

Panel 14. Education for Good. Affirmative technoscientific practices in the educational space

Convenors:

Leonardo Piromalli, *Istituto di Ricerche Educative e Formative*
Assunta Viteritti, *Sapienza, University of Rome*

Keywords: care, knowledge, policy, practice, sociomateriality

This open panel invites contributions that explore education as a public space (Murdoch 1998; Löw, 2016) in order to experiment with technoscientific practices capable of promoting the everyday common good within educational settings. We encourage a rethinking of how educational practices and policies can be designed and reconfigured through sociomaterial mending, care and regenerative reflection. Contributions are welcome that address the role of affirmative critique in reimagining the relationships between education and technoscience, and explore how we might transition from merely exposing injustices to actively inhabiting "trouble" and engaging with open-ended futures (Haraway, 2016) while emphasizing transdisciplinary and intra-active modes of knowing (Barad, 2007). Particular interest lies in research that examines how education can cultivate material-discursive entanglements that challenge existing hegemonic structures, as well as how it may foster mending, healing, regenerative reflections and the flourishing of diverse life forms.

For instance, we invite contributions that explore:

- local practices of bending, gaming, or resistance by various educational actors (Souto- Otero & Benito-Montagut, 2016) in response to the effects of corporate interests and global policies on educational technoscience;
- different rhythms, unexpected pauses, and collaborative temporal imagination in the face of rapid technological advancement and acceleration in contemporary educational scenarios (Tierens et al., 2024);
- efforts to unlearn power dynamics that have historically intersected education, space, and technologies (Landri, 2018) by re-centering marginalized knowledge, objects, affects;
- practices that highlight how existing epistemic inequalities can be mitigated or counteracted through collaborative actions among educators, students and technoscientific actors;- practices of alliance with non-human living entities that experiment with post- anthropocentric educational practices, reimagining the relationship between learning and more-than-human worlds (Zembylas, 2022).

At the heart of our call lies the belief that education should not serve merely as a passive receptor of technological interventions but rather as an active participant in co-creating shared futures. These may be spaces of pluralism where diverse experiences are affirmed and given voice rather than measured and compared (Zembylas, 2022; Gorur et al., 2023), as well as environments of mending and care that can hold together fragmented and vulnerable worlds (Puig de la Bellacasa, 2015).

We believe that STS practice-theory can provide valuable support for working "in" and working "on" the world (Law and Singleton, 2013) to construct and cultivate a shared yet multiple vision of the "good" in education.



13 JUNE 2025 09.00 - 11.00

ID 295 - Mathematical Belonging and the Role of Technoscience

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Keywords: mathematics, belonging, technoscience, college students, education

In a review of research in mathematics education over the past century, Schoenfeld (2016, p. 518) noted "equity, assessment, and technology" as "scholarly challenges" for the future in the field. In this same review, he described the historical role of Artificial Intelligence and its contribution to the cognitive revolution in mathematics education. The purpose of this abstract is to explore the specific connection between belonging and technoscience to attend to two of the broad scholarly challenge areas in mathematics education research. Belonging in mathematics is not a widely researched topic, although it is peripheral to identity. However, research shows how some students experience a lack of belonging in mathematics (Solomon, 2007), especially if they are part of a marginalized group in the U.S. (Author, 2020). This is partly due to Western notions of mathematics that are narrow, rigid, and procedural (Baker, 2023; Gutiérrez, 2018).

Our research team of mathematics educators, mathematicians, and psychologists sought to understand mathematical belonging among college students. We surveyed hundreds of first- and second-year college students in the U.S. about their experiences in mathematics. We wanted to understand more about the ways in which students feel that they belong, or don't belong, in various mathematical contexts. What we found surprised us: there are multiple ways that students experience belonging! We found that students experience at least four distinct types of positive belonging in mathematics, which we call Individual, Classroom, Collaborative, and Community belonging, along with negative experiences of Exclusion (Authors, 2024). In our descriptions of these four types of belonging, we make a case for the role of technoscience, viewing it as authentic content with social responsibility (Makrakis & Kostoulas-Makrakis, 2005; Tala, 2009). Further, there is promise for technoscience to advance Collaborative and Community belonging in mathematics.

Individual belonging refers to feelings of acceptance, appreciation, and value when in a mathematical setting, such as the classroom. Classroom belonging is defined as relating to classmates in a mathematical setting. Collaborative belonging refers to feeling that one's ideas are accepted when working with others to solve mathematical problems. Community belonging is defined as feelings of inclusion and connection in the mathematical community. While community belonging is somewhat dependent on how students define the mathematics community and therefore less clearly defined than the other types of belonging, there is a lot that can be done to create a sense of community belonging in mathematics. An important first step is for us as mathematics educators and mathematicians to broaden our definitions of the mathematics community to be more inclusive and expansive. If there is an awareness of the harm that has been caused by mathematics in society (O'neil, 2017), educators can create spaces for communities to explore the good that mathematics with a technoscience perspective can have in the future. Collaborative and community belonging in mathematics requires a departure from idiosyncratic practices of a discipline to practices that have the potential to raise social consciousness. Thus, exploring these categories of mathematical belonging can invite broader participation.

