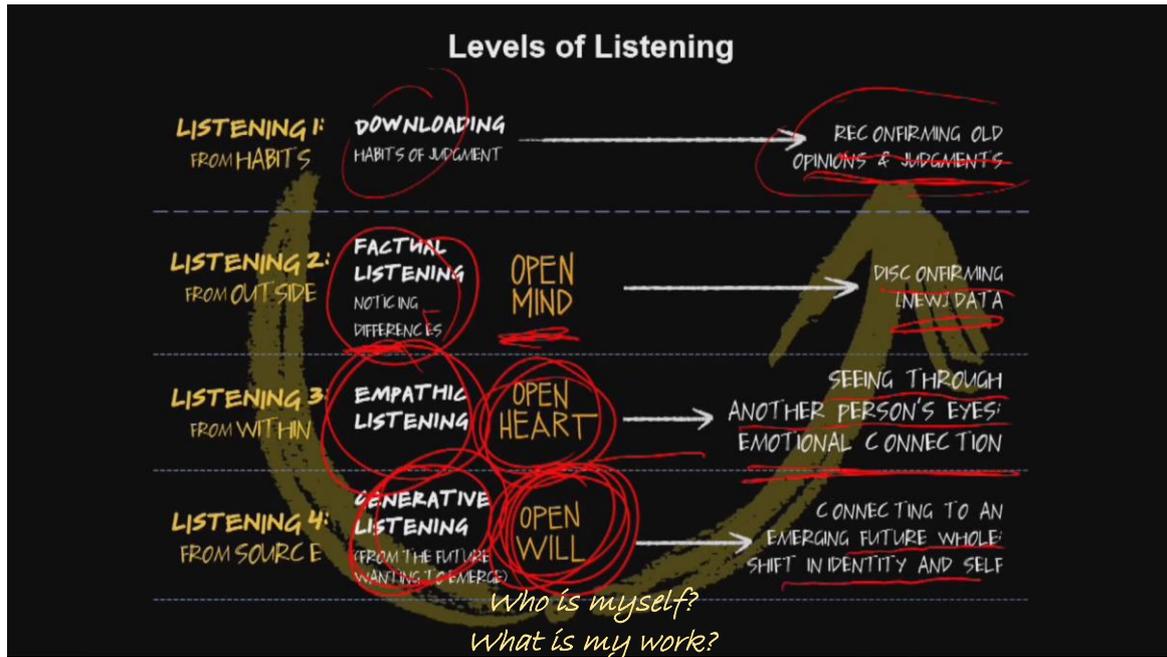


Figure 6. The core steps and process of Theory U.

### 2.2.1.2. Classroom as a complex adaptive system

In the view of complexity thinking, classrooms can be considered as complex adaptive systems (CAS) and the teacher is seen as a systems gardener. As systems gardener in a CAS, the role of the teacher is to create the context for learning to emerge in the classroom towards the desired direction rather than to control the process of learning. Consequently, a teacher should see and act from the whole, create conditions for emergence, and integrate diversity (Systems Innovation (SI) 2020).

In practice, this can be achieved through creating boundary, probing experiments, and dampen and amplify, as the field of complexity suggests. Creating boundary means to define the limits of the system and thus setting the context within which self-organization can occur. Probing experiments refers to introducing safe to fail experiments and waiting to see if a pattern forms (attractor<sup>4</sup>). If it is beneficial for the learning process learners will get attracted to it. Dampen and amplify is about dampening down or amplifying the attractors depending if they are beneficial to the whole system or not. This approach to teaching and learning is particularly pertinent to Path2Integrity, partly due to the dialogical methods the project's training interventions are based on (Systems Innovation (SI) 2020).

<sup>4</sup> Attractors are the result of emergent phenomena. An attractor is a set of states towards which a system will naturally gravitate and remain cycling through unless perturbed. In social systems, attractors are the source of least resistance for a person or a social group at any given time. Shared vision, team processes, and information flows used as positive feedback mechanisms have been identified as potential metaphors of attractors in educational setting.

Source: Gilstrap, D. L. (2005). "Strange attractors and human interaction: Leading complex organization through the use of metaphors." *Complicity: An International Journal of Complexity and Education* 2: 55-69.

### 2.2.1.3. Emergent learning

Emergent learning is an imperative in a VUCA world that is highly interconnected and constantly changing. Emergence, from the perspective of complexity science, is not merely about finding adaptable solutions, but it is a process by which through the interactions of many simple, individual entities (agents) more complex behaviours are formed as a collective (Darling, Guber et al. 2016). Ethics can be considered as an emergent property of the behaviour of (social) agents deriving from micro and local rules (Minati 2010). Hence, emergence and emergent learning are concepts particularly pertinent to RE/RI education.

Emergent learning, unlike intended learning that “happens from a place of knowing and against a set of specific goals”, “happens from a place of reflection and sensemaking” (Fig. 7), as Theory U also points out. The enablers of emergent learning, as summarised in figure 8, will be embedded in the Path2Integrity training programme activities in order to foster emergent and transformative learning and to render the educators more competent and confident to teach RI in the world of the 21<sup>st</sup> century (Omer 2017, Chattopadhyay 2019, Chattopadhyay 2019).

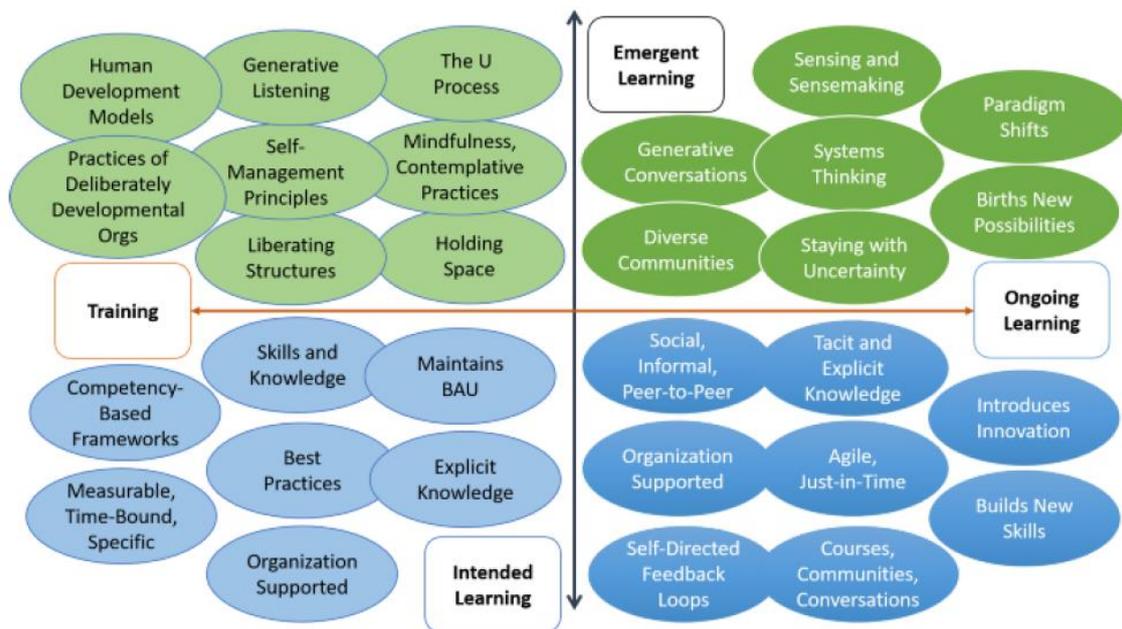


Figure 7. Moving from intended to emergent learning

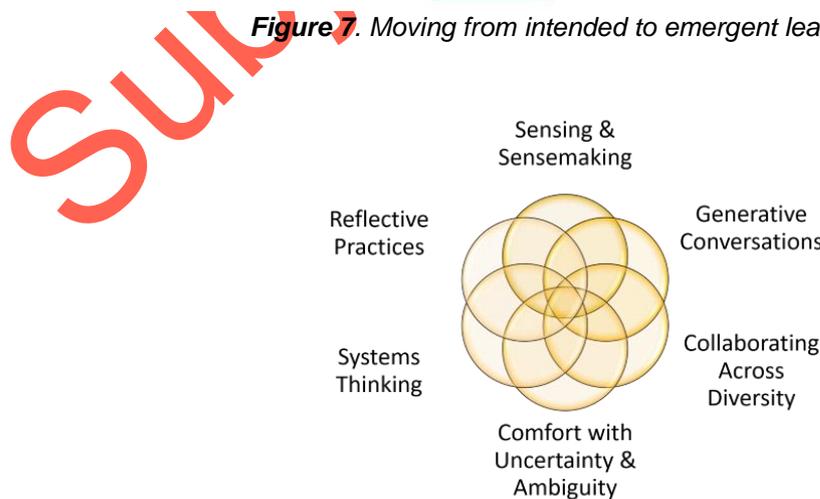


Figure 8. Enablers of emergent learning.

### 2.2.1.4. Cognitive flexibility

One of the main challenges for modern education, but also, in particular, for the field of RI education is how to enable learners “to independently apply the instructed knowledge to new situations that differ in their characteristics from those of initial learning and not to merely reproduce the instruction they received in the classroom”. This is called *knowledge transfer*, the ability to apply what was taught in the classroom in real-world situations in new and greatly varying contexts (Spiro, Coulson et al. 1988, Spiro 2015).

In this regard, the concept of cognitive flexibility and the relevant theory, the cognitive flexibility theory (CFT), provide very useful insights. Cognitive flexibility has been described as the mental ability to be aware of alternative ways and options, to be flexible in accommodating to new situations (adaptability), and to feel competent in these situations. Cognitive flexibility is present in humans since preschool years and can be strengthened or weakened throughout one’s life depending on their environment and experiences. Education certainly plays an essential role in this (Onen and Kocak 2015).

The CFT, which was developed by Spiro and his colleagues more than 30 years ago, is defined as “a theory of learning and instruction for advanced knowledge acquisition and application in complex and ill-structured knowledge domains”. Ill-structured domains, unlike well-structured ones, are characterised by non-linearity and high interconnectedness. A result of this is that there are multiple solutions to a single problem. This type of problems is best analysed from multiple perspectives. In short, to enhance learners’ cognitive flexibility and foster the flexible usage of knowledge, Spiro and others suggest that it is necessary to present information in different ways, including various conceptual representations as well as methods and techniques, with different purposes in different contexts (Spiro, Coulson et al. 1988, Spiro 2015).

The full list of remedies Spiro and his colleagues suggest in order to cultivate cognitive flexibility include:

1. **Avoidance of oversimplification and overregularization:** To adopt an approach of *intermediateness*. The two extremes, oversimplification and overregularization (reduction bias<sup>5</sup>) of cases as opposed to the perception that each case is unique, should be avoided in ill-structured domains<sup>6</sup> (cf. Cynefin framework). Each case is a “one-time situation”, but it is not considered as unique. That is because the relation of a new case to preceding ones is *intermediate*, partially overlapping and partially non-overlapping.
2. **Multiple representations:** Single representations, including single schema, organizational logic, line of argument, prototype, analogy, etc., will fail to capture important facets of complex concepts. “Cognitive flexibility is dependent upon having a diversified repertoire of ways of thinking about a conceptual topic”. Knowledge that will have to be used in many ways has to be learned, instructed, represented, and tried out in many ways.
3. **Centrality of cases:** Because the conceptual elements that are relevant and their pattern of combination vary widely across cases, abstract concepts, such as theories, general principles, etc., cannot be determined and prescribed in advance. “Increased flexibility in responding to highly diverse new situations comes increasingly from reliance on reasoning from precedent cases”. “The more ill-structured the domain, the poorer the guidance for knowledge *application* “top-down” structures will generally provide”.

<sup>5</sup> It should be avoided to treat superficial similarities among different phenomena as unifying characteristics, interacting components as independent, incomplete conceptual accounts as being comprehensive. The irregular as regular, the non-routine as routine, the disorderly as orderly, the continuous as discrete, the dynamic as static, the multidimensional as unidimensional.

<sup>6</sup> As suggested also by the Cynefin framework, different types of problem demand different kinds of approach to manage them. Problems of complex nature cannot be reduced to simple or complicated.

4. **Conceptual knowledge as knowledge-in-use:** Concepts receive full meaning only in context in ill-structured domains. As a consequence, a concept's meaning in use cannot be determined across cases in a universal way, but one must pay a close attention to the details of how a concept is used in a particular case, example, or event. Therefore, abstract generalization should be avoided.
5. **Schema assembly (from rigidity to flexibility):** "In complex and ill-structured domains, one cannot have a prepackaged schema for everything!" Knowledge cannot merely be *retrieved* from intact, rigid, precompiled structures, but it must be *assembled* from "different conceptual and precedent case sources to adaptively fit the situation at hand".
6. **Non-compartmentalization of concepts and cases (multiple interconnectedness):** Despite the fact that concepts and cases have to be focused on separately, so that knowledge and complexity is conveyed in smaller bites, they should not be relegated to separate compartments. Instead, multiple interconnectedness along multiple conceptual dimensions should be fostered.
7. **Active participation, tutorial guidance, and adjunct support for the management of complexity:** In ill-structured domains, knowledge cannot just be handed over to the learner. Hence, active involvement of the learner in knowledge acquisition together with opportunistic guidance by expert mentors is important. Also, support should be provided to the learner to manage the added complexity that comes with ill-structure (Spiro, Coulson et al. 1988, Kloss 1994, Spiro 2015).

Subject to change

### 3. Contents and structure of the curriculum

Module	Topic <sup>7</sup>	Description	Learning Objectives	Duration <sup>8</sup>	Methods/Activities
1	<u>Kick-off:</u> Welcome and introduction to the Path2Integrity project	This module will welcome the educators to the training programme and provide a brief overview of the project's rationale as well as its goals, structure, methods and materials.	<p><i>Knowledge on</i></p> <ul style="list-style-type: none"> <li>- Why RI and RI training are important</li> <li>- The project's rationale, goals, structure, methods and materials</li> <li>- An overview of what the project offers and how the training programme fits into it</li> </ul> <p><i>Skills to</i></p> <ul style="list-style-type: none"> <li>- Navigate through and retrieve relevant project materials</li> <li>- Interact with other participants</li> </ul>	30 min	<ul style="list-style-type: none"> <li>- Watch the power point video(s)</li> <li>- Navigate through the project website and materials to familiarise yourselves with them</li> <li>- Icebreaker and team-building activities that involve storytelling: <ul style="list-style-type: none"> <li>• Participants to introduce themselves (in groups) by sharing their story of how they got interested in RI and the Path2Integrity training.</li> </ul> </li> </ul>
2	<u>Introduction</u> to the training programme	<p>This module aims to:</p> <ul style="list-style-type: none"> <li>- present the philosophy, rationale, objectives and structure of the training programme</li> <li>- introduce its contents, methods and learning activities</li> <li>- explain why it is designed the way it is, incl. common challenges in teaching RI and how the programme aims to address them</li> <li>- describe the programme's target groups</li> </ul>	<p><i>Knowledge on</i></p> <ul style="list-style-type: none"> <li>- The structure, contents, methods and activities of the training programme</li> <li>- The structure and contents of Path2Integrity learning cards and handbook(s) suitable for your target groups</li> <li>- The structure and contents of the European Code of Conduct for Research Integrity (ECoC)</li> </ul> <p><i>Skills to</i></p> <ul style="list-style-type: none"> <li>- Navigate through the project's training materials, esp. the learning cards, handbook(s) and ECoC</li> </ul>	1 hour	<ul style="list-style-type: none"> <li>- Watch the power point video(s)</li> <li>- Navigate through the learning cards, handbook and ECoC to familiarise yourselves with them</li> <li>- Hands-on activity 1: <ul style="list-style-type: none"> <li>• Navigate individually through the Path2Integrity materials relevant to your target audience to familiarise yourself with them.</li> </ul> </li> <li>- Hands-on activity 2: <ul style="list-style-type: none"> <li>• Post and/or discuss about the challenges you face when you teach RI.</li> <li>• Share with others in the group what your expectations are from the training programme.</li> </ul> </li> </ul>

<sup>7</sup> An incremental approach is followed in sequencing and structuring the topics and activities of the programme.

<sup>8</sup> The workload per module may vary among participants depending on how familiar each one of them is with the concepts presented.

					<ul style="list-style-type: none"> <li>• Develop a shared (learning) vision in your group and post it, so that other groups can see it.</li> </ul>
3	<p><u>Integrity</u>: What it is and why it is important</p>	<p>The word integrity itself means unified, intact, whole, harmony, undivided, consistency. Yet definitions about integrity are characterised rather by fragmentation and ambiguity, which make it challenging for many to fully understand and explain the concept to others. Against this background, this module will aim to provide a comprehensive understanding of the concept of integrity and why it matters.</p>	<p><i>Knowledge on</i></p> <ul style="list-style-type: none"> <li>- The different perspectives of integrity</li> <li>- Concepts related to integrity, incl. values, virtues, norms, morality, self-control/self-governance, rules, compliance</li> <li>- The importance of integrity</li> </ul> <p><i>Skills to</i></p> <ul style="list-style-type: none"> <li>- Explain to others what integrity is and why it matters</li> </ul> <p><i>Reflection on</i></p> <ul style="list-style-type: none"> <li>- Examples that are characterised by integrity or lack of integrity</li> <li>- Different codes of conduct relevant to the participants' context</li> </ul>	1.5 hours	<ul style="list-style-type: none"> <li>- Hands-on activity 1:                             <ul style="list-style-type: none"> <li>• Take a quiz before you watch the power point video(s). The quiz will provide short examples of cases that are characterised by integrity or lack of it, to enable participants to start constructing by themselves an understanding of what integrity is and its importance</li> <li>• Share your thoughts about it and discuss with the others.</li> </ul> </li> <li>- Watch the power point video(s)</li> <li>- Hands-on activity 2:                             <ul style="list-style-type: none"> <li>• Post RI codes that you know of/looked for which are considered to be important/pertinent to your country/region or discipline.</li> <li>• Reflect on them and discuss about them with others in your group, also in relation to ECoC.</li> </ul> </li> </ul>
4	<p><u>Integrity in research</u></p>	<p>What research integrity is and why it matters? In this module the term "research integrity" will be deconstructed into its main components and then it will be reconstructed again, building upon the three previous modules. This will involve the participants' reflection and cooperation in order to enable them to obtain a more in-depth and flexible understanding of the term and its relevance to science.</p>	<p><i>Knowledge on</i></p> <ul style="list-style-type: none"> <li>- Basic concepts used in the field of research integrity, incl. integrity, morality, values, norms, rules, science, research, research process, research community, research environment</li> <li>- The beliefs, values, methods and procedures in the research community</li> <li>- The added value of integrity in research</li> </ul>	2 hours	<ul style="list-style-type: none"> <li>- Watch the power point video(s)</li> <li>- Hands-on activity 1:                             <ul style="list-style-type: none"> <li>• Think and discuss based on your understanding of the endeavor of research, which values you think are relevant in order to serve its purpose. Do the same about your specific discipline.</li> <li>• Think and discuss in which steps of the research process these values are relevant and should be applied, and how.</li> </ul> </li> </ul>

