Data Vis Activities for Children: Hands-on Exploration of Activities & Challenges around Visual, Physical and Tangible Representations for Play and Data Literacy

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Data literacy is recognised as a fundamental skill in early education, prompting growing interest across education, data visualization, and child–computer interaction in hands-on, child-centred approaches to data engagement. However, knowledge of best practice in data literacy and analysis remains fragmented across communities, while advances in AI introduce new opportunities and challenges for designing data-driven activities for children. This half-day, hands-on working workshop aims to synthesise insights across domains by bringing together diverse researchers and practitioners to share, play-test, and reflect on visual, physical, and tangible data activities for children. Outcomes include shared resources and the foundation of a cross-disciplinary community.

Additional Key Words and Phrases: Data visualization, Data physicalization, Tangible representation, Children, Data literacy

1 Introduction

Designing interactive systems for children has a long and rich history of engaging the body, physical materials, and tangible interaction. Within the child–computer interaction (CCI) and learning sciences communities, researchers have repeatedly demonstrated how tangible representations, embodied interaction, and physical play can support children's learning, creativity, and sense-making [2–4, 8, 9]. This work has highlighted the importance of hands-on exploration, open-ended play, and social interaction when designing for children. Parallel to developments in CCI

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design, the data vis/phys communities have explored visual, physical, and hybrid representations of data that leverage perception, materiality, and embodied interaction (e.g., [6]). However, despite shared interests in exploration, sense-making, and material engagement, CCI and data vis communities have largely developed in parallel. Opportunities remain underexplored for integrating insights from tangible and physical interaction design with contemporary practices in data visualization and physicalization — when designing activities that meaningfully engage children with data.

Prior hands-on workshops in data visualization and physicalization have explored constructive, participatory, and physical approaches to engaging with data, highlighting their potential for reflection, engagement, and meaning-making [5, 7]. However, these efforts have largely focused on adult audiences, emerged outside the child–computer interaction community, and have not addressed the design of data activities for children across ages and contexts, resulting in limited cross-community exchange and shared understanding of how such approaches are currently designed and used across contexts with children. This workshop brings together researchers, educators, and practitioners from children-interaction design, data visualization/physicalization, and related fields to explore the design of physical, visual, and tangible activities for engaging children with data. Building on previous successful hands-on workshop formats [5], the workshop emphasizes live demonstrations, pitches and reports, