



UNIVERSITY OF
CAMBRIDGE

Faculty of Education

WHY THE ARTS MATTER
IN 'FUTURE-MAKING' AND
'MAKING-WITH'
STEAM EDUCATION?
HOW INTRA/TRANSDISCIPLINARY
APPROACHES CAN ADVANCE
SCIENCE EDUCATION IN EUROPE?
WHAT MATTERS?

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1. 'MAKING-WITH' THINGS AND 'THING-POWER' (TYRE, CHALK, ROPE, STREET) (BENNETT, 2010; HARAWAY, 2016)

2. 'WORLD-IN-THE-MAKING' (LENZ TAGUCHI, 2011) WITH MATTER WHICH ITSELF HAS A LIFE CO-CONSTRUCTED WITH OTHER BEINGS AND BODIES (HUMAN AND NONHUMAN AND MORE-THAN-HUMAN ENTITIES)

3. 'FUTURE-MAKING' WHICH IS THE CAPACITY TO INVENT VISIONS OF WHAT MIGHT BE WHICH LEAVES SOMETHING BEHIND WHILE REACHING OUT TO SOMETHING NEW UNFOLDING IN THE INTER-DEPENDENCE OF PERSONAL AND COLLECTIVE REALISATION (NAESS, 1990)





**Hay, P. (2023) *Children as Artists*.
Routledge**

THE VITAL MATERIALISM (BENNETT, 2010) OF HUMAN AND NONHUMAN/MORE-THAN-HUMAN ENTITIES WHICH CHALLENGES THE ONTOLOGICAL PRIVILEGING OF 'THE HUMAN'. 'WE DON'T OBTAIN KNOWLEDGE BY STANDING OUTSIDE THE WORLD; WE KNOW BECAUSE WE ARE OF THE WORLD. WE ARE PART OF THE WORLD IN ITS DIFFERENTIAL BECOMING.' (KAREN BARAD, 2007, P. 185)

EDWARDS,
CALDWELL and
HEATON (2021)
*Art in the Primary
School: Creating
Art in the Real
and Digital World.*
Routledge.

*relationally
connecting
entities

*inhabiting
uncertainty

* embodied
thinking and
feeling
through
making

*a world-in-
the-making-
with fluid
boundaries





So? How do we unlock and put to work research with entangled agencies?

Rooted in collaborative research, this book features teachers who are ‘teaching for openings...and transforming classrooms... in an uncertain world’ (Maxine Greene, 1998: 87) Each chapter collaboratively stories teachers writing with academics/researchers who are embodying ‘I am...not yet’. Each project reveals how change can be unlocked and sculpted differently by asking new questions about how children learn and engage in ‘a world in-the-making’ (Lenz Taguchi, 2011).

♦

RE-CONFIGURING... MAKING-WITH MATERIAL ENTANGLEMENTS WHERE BOTH SCIENCE AND ARTS TEACH TOGETHER

- *What if* the learning spaces of schools were **extended outdoors** as if ‘things could be otherwise’?
- *What if* learning communities could **engage with intra/transdisciplinary design-based and enquiry-based** problem solving which connects disciplines?
- *What if* we could justify this as an activity of **RE-valuing** and **RE-purposing *critical and creative thinking*** for both the children, the teachers and the parents inviting **FUTURE-MAKING-WITH** new forms of knowing, being, and doing?



Gray, D., Colucci-Gray, L. and Robertson, L. (2022) Cultivating priary creativities in STEAM gardens. In Burnard & Loughrey (Eds) *Sculpting New Creativities in Primary Education*. Routledge