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ID 495 - AI storytelling for a social and restorative justice pedagogy

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Keywords: AI, universities, prisons

Underprivileged groups are a minority in American universities, which should be immune to partisan interests and accessible to everyone. Pragmatic action to increase equity, diversity, and inclusion in higher



education admissions has been lacking or short-lived. Current solutions have targeted the administration through hiring diversity experts and faculty through bias training, even though, according to the 2016 Harvard Business Review, traditional bias training, which includes visual and text-based role-play scenarios, is forgotten within days and can cause adverse outcomes, such as defensive reactions, resentment across diverse groups, and stereotype reinforcement.

In devising strategies to diversify, American universities have left out the students, who today are primarily passive receivers and spectators of many initiatives focused on "talking" more than "doing." This research fills this gap by empowering diverse groups, college students and incarcerated youth, inside the classrooms as active content makers of cultural content. For the incarcerated group, at times illiterate and artistically challenged, AI is the only tool that allows freedom of expression. This research presents a literature review and several case studies of pedagogical interventions by the author and her colleagues, collaborations between university students and incarcerated populations, to demonstrate that changing pedagogical paradigms and classroom dynamics foster students' inclusive attitudes and behaviors.

America produces the world's greatest technological innovations but struggles with the most devastating socio-economic and racial inequalities of this century. This research shows two systems in crisis:

Public universities are significantly under pressure to provide a welcoming environment inclusive of all races, genders, and socio-economic statuses but are miserably failing due to their top-down paternalistic approach focused on reaching change through an information deficit model that alienates students and personnel and has been proven largely ineffective (al-Gharbi, 2020; Devine and Ash, 2021; Brannon et al., 2018). The public correctional detention system holds the world's highest incarceration and recidivism rates, keeping incarcerated people, many of whom are of color, idle without a chance at rehabilitation or a productive future after being released.

This research proposes a methodology of breaking conventional barriers, merging the two systems, public universities and public prisons, to benefit students and incarcerated youth by embracing an empowerment-based approach that enlists the recipients as active change-makers, recognizing that they must be the primary drivers of their own transformation if we want it to be effective and long-lasting (Cox and Devine, 2019). Combining psychological and sociocultural theories with AI storytelling, this research sheds light on leveraging technological affordances to create collaborative environments inside the classrooms that unite college students and incarcerated individuals for a social and restorative justice pedagogy.

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ID 529 - Teenagers and digital technologies. A comparison among the perspectives of high school students, teachers and leaders

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Keywords: youth, school leaders, professors, digital technology, education

Social media and, more in general, digital technologies are increasingly becoming entrenched as habitual tools for communication, social interaction and learning, mediating not only the everyday lives of new generations but, inevitably, of the older ones (Trentin 2017). The pervasiveness of these tools in different domains requires us to reflect on their role and rethink new models of interaction that start from the bottom by listening to those who use and live these tools: young people.

Based on data collected through structured interviews administered in the framework of an Erasmus+ European project about digital literacy and disinformation (DRONE Project), the present contribution intends to compare views on the digital engagement of teenagers by teenagers themselves, by high school professors and school leaders. We can consider the three groups as concerned public (Marres 2012) gath-



ering around the issue of digital and teenagers, expressing their views on the question of teenagers' use of digital technologies in different spheres, including school ones.

By comparing different versions of the issue, we will propose a reflection on possible dialogue among these three different concerned publics. While for school leaders, the digital represents the natural environment of young people and offers them easy access to the various social worlds (Clark, Leigh Star 2012), for teachers, this relationship is more complicated. If, on the one hand, this world has quick and easy access, it also represents a supportive tool, used critically and often consciously, and a new way of interacting. In this sense, many teachers have worked to deepen that relationship and give them or learn from young people how to navigate this world. An additional element emerges from the adolescents' perspective: the virtual one represents one among the possible worlds of one daily life that does not necessarily replace the others but coexists. It is constantly evolving, astonishing but frightening at the same time, and while it is true that it is easy to access, it also represents new challenges and opportunities for young people, and many are aware of this.

Finally, our analysis explores the ground on which education could "not serve merely as a passive receptor of technological interventions, but rather as an active participant in co-creating shared futures", as the call says, and thus probes the space for co-creating shared patterns among the various concerned publics making up the education environment.

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ID 598 - Art-based methodologies for sustainability. Exploring ways of relating.

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Keywords: art-based methodologies, sustainability, academic education, relationality.