			<p><i>Skills to</i></p> <ul style="list-style-type: none"> <li>- Explain to others what research integrity is as well as relevant key concepts</li> <li>- Explain the significance of integrity in research</li> <li>- Identify key elements of RI in the various steps of the research process and in the different components of the research environment</li> </ul> <p><i>Reflection on</i></p> <p>The key components of RI you identified in contrast to the ones in ECoC and the other codes of conduct relevant to your context (the ones identified in module 3)</p>		<ul style="list-style-type: none"> <li>• Compare your reflections with the contents of the ECoC and the other codes of conduct you identified in module 3.</li> <li>- Hands-on activity 2:             <ul style="list-style-type: none"> <li>• Think which steps of the research process and aspects of the research environment are relevant to your target audience and discuss this with the other participants.</li> </ul> </li> </ul>
5	<u>Integrity and identity</u>	<p>“Who am I”, as an educator, as a researcher, as a student? This is what the concept of identity aims to answer. As persons we have multiple identities both in our personal and professional life. Some identities are given, such as gender, and some are constructed over time. The different identities one has change throughout his/her life-course. The identities one holds at a particular stage in his/her life largely affect his/her values, beliefs, and assumptions at this given time period. Sometimes one’s identities may conflict. What is the role of integrity in this case?</p>	<p><i>Knowledge on</i></p> <ul style="list-style-type: none"> <li>- The concept of identity</li> <li>- Theories of identity development</li> <li>- The interlinkages between identity and integrity</li> <li>- The conflict of identities</li> </ul> <p><i>Skills to</i></p> <ul style="list-style-type: none"> <li>- Acquire a deeper understanding of your identity as an educator and that of your students</li> <li>- Obtain some insights into the process of integrity development</li> </ul> <p><i>Reflection on</i></p> <ul style="list-style-type: none"> <li>- The different identities that make you as a person</li> <li>- The knowledge, practices, beliefs and moral principles that make up</li> </ul>	2 hours	<ul style="list-style-type: none"> <li>- Watch the power point video(s)</li> <li>- Hands-on activity 1:             <ul style="list-style-type: none"> <li>• Make a list of the different identities that make you as a person.</li> <li>• Reflect on your identity as an educator and discuss this with the others.</li> <li>• Think whether your different identities ever come in conflict and how you act in these situations.</li> </ul> </li> <li>- Hands-on activity 2:             <ul style="list-style-type: none"> <li>• Think whether you can discern or estimate any of the identity development stages in your learners’ audience.</li> <li>• Discuss with others about potential actions you could take, as an educator, to support your learners towards developing integrity.</li> </ul> </li> </ul>

		<p>The module will examine the concept of identity, how it develops and the ways it interrelates to integrity. The overarching goal of this module is dual. First, to enable the participants to reflect on their identity as educators, who they are and what they may want to become. Also, to start cultivating openness, so that they become more receptive to new ways of thinking. Second, to provide educators with better understanding of their students and how to support them towards developing integrity, as part of their identity as students, but also as a component of their current/future identity as researchers.</p>	<p>and characterise your identity as an educator</p> <ul style="list-style-type: none"> <li>- The role of the educator in the teaching of RI</li> <li>- Your students' identity development stages</li> </ul>		
<p>6</p>	<p>The nature of <u>human morality</u></p>	<p>Why some humans have stronger moral values and comply with them, whereas others do not? Is morality inherent or can be learnt? If so, what education could do and how? What are the factors that affect moral decision making? Is it the result of moral reasoning or of moral intuition? Why is it easier for some people to do the right thing when it is the hard thing to do compared to others?</p> <p>This module will aim to answer these questions by providing an understanding about the diversity of morality and self-control in humans and discuss about the role</p>	<p><i>Knowledge on</i></p> <ul style="list-style-type: none"> <li>- The three most common moral theories/approaches, incl. consequentialism, deontology and virtue ethics</li> <li>- Key insights from science about human morality on multiple levels:             <ul style="list-style-type: none"> <li>• The origins of morality: Individual selection, kin selection and reciprocal altruism</li> <li>• Prosocial and psychosocial development of morality</li> <li>• The role of context, incl. culture, and priming in moral behaviour</li> </ul> </li> <li>- Key knowledge about the development and attainment of self-control and empathy</li> </ul>	<p>3 hours</p>	<ul style="list-style-type: none"> <li>- Watch the power point video(s)</li> <li>- Hands-on activity 1:             <ul style="list-style-type: none"> <li>• In pairs, each one of you choose a learning card you may use in the future.</li> <li>• Each one of you develops a scenario based on the storytelling or role-play activity in the learning card.</li> <li>• Present your scenario to your colleague.</li> <li>• After your colleague presents his/her scenario, think how you would reconstruct the scenario applying the knowledge you obtained in this module by asking each other</li> </ul> </li> </ul>

		<p>of education, also in connection with Path2Integrity. For this, human morality will be presented from a holistic approach. Morality will be examined from a multidimensional perspective, from the evolutionary leftovers from our ancestors that shape our moral behaviour until a few seconds before one makes a decision that has moral aspects. The factors that shape and affect self-control and empathy will also be discussed.</p>	<ul style="list-style-type: none"> <li>- The role education can play in people’s moral development                             <ul style="list-style-type: none"> <li>• Key moral competencies</li> <li>• Methods that have the potential to foster moral skills, incl. narration and perspective taking</li> </ul> </li> </ul> <p><i>Skills to</i></p> <ul style="list-style-type: none"> <li>- Discern the cognitive and affective processes involved in students’ moral decision making</li> <li>- Reconstruct RI scenarios as needed to challenge students’ reasoning and thus support them in getting to know thyself and making conscious decisions (that have RI aspects)</li> </ul>		<p>if-then questions (some hints may be given).</p> <ul style="list-style-type: none"> <li>• Reflect together on your experience in this activity.</li> </ul> <ul style="list-style-type: none"> <li>- Hands-on activity 2:                             <ul style="list-style-type: none"> <li>• Share your conclusions (by posting them) with the other members of your group.</li> <li>• As a group, share your conclusions from this activity with the other groups.</li> </ul> </li> </ul>
<p>7</p>	<p><u>The science of learning</u></p>	<p>Educators to be able to facilitate effectively their students’ learning process they need to have some key insights into how learning occurs, what factors influence it and how to be flexible in their role as teachers based on the type of knowledge they want to convey in a particular context, incl. the learners’ developmental readiness.</p> <p>On this basis, this module will provide key knowledge from the science of learning that is relevant to the learning and teaching of RI.</p>	<p><i>Knowledge on</i></p> <ul style="list-style-type: none"> <li>- Learning theories and theories of intellectual development</li> <li>- Key aspects of the unified learning model, the cognitive flexibility theory and the concept of mental models and their relevance to the teaching of RI</li> <li>- Complex problem solving, decision making and critical thinking</li> </ul> <p><i>Skills to</i></p> <ul style="list-style-type: none"> <li>- Discern your target audience’s stages of intellectual development, (mis)conceptions and learning difficulties they may have in regard to RI</li> <li>- Identify appropriate teaching practices to best support the learning of</li> </ul>	<p>3 hours</p>	<ul style="list-style-type: none"> <li>- Watch the power point video(s)</li> <li>- Hands-on activity 1:                             <ul style="list-style-type: none"> <li>• In pairs (same ones as in module 6), think and discuss how you would apply the knowledge obtained in this module when using the learning cards (the ones you worked with in module 6) in the classroom. Scenarios that will include different target groups with specific characteristics will be given to the participants for this activity.</li> </ul> </li> <li>- Hands-on activity 2:                             <ul style="list-style-type: none"> <li>• Share your conclusions (via a post) with the other members of your group.</li> </ul> </li> </ul>

			each one in your target audience according to their needs		<ul style="list-style-type: none"> <li>As a group, share your conclusions from this activity with the other groups.</li> </ul>
8	<u>Storytelling and role-playing</u>	<p>Storytelling and role-playing, two dialogical methods of teaching and learning, are the main instructional methods used in Path2Integrity. Storytelling and role-play are considered to be very useful methods for the learning and teaching of RI, because, among other, they enable learners to explore the complexity of problem solving and decision making of cases with RI aspects as well as to be emotionally involved and take the perspective of others. This module aims to introduce the Path2Integrity methods to the participants and offer them the opportunity to apply them using the Path2Integrity learning cards.</p>	<p><i>Knowledge on</i></p> <ul style="list-style-type: none"> <li>Theoretical foundations of storytelling and role-playing</li> <li>The relevance of the methods to the teaching of RI</li> <li>The technique of storytelling and role-playing, incl. preparation and instruction, enactment, discussion and evaluation</li> </ul> <p><i>Skills to</i></p> <ul style="list-style-type: none"> <li>Prepare RI sessions using storytelling and role-playing</li> </ul> <p><i>Reflection on</i></p> <p>Your experience practicing the methods of storytelling and role-playing</p>	6 hours	<ul style="list-style-type: none"> <li>Watch the power point video(s)</li> <li>Hands-on activity 1:                             <ul style="list-style-type: none"> <li>In groups, the participants will practice the use of a learning card based on storytelling.</li> <li>One or two participants of each group will be the educator(s) and the remaining ones will play the role of students. A scenario will be provided to the participants in which specific characteristics will be attributed to the students. The activity will be developed according to the principles of role-playing.</li> <li>If deemed necessary, the members of the group can switch roles, so that all members of the group can have the opportunity to play the role of the educator.</li> </ul> </li> <li>Hands-on activity 2:                             <ul style="list-style-type: none"> <li>Share your reflections on this experience (via a post) with the other groups.</li> </ul> </li> </ul>
9	<u>Delivering a RI session using the Path2Integrity tools</u>	<p>This module aims to provide practicum knowledge to the educators as to how to prepare, design, implement and evaluate a RI session by using the Path2Integrity methods and materials.</p>	<p><i>Knowledge on</i></p> <ul style="list-style-type: none"> <li>Getting to know your audience and educator self-preparation</li> <li>Designing a RI session based on your audience's needs and context</li> <li>How to create a conducive environment in the classroom</li> <li>Facilitation skills</li> <li>How to assess a RI session using the Path2Integrity materials</li> </ul>	6 hours	<ul style="list-style-type: none"> <li>Watch the power point video(s)</li> <li>Hands-on activity 1:                             <ul style="list-style-type: none"> <li>Watch the video of an educator (we suggest Michael Sandel) facilitating a discussion about ethics.</li> <li>Reflect upon it and discuss about his facilitation skills.</li> </ul> </li> <li>Hands-on activity 2:</li> </ul>

			<p><i>Skills to</i></p> <ul style="list-style-type: none"> <li>- Use the Path2Integrity materials to assess the students' progress and learning</li> </ul> <p><i>Reflection on</i></p> <ul style="list-style-type: none"> <li>- Their performance as RI educators and their role as students</li> </ul>		<ul style="list-style-type: none"> <li>• Each one of the educators (or in pairs) in the group prepare and design a RI session using the Path2Integrity materials.</li> <li>• One of them implements it and the others participate as students.</li> <li>• They all together use the Path2Integrity materials to evaluate the session.</li> </ul> <p>- Hands-on activity 3:</p> <ul style="list-style-type: none"> <li>• Share your reflections on this experience (via a post) with the other groups.</li> </ul>
Field practicum				Up to 4 weeks	
10	Feedback and evaluation	At the closing of the training programme the participants will have the opportunity to discuss and reflect upon the learning experience offered by the programme as well as to provide feedback to the Path2Integrity consortium.	<p><i>Reflection on</i></p> <ul style="list-style-type: none"> <li>- Their experience during the field practicum with using the new knowledge obtained and the Path2Integrity materials and methods</li> <li>- Their overall learning experience during the programme</li> </ul>	2 hours	<ul style="list-style-type: none"> <li>- Hands-on activity 1:                             <ul style="list-style-type: none"> <li>• Discuss with the other educators and facilitator and reflect upon your experience with using the Path2Integrity materials during the field practicum.</li> </ul> </li> <li>- Hands-on activity 2:                             <ul style="list-style-type: none"> <li>• Discuss and reflect upon the training experience overall.</li> </ul> </li> <li>- Hands-on activity 3:                             <ul style="list-style-type: none"> <li>• Complete the feedback form.</li> </ul> </li> </ul>
<b>Total</b>				<b>27 hours</b>	

**Table legend**

-  These activities are conducted in groups via a web conferencing tool, such as Zoom, MS Teams, etc. (synchronously) or by using the interactive tools of the programme’s online learning environment (asynchronously).
-  These activities are conducted in pairs synchronously via a web conferencing tool, such as Zoom, MS Teams, etc.
-  These activities are conducted in groups synchronously via a web conferencing tool, such as Zoom, MS Teams, etc.

Subject to change

## 4. Additional information for the curriculum

It should be noted here that as the curriculum has not been consolidated yet and the modules and relevant activities have not been tested yet, changes may occur. Any potential changes will be incorporated in the version of the training curriculum that will be published later in the project lifetime.

### 4.1. Timeline and interactive activities

The training programme extends over a period of six weeks. The spaced learning approach is adopted, as the practice of learning information by studying the material with distinct time intervals between each study period is strongly preferred in order to support long-term retention of studied material (Weidman and Baker 2015). It is suggested that modules 1-9 run within a period of two weeks (adjustments can be made, if needed) and four weeks are allocated for the field practicum.

During the training programme there will be activities that are either asynchronous or synchronous. The majority of the modules' hands-on activities are to some extent interactive, some in pairs and others in groups. It is considered that educators can benefit the most, if they get involved in discussions with others through a video call. By working together, the educators can provide support to each other and co-create knowledge. If this is not possible, the alternative is to use the interactive tools the online learning environment of the programme will offer.