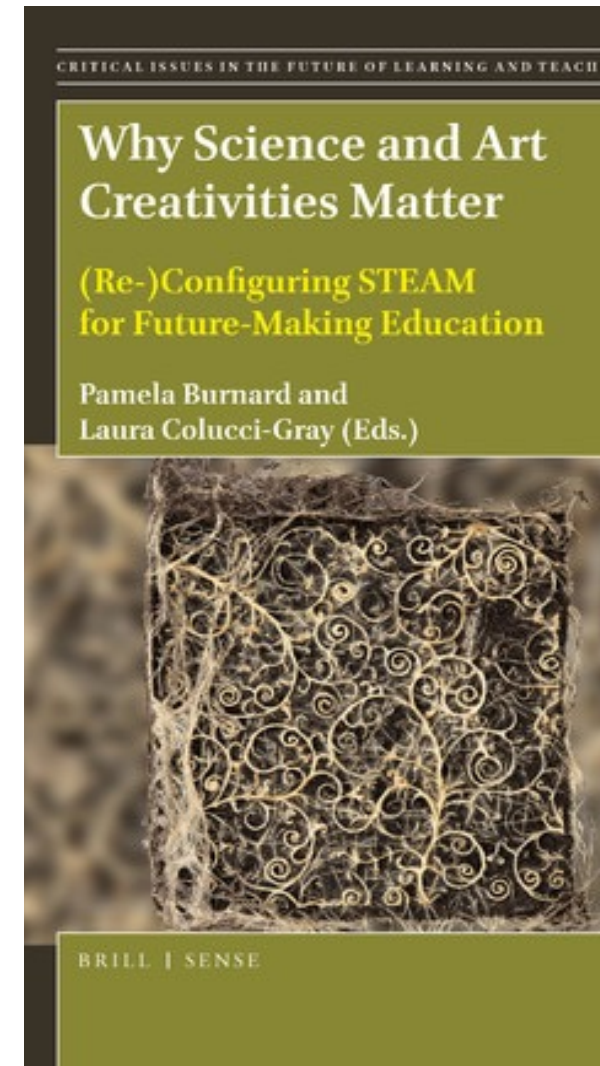
MAKING-WITH 'THINGS'
VITAL MATERIALISM of ART-MAKING
FUTURE-MAKING practices which expand knowledges, pluralise creativities, expand C21st skills

WHAT MATTERS? (Across 17 chapters, 42 authors)

