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I work as a senior researcher in education and a university lecturer in craft science at the School of Applied Educational Science and Teacher Education at the University of Eastern Finland. I am also a Bachelor of Visual Arts and hold the title of docent in education. I have always been deeply interested in crossing disciplinary boundaries, and since my doctoral research, I have actively collaborated with researchers from diverse fields in various kinds of educational research and development projects.

My academic journey began with a profound interest in mediated action, particularly in the context of design-oriented learning in museums. My dissertation applied mediated action and CHAT as conceptual frameworks for co-designing educational technologies and pedagogical models for learning with and from museum objects. Over the years, I also have used these frameworks to support in-service and pre-service teachers in designing, implementing, and reflecting on various design-oriented learning projects in their schools and pedagogical practices. CHAT, in particular, has given valuable conceptual tools for helping teachers reflect, share, and redirect the non-linear processes of learning and teaching in which design-and inquiry oriented pedagogies build on.

In recent years, my research has focused on theorizing and exploring mediated action in the age of artificial intelligence (AI). Together with my key collaborator, prof. Matti Tedre, we have been theorising and examining how AI-driven tools reshape mediated action, agency, and knowledge creation within emergent and epistemically opaque networks of human and non-human actors. Parallel to our theoretical work, we also aim to translate these insights into actionable educational practices as part of our Generation AI project, funded by the Strategic Research Council (STN). In this project, we are co-designing and implementing large-scale school interventions in collaboration with our local schools and teachers, involving over 200 children. Over a sustained three-year period, we have been developing cumulative learning paths, educational technologies, AI-based learning environments, and scaffolding strategies aimed at cultivating children's data agency.

Our overall goal is to help novice learners to understand the key concepts, mechanisms, and workflows behind AI systems so that they can make informed decisions and critically reflect, shape, and transform tool-mediated actions in a data-driven world. Understanding how AI systems work is also essential for addressing many undesirable outcomes of AI and datafication, such as erosion of privacy, surveillance, uneven power relationships, hybrid influencing, behavior engineering, exacerbation of social inequities, and loss of agency.

Moreover, our joint efforts in developing AI education represent a participatory design process, in which we collaborate with school teachers and use activity theory to reflect on and direct emerging activities. Teachers are not only asked to identify the development needs of the educational technology and related practices and curriculum materials being developed, but are also encouraged to reflect on how the activity system surrounding these new tools and materials is forming and how it should be improved in practice to meet particular goals and aims. This includes opportunities to collaboratively identify emerging contradictions and resolving tensions that will inevitably arise when transforming existing activity systems and social practices in schools.

In addition to school interventions, we have also examined the complexities of human-technology relationships in the context of teacher education, particularly in democracy education and in craft education. Through hands-on workshops for in-service teachers, we have engaged our participants in collaborative exploration of the opportunities and challenges introduced by AI, generative AI and data-driven design. These projects have highlighted the importance of raising teachers' critical awareness of the trade-offs and tensions associated with integrating AI into educational practices, including deeper level reflections on what should not be automated in education.

Currently, prof. Matti Tedre and I are finalizing our forthcoming book on AI and AI education, which explores the transformative impact of AI on epistemic and social practices across disciplines, professions, and everyday life. Moreover, the book critically examines the contradictions and ethical tensions inherent in these shifts. At the heart of this vision is to provide a robust theoretical and pedagogical foundation for supporting all children's equal opportunities to become contributing members, responsible designers and transformative agents in data-driven society.

#### Selected publications:

Vartiainen, H. & Tedre, M. (2024). How Text-to-Image Generative AI Is Transforming Mediated Action. *IEEE Computer Graphics and Applications*, 44 (2), 12-22.

Vartiainen, H., Kahila, J., Tedre, M., López-Pernas, S., & Pope, N. (2024). Enhancing Children's Understanding of Algorithmic Biases in and With Text-to-Image Generative AI. *New Media and Society* (Online first).

Vartiainen, H., Pellas, L., Kahila, J., Valtonen, T., & Tedre, M. (2024). Pre-service teachers' insights on data agency. *New Media & Society*, 26(4), 1871-1890.

Kahila, J., Vartiainen, H., Tedre, M., Arkko, E., Lin, A., Pope, N., Jormanainen, I. & Valtonen, T. (2024). Pedagogical framework for cultivating children's data agency and creative abilities in the age of AI. *Informatics in Education*, 23(2), 323-360.

Vartiainen, H, Liukkonen, M. & Tedre, M. (in press, 2025). Emerging human-technology relationships in a co-design process with generative AI. *Thinking Skills and Creativity*, 56.

Vartiainen, H. & Tedre, M. (2023). Using Artificial Intelligence in Craft Education: Crafting with Text-to-Image Generative Models. *Digital Creativity*, 34(1), 1-21.