The increasing gradient of the colour in the table indicates activities that require least interaction to most. This means that the hands-on activities of modules 8, 9, and 10 should run in a synchronous way through a video call. The activities of modules 6 and 7 require interactive collaboration in pairs. Frequent and fruitful collaboration among participants during the training programme can provide a good foundation for the establishment of the Path2Integrity RI community.

### 4.2. Facilitators

The current plan is that the training that will take place during the project lifetime will be facilitated by Path2Integrity consortium members. After the end of the project, the training programme should be able to run without facilitators. We believe this is very doable, especially if a strong Path2Integrity community has been established during the project. If this has been achieved, educators who take the training after the programme ends could seek for support or learning partners through the community.

### 4.3. Training materials

This sub-section presents the main types of materials that will be used during the training programme and provides brief information about the ways they will be used.

#### 4.3.1. PowerPoint videos

PowerPoint presentations with a voiceover narration in the form of videos will be the main materials through which information will be communicated to the participants. Each module will consist of one or more presentations depending on its contents and structure.

### **4.3.2. Quizzes**

Quizzes will be provided whenever it is considered there is a need to challenge the participants' mental models and create "Aha" moments or to offer them some additional support when they are asked to construct knowledge.

### **4.3.3. Online videos**

Participants will be asked to watch videos for observation or for helping them to understand better some concepts.

### **4.3.4. Other materials**

Additional materials, such as readings and online resources, will be recommended for those participants who would like to obtain a more in-depth understanding of the contents covered in the training programme.

## **4.4. Training methods**

This sub-section outlines the main types of methods that will be used during the training programme. It is important to note here that, as it has probably become obvious by now, there will be one training programme for all the different levels of educators. However, there will be two versions of the activities, whenever needed, one for beginners and one for advanced learners. The participants will have the opportunity to choose themselves the level of difficulty depending on their prior experience and the extent they want to challenge themselves.

### **4.4.1. Storytelling and role-play exercises**

In order to enable educators to experience the methods they will have to use in the classroom, exercises of storytelling and role-play will be incorporated in the curriculum whenever suitable. This will not only allow them to become more familiar with the methods, but also to understand better their students' perspective.

### **4.4.2. Reflection exercises**

As emphasised in the theoretical part of the curriculum, reflection is an integral part of the learning process. The reflection exercises in Path2Integrity aim to enable educators to think constructively about their worldview, their behaviour and practices as RI teachers with a view of improving themselves.

### **4.4.3. Interactive discussions**

The interactive discussions aim to facilitate learning through interactions with other educators, knowledge exchange and co-construction.

### **4.4.4. Field practicum**

The field practicum will offer educators the opportunity to practice the knowledge obtained during the training programme in the classroom with their actual target groups. The duration of it is currently four weeks. Educators with similar target audience could also collaborate during their field practicum to support each other.

#### **4.4.5. Teaching journal**

It will be advised that the educators keep a teaching journal during the field practicum by using the CoRe tool (Eames, Williams et al.). The CoRe tool has been developed in order to operationalise the concept of PCK (Appendix 3). This can help educators to make the challenges they face explicit when they teach RI to specific target groups in a particular context. Also, based on the CoRe tool the educators will have developed for the teaching of RI in their classroom, they could also contribute to the enhancement of PCK for RI.

#### **4.5. Group formation**

For the methods of storytelling and role-play trust needs to be built in the group. Therefore, it is suggested, also in the relevant literature, that the educators work in small groups meaning no more than six. The groups will be formed based on the education level of the educators. However, for some activities it may be necessary that the educators exchange also knowledge and thoughts across groups. To facilitate this, we suggest that a profile for each educator is created, so that others can have a sense of who is who, and also create online spaces in Moodle, e.g. fora, where all educators can interact. In order to build the groups properly, we would like to ask the participants to complete a short questionnaire beforehand, so that the programme facilitators knows the audience in advance. An alternative option for this would be to invite the educators some time before the training starts, e.g. a week ago, to get to know each other and let the groups to emerge through this interaction. To decide upon the different alternatives, it might be best to consult also the local organisers each time.

#### **4.6. Assessment method**

All the participants will be requested at the end of the training programme to complete a short feedback form. Write about critical things they have learned and how the course changed their thinking, if so, and how they plan to particularly apply the new knowledge.

#### **4.7. Certificate of participation**

A certificate of participation will be awarded to all educators who will actively participate in the training programme.

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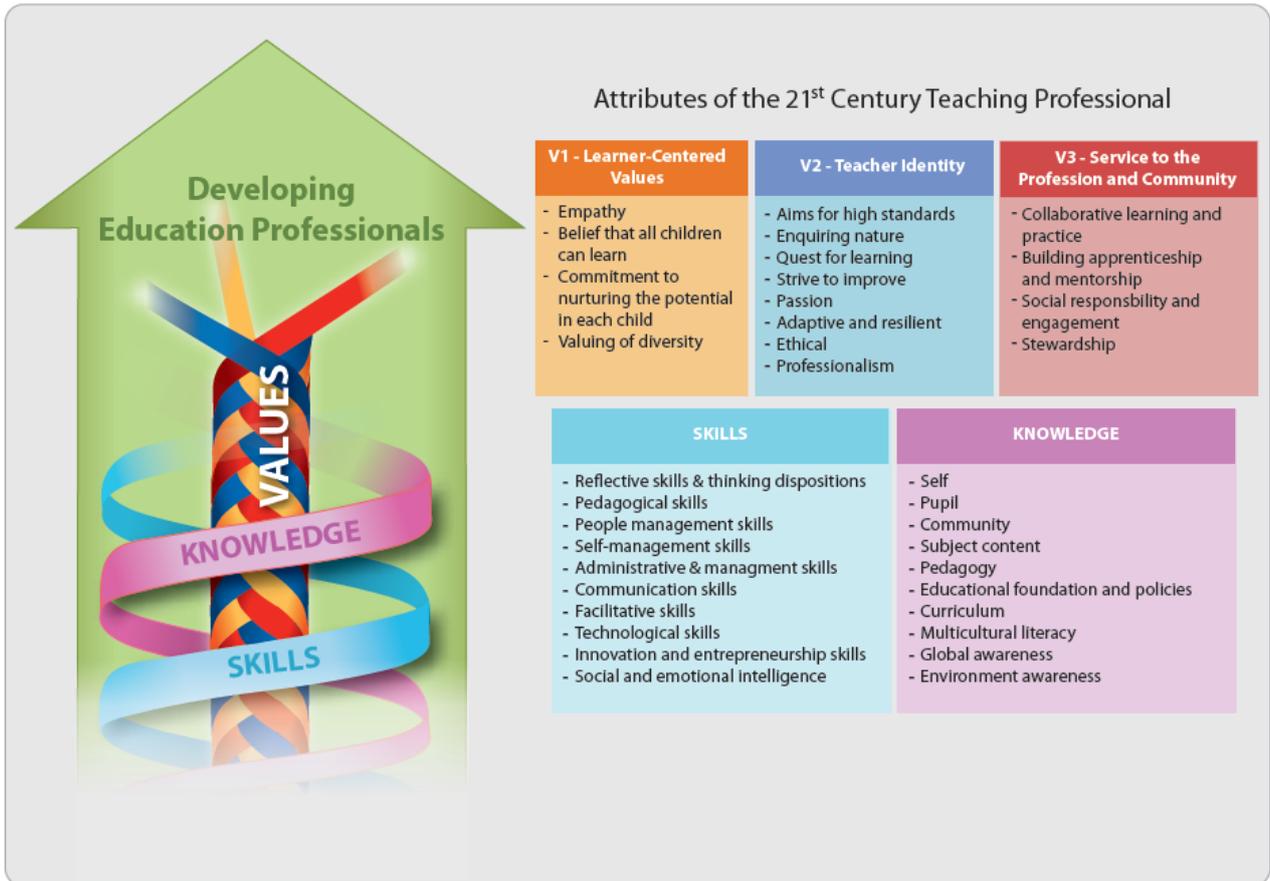
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## Appendices