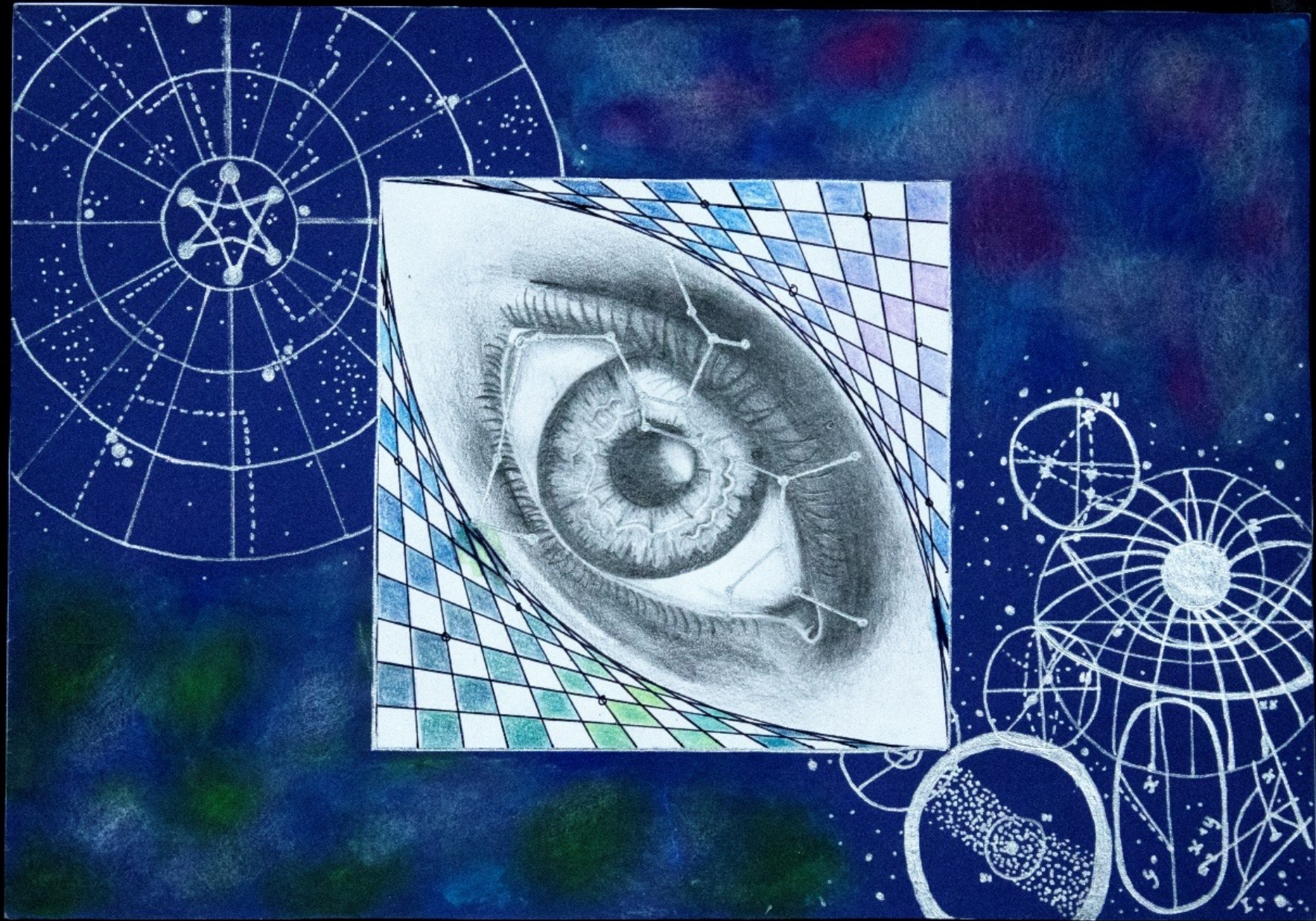
1. **RADICALLY MOVING AWAY** from linear, technocratic conceptions of teaching disciplines in silos or seeing education as **PREPARATION** for the future but rather **FUTURE-MAKING EDUCATION**