Ethics, responsibility, and sustainability have become urgent issues in both education and society. However, there is a need to go beyond traditional approaches (such as CSR, codes of ethics, or lists of competencies and principles) which often reinforce neoliberal dynamics. What kind of pedagogical approaches may encourage more transformational and responsible learning and doings?

Feminist posthumanism introduces a new epistemological approach, or an ethico-onto-epistemology: knowing and learning do not refer to the reproduction of pre-existing knowledge, but emerge from material-relational doings, beings and respons-abling—with the world. Emphasis is placed on the continuum between humans and non-humans in different ways (air, water, bacteria, fungi, etc.) as forms of embodiment. The arts and aesthetic learning processes, by engaging the body, the senses and other materialities encourage different ways of knowing, relating, affecting and being affected.

Building on this framework, we have developed a project aiming to explore sustainability as embodied practices, by applying transdisciplinary approaches at the intersection of art and science. We have developed (four) workshops addressed to students of different programs (education, engineering, communication, health care and management) at a university in Sweden. The workshops aimed to explore key concepts for sustainable transitions - care, threshold, water and landscaping – and were facilitated by professionals in drama, dance and visuals from different universities (MDU, Stockholm University, University of Trieste) and from different art scenes.

The project is currently ongoing, and the aim of this contribution is to share some preliminary reflections and questions coming from those experiences.

Which forms of relationality? While all workshops explore sustainability-related concepts through embodiment and relationality, the heterogenous techniques which were mobilized bring the attention to different aspects of relationality and ways of relating.



Connecting planets – art & science. Mobilization of art-based methods: representation versus performativity. What do these methods do to a public which is more used to traditional methods? Vice versa, how may the encounters with students outside the arts lead to rethink those methods?

Interdisciplinarity in practice (or through controversies). The concepts were chosen to be explored by students from different disciplinary backgrounds. While these encounters enriched the discussions, they also occasionally led to controversies.

"Test what works": Methodologies are not given but need to be adaptable according to different publics and situations. This requires teachers to cultivate and develop a listening attitude and capacity to facilitate reflection emanating from situated experiences.

Challenging hierarchies. How may the relationship between teachers and students be (re-)configured through these methodologies? Overcoming hierarchies by new ways of being together and interacting in the classroom (teachers performing exercises together with students etc.).

"Points de bascule". At the start, art-based workshops often trigger bodily and affective reactions such as surprise, giggling, confusion, a sense of doing something childish, or even resistance. Then we observe some turning points—what we call "points de bascule"—where initial reactions shift toward greater engagement, enjoyment, and moments of éclat. What happens in these moments? What do they do, both to students and to teachers?

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ID 783 - Storytelling as an educational Responsible Research tool for AI for good

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Keywords: responsible research, education, artificial intelligence

Although the general public and young researchers are often exposed to utopic and dystopic media narratives of how AI technoscience can save or destroy humanity, they do not have the resources and tools to understand and rethink the new reality that the new technoscience brings to the present and near future and their role and responsibility in this. Thus, we created the EDU RRI toolkit that provides a set of resources that are easy to use and adapt to the level and area of the learners, and it has been designed specifically to support the integration of responsible research in the education and training of early and mid-career researchers, professionals, and practitioners.

Stories can be powerful tools for educational and training purposes, as they can help us think around significant issues where human cognition and emotions intersect. Using this as a central idea, we develop two fictional research projects with controversial uses of AI. The first one was about pain sensors developed with the use of AI to create a novel approach to physiotherapy, and the second was about an AI doll for abandoned children living in children's homes. We used the help of a large language model (LLM) tool (ChatGPT) to convert these projects into stories.

Our method draws from the narrative theory of education. Narrative-based learning is a learning approach that suggests that people make sense of their experiences through stories, and storytelling (Mawasi et al., 2022). Such narratives function as a mental framework and as the communication vehicle for people to interpret and understand the world around them, including their own experience of the world.

To test the method, we organised four focus groups with researchers from different career phases and disciplines and asked our participants: a) to criticise the stories as they have been written; b) to identify gaps and problematic areas and ways to improve them; c) to imagine the negative consequences, ethical and legal implications, but also their future impact on individuals and society as a whole; d) to find ways



to address potential issues; and e) finally, to rewrite the stories. We encouraged them to be as creative as they wished, removing elements of the story or add new ones that can help communicate their own views.

In this paper, we're going to discuss our research findings. We are going to present how our participants engaged with these stories, better understood the context, reacted to controversial parts of stories, thought of implications and risks based on their scientific knowledge, past experiences but also fictional dystopic narratives of AI technologies and finally searched for ways to write about new technoscience in a way that is both intriguing and engaging but also provides more accurate information and is critical and thought provoking.

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13 JUNE 2025 09.00 - 11.00

ID 793 - Caring for Education: Reconsidering Educational Drudgery

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Keywords: EdTech, Educational Drudgery, Generative AI, Care

The EdTech landscape is notorious for its demands for, and promises of, educational reform. While this is not a new phenomenon, it seems these demands are today turbocharged by the growing popularity of LLM-based educational applications (Sriprakash et al., 2024). Often, a primary selling-point of these tools is that they will help reduce time and effort spent on all kinds of distracting, boring, or otherwise inefficient teaching responsibilities. Products like Khan Academy's Khanmigo, for instance, promise teachers they will "make your role less about busy work [without] learning curve ('Meet Khanmigo', n.d.)". The way EdTech discourses draw on and reproduce uncritical images of 'technology' as panacea for all kinds of 'educational ills' is well-documented (see, for instance: Selwyn, 2016; Zawacki-Richter et al., 2019). Less prominent, however, is the study of the practices that these discourses discard out-of-hand as 'busy work', 'mindless work' or 'educational drudgery', particularly those practices engaged in by educators.

My paper aims to examine the nature of these educator-practices which EdTech seeks to reinvent, focusing specifically on the areas of 'feedback provision' and 'course design'. These domains will be studied by juxtaposing the results of a thematic analysis of commercial discourses about LLM-based teaching tools, with a philosophical reevaluation of the practices EdTech seeks to innovate out of existence. The philosophical analysis will draw on Nell Noddings' (1992) call to rethink education in terms of care, and Bernard Stiegler's (2008) pharmacological analysis of digital grammatization's implications for education. The purpose of this exercise is not to specify how to 'properly' use LLM-based teaching tools; but to show that, by caring about and for 'educational drudgery', this drudgery may itself appear as a form of care: for students, for what they make, and for the knowledge that is shared with them. By way of conclusion, the paper considers how this perspective on educational drudgery may inform pedagogical engagements with LLM-based teaching tools. Specific attention will be paid to the temporal contrast between 'careful drudgery' and 'techno-optimized efficiency'.

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13 JUNE 2025 09.00 - 11.00

ID 800 - Developing a Critical Pedagogy for Active Responsible Digital Innovation

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Keywords: critical pedagogy, critical technical practices, empathic imagination, STEM Higher Education

This paper addresses the 'active responsibility gap' (Santoni de Sio and Meccacci, 2020) of information and communication (ICT) professionals in the face of contemporary digital and artificial intelligence technologies. "This gap consists in the risk that persons designing, using, and interacting with artificial intelligence (AI) may not be sufficiently aware, capable, and motivated to see and act according to their moral obligations towards the behaviour of the systems they design, control, or use (p. 1059). As we contend, the active responsibility gap should be addressed in education programs in information and computer science in particular.

Digital technologies and AI both embody and disrupt sociocultural values (Han et al., 2022; Flanagan et al., 2008). The values 'inscribed' in these technologies tend to represent the perspectives and interests of a privileged minority (i.e., WEIRD) and may lead to undesirable effects in terms of the amplification of inequalities and the exclusion of marginalized and less privileged people. ICT professionals of all kinds play a crucial role in "reproducing [such] structures of inequality" (Manning, 2024: 6). It is therefore essential to educate future ICT professionals to recognize their role in (unintentionally) perpetuating personal and cultural biases within contemporary digital technologies and AI, all the more so as values carried and inscribed in AI technology are increasingly difficult to trace.

The objective of raising the moral and social consciousness of ICT professionals is in line with contemporary calls and guidelines for responsible and humane AI (UN, 2024; HLEG, 2019; Dignum; 2019; 2021). However, to date, STEM higher education falls behind in translating these principles into critical educational practices and didactic methods. The odd obligatory ethics course aside, in information and computer science curricula, to date, pursuing efficiency and effectiveness gains (i.e., instrumental values) still seem to prevail over societal/moral ones (i.e., intrinsic values).

In this paper we urge for the need of developing a critical pedagogy for responsible digital innovation (cf. Conley et al., 2024) to be integrated in higher education programs in information and computer science curricula. As we will show, the essence of such a didactic method is not so much determining which values information and computer students should engage with, but instead how they may develop a sensitivity for alternative value propositions such as inclusivity and equality, providing them the means and (experimental) working formats to do so.

To enhance the empathetic imagination and active engagement of information and computer science students with social-ethical dilemmas of emerging technologies, we depart from principles of Critical Technical Practices as applied to digital research (Hirsbrunner et al., 2024; Van Geenen et al., 2024). In short, this means that critical reflection is specifically understood as something that ICT professionals do prospectively and from within the technical practices they help co-create. Subsequently, and in line with the various types of responsibility as defined in the tradition of Responsible Research and Innovation (RRI), we propose the development of five ideal typical learning activities to revolve around virtue, process, outcome and forward looking responsibility respectively.