### Appendix 1: The V<sup>3</sup>SK model of teacher education for the 21<sup>st</sup> century

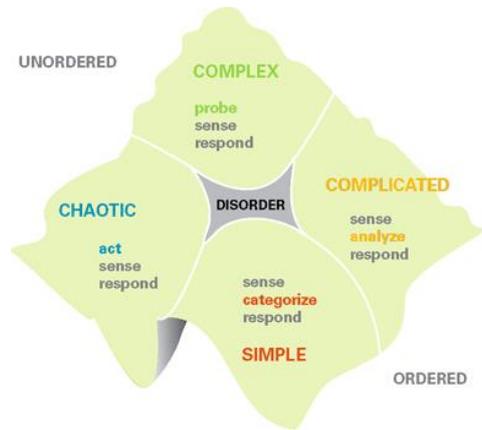
The main attributes of the V<sup>3</sup>SK model, which aims to provide a compass for the teacher education in the 21<sup>st</sup> century (Low and Tan 2017).



Supp.

## Appendix 2: The Cynefin framework

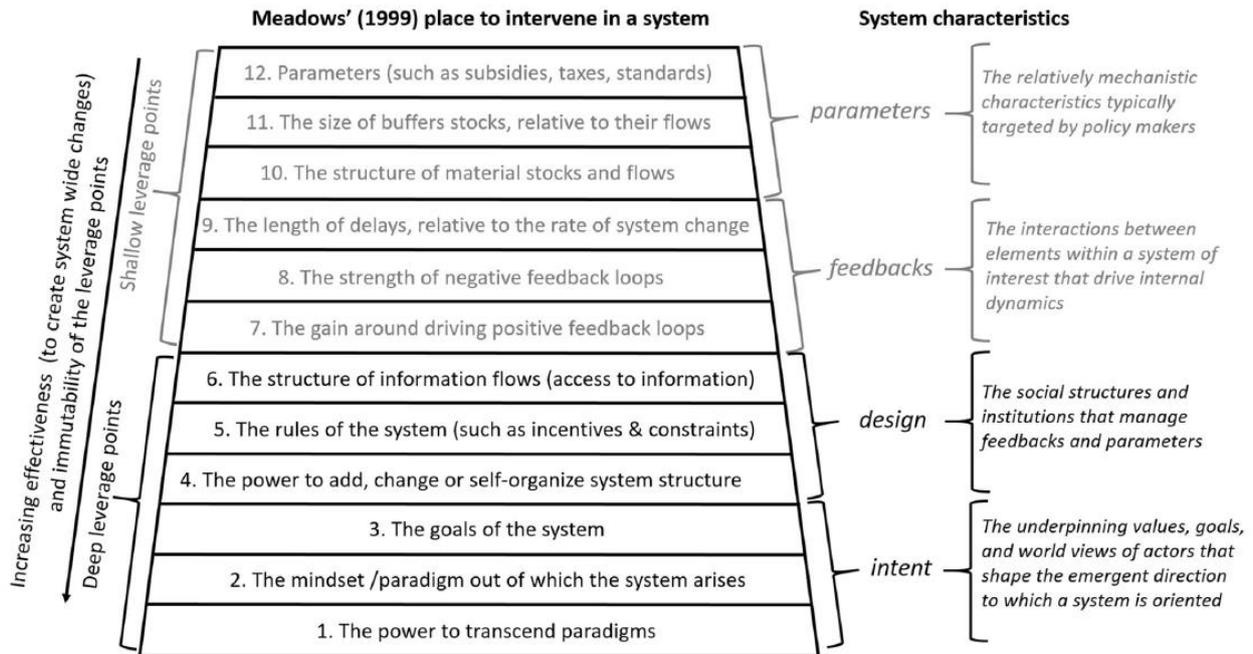
The Cynefin framework helps to determine the prevailing context in which one is to perform and to make appropriate choices accordingly (Snowden DJ 2007).



	THE CONTEXT'S CHARACTERISTICS	THE LEADER'S JOB	DANGER SIGNALS	RESPONSE TO DANGER SIGNALS
SIMPLE	<ul style="list-style-type: none"> <li>Repeating patterns and consistent events</li> <li>Clear cause-and-effect relationships evident to everyone; right answer exists</li> <li>Known knowns</li> <li>Fact-based management</li> </ul>	<ul style="list-style-type: none"> <li>Sense, categorize, respond</li> <li>Ensure that proper processes are in place</li> <li>Delegate</li> <li>Use best practices</li> <li>Communicate in clear, direct ways</li> <li>Understand that extensive interactive communication may not be necessary</li> </ul>	<ul style="list-style-type: none"> <li>Complacency and comfort</li> <li>Desire to make complex problems simple</li> <li>Entrained thinking</li> <li>No challenge of received wisdom</li> <li>Overreliance on best practice if context shifts</li> </ul>	<ul style="list-style-type: none"> <li>Create communication channels to challenge orthodoxy</li> <li>Stay connected without micromanaging</li> <li>Don't assume things are simple</li> <li>Recognize both the value and the limitations of best practice</li> </ul>
COMPLICATED	<ul style="list-style-type: none"> <li>Expert diagnosis required</li> <li>Cause-and-effect relationships discoverable but not immediately apparent to everyone; more than one right answer possible</li> <li>Known unknowns</li> <li>Fact-based management</li> </ul>	<ul style="list-style-type: none"> <li>Sense, analyze, respond</li> <li>Create panels of experts</li> <li>Listen to conflicting advice</li> </ul>	<ul style="list-style-type: none"> <li>Experts overconfident in their own solutions or in the efficacy of past solutions</li> <li>Analysis paralysis</li> <li>Expert panels</li> <li>Viewpoints of nonexperts excluded</li> </ul>	<ul style="list-style-type: none"> <li>Encourage external and internal stakeholders to challenge expert opinions to combat entrained thinking</li> <li>Use experiments and games to force people to think outside the familiar</li> </ul>
COMPLEX	<ul style="list-style-type: none"> <li>Flux and unpredictability</li> <li>No right answers; emergent instructive patterns</li> <li>Unknown unknowns</li> <li>Many competing ideas</li> <li>A need for creative and innovative approaches</li> <li>Pattern-based leadership</li> </ul>	<ul style="list-style-type: none"> <li>Probe, sense, respond</li> <li>Create environments and experiments that allow patterns to emerge</li> <li>Increase levels of interaction and communication</li> <li>Use methods that can help generate ideas: Open up discussion (as through large group methods); set barriers; stimulate attractors; encourage dissent and diversity; and manage starting conditions and monitor for emergence</li> </ul>	<ul style="list-style-type: none"> <li>Temptation to fall back into habitual, command-and-control mode</li> <li>Temptation to look for facts rather than allowing patterns to emerge</li> <li>Desire for accelerated resolution of problems or exploitation of opportunities</li> </ul>	<ul style="list-style-type: none"> <li>Be patient and allow time for reflection</li> <li>Use approaches that encourage interaction so patterns can emerge</li> </ul>
CHAOTIC	<ul style="list-style-type: none"> <li>High turbulence</li> <li>No clear cause-and-effect relationships, so no point in looking for right answers</li> <li>Unknownables</li> <li>Many decisions to make and no time to think</li> <li>High tension</li> <li>Pattern-based leadership</li> </ul>	<ul style="list-style-type: none"> <li>Act, sense, respond</li> <li>Look for what works instead of seeking right answers</li> <li>Take immediate action to reestablish order (command and control)</li> <li>Provide clear, direct communication</li> </ul>	<ul style="list-style-type: none"> <li>Applying a command-and-control approach longer than needed</li> <li>"Cult of the leader"</li> <li>Missed opportunity for innovation</li> <li>Chaos unabated</li> </ul>	<ul style="list-style-type: none"> <li>Set up mechanisms (such as parallel teams) to take advantage of opportunities afforded by a chaotic environment</li> <li>Encourage advisers to challenge your point of view once the crisis has abated</li> <li>Work to shift the context from chaotic to complex</li> </ul>

### Appendix 3: Leverage points in systems

Donella Meadow’s 12 leverage points further organised in system characteristics by Abson and his colleagues in 2017 (Abson, Fischer et al. 2017).

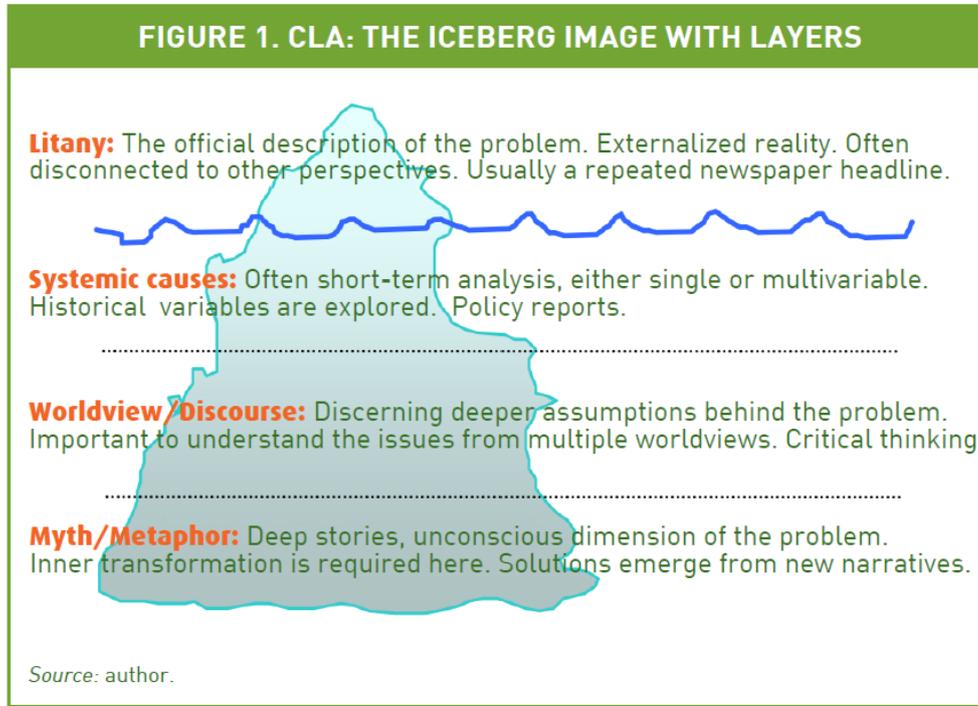


The four system characteristics represent a nested hierarchy of, tightly interacting, realms of leverage within which interventions in a given system of interest may be made. Deeper system characteristics constrain the types of interventions possible at shallower realms of leverage

Subject

## Appendix 4: The Causal Layered Analysis approach

The Causal Layered Analysis 4-level approach to alternative futures and an example of its potential application in teaching (Inayatullah 2019).



**TABLE 4. HIGHER EDUCATION FUTURES**

Level/Layer	Student Worldview	Current Reality	Transformed Future
Litany	Student-centered learning	Traditional teaching and learning	Holistic teaching and learning
System	Learning outcome should not be predetermined Flexible learning	Rigid — one-way learning	Quality issues Assessment (self-assessment and benchmarking) Recognition
Worldview	Democratic teaching and learning	Lecturers dominate teaching and learning	Creative partnerships between independent human beings
Myth/Metaphor	Tug of war between students, the ministry, and lecturers	One-man show and lecturer knows best	The orchestra — in sync and in harmony

*Source: author.*

## Appendix 5: The CoRe tool

The CoRe tool can be a useful resource in helping educators to build pedagogical content knowledge (PCK) (Eames, Williams et al.).

Table 1. Sample CoRe matrix

	Enduring idea 1	Enduring idea 2	Enduring idea 3	Enduring idea 4
What do you intend the students to learn about this idea?				
Why is it important for the students to know this?				
What else do you know about this idea that you do not know intend students to know yet?				
What difficulties/limitations are connected with teaching this idea?				
What do you know about student thinking which influences teaching about this idea?				
Are there any other factors that influence your teaching of this idea?				
What teaching procedures would you use, and why, for this idea?				
How would you ascertain student understanding of, or confusion about, this idea?				

Supplement