2. It does not advance a particular conception of arts or a particular theory about how science or art work as subjects but rather engages with **TROUBLING DIFFERENT WAYS of (RE-)CONFIGURING STEAM as EMBODIED LEARNING AND TEACHING**, through the affective, agentic aspects and materiality of arts-based / arts-science infused educational innovations (e.g. by engendering corporeal cartographies of the body, bodies and bodily practices and relations and disrupting the outcomes-based models of schooling)

3. **LESSENING THE GAP BETWEEN SCHOOL AND ‘a world-in-the-making’** (Lenz Taguchi, 2011): by performing **MULTIPLE TANGOES OF AN ETERNALLY INSEPARABLE DUO** (Shyam Wuppulari and Dali Wu (2019))

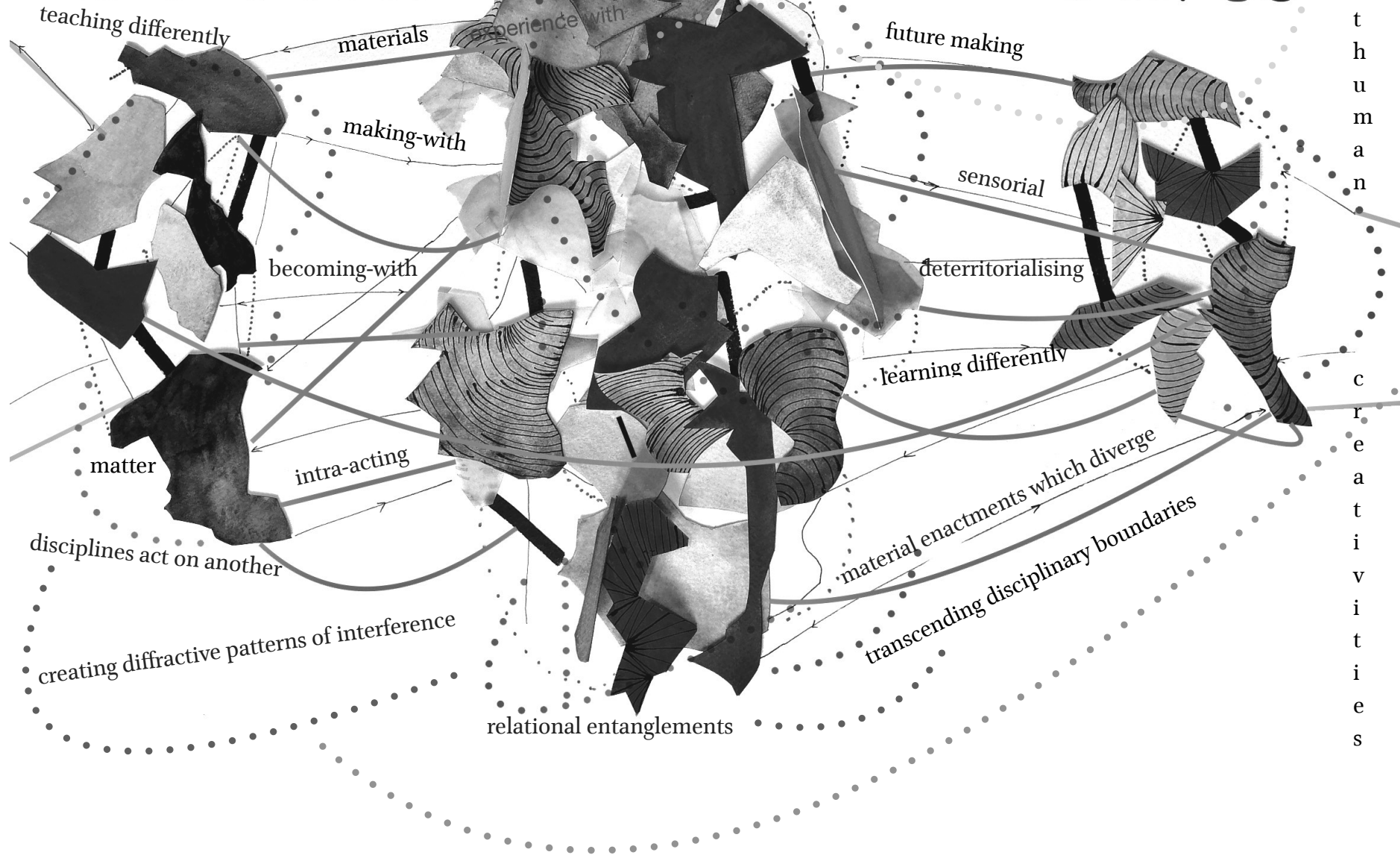






Sciences

Arts



**HOW RECONFIGURING
SCIENCE EDUCATION CAN BE
ADVANCED?**

**THROUGH
MATERIAL ENACTMENTS OF
INTRA/TRANSDISCIPLINARY
WAYS OF KNOWING, BEING,
DOING**

**FOR
FUTURE-MAKING
WHICH ACKNOWLEDGES THE
CORPOREAL EPISTEMOLOGY
AND CENTRAL ROLE OF
BODILY PERCEPTION (JAN VAN
BOECKEL, 2022)**

**BY
MAKING-WITH THE
MATERIALITY OF ARTS AND
SCIENCES WHEN THEY TEACH
TOGETHER**

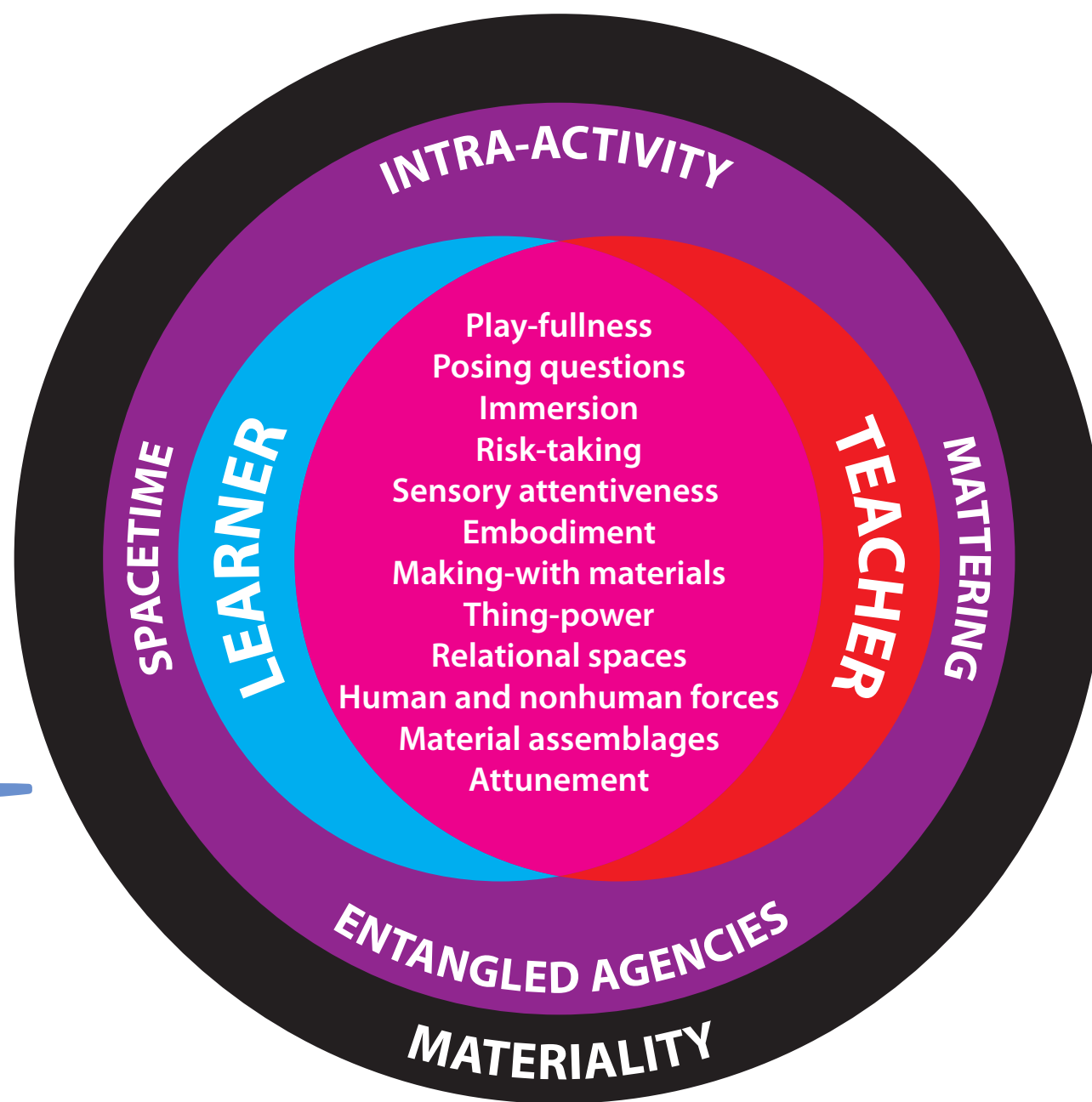


Reconceptualising **SCIENCE EDUCATION** as the design and enactment of 'future-making' because this is about how we exist, how we lead our lives, and what is at stake in the context of both science and sustainability education with children, young people and adults.

Here, art is not included as 'the icing on the cake' or a mere illustration of the scientific data (to make things playful or attractive). Here art is the point of departure in an infused process of exploration and coming to a new understanding of understanding our world-in-the-making.

Here is an emergent mapping of the materiality of this embodied practice.

BURNARD, P. (2023)
WHY PLURALISING
CREATIVITIES
MATTERS: A
POSTHUMAN
PERSPECTIVE
BRILL-I-SENSE
(IN PRODUCTION)



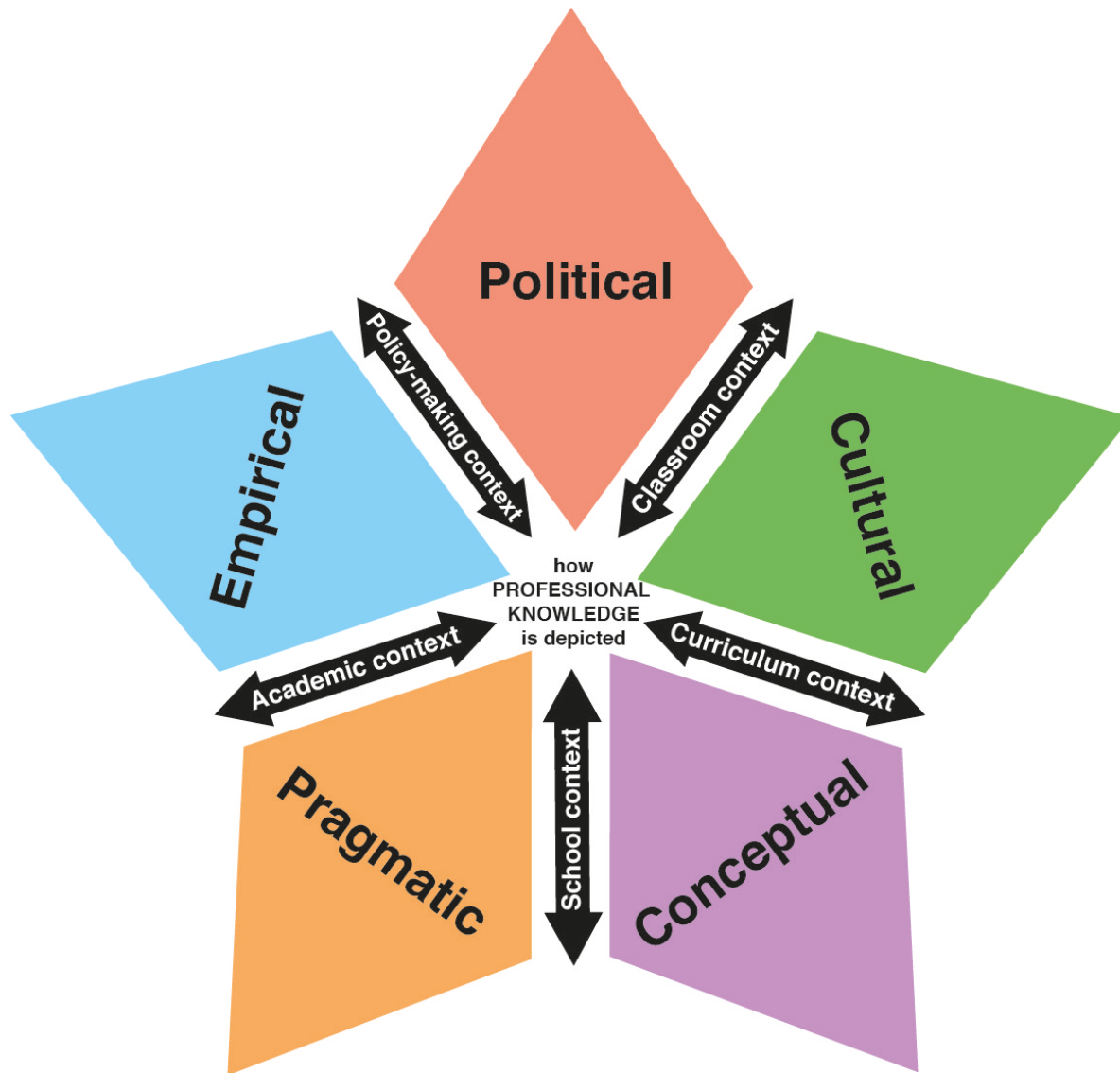
Adapted from Burnard, Craft and Grainger, 2006 Model of Possibility Thinking

PROFESSIONAL LEARNING: RETHINKING TEACHER EDUCATION



A NEW SCIENCE EDUCATION FOR EUROPE

IF, 'future-making' is the capacity to invent visions of what might be, **unfolding as a 'world in-the-making'** (Lenz Taguchi, 2011). where '**making-with**' through **MATERIAL ENACTMENTS** which generate **NEW WAYS OF KNOWING-BEING-DOING** which **leaves something behind** while **reaching toward something new** (i.e knowledge creation), we need:



1. To **REPOSITION** the **non-human** (materials, machines, environments, other living forms), and in so doing, to rethink what counts as **PROFESSIONAL KNOWING-BEING-DOING**.

2. To **develop a new discourse** which helps us to **DISMANTLE** (reductive) **BINARIES** such as object-subject, nature-culture, body-mind, science-arts

3. To **RE-LEARN/RE-THINK** **culturally, socially, collaboratively and generatively with teachers** (and interprofessional industry experts) to plan **ARTS-SCIENCE INFUSED PROJECTS** WHICH ARE RELEVANT FOR THE LOCAL SCHOOL COMMUNITY i.e. CO-AUTHORING A COMMUNITY STEAMED CURRICULUM (Alexander, 2009, Craft, 2005)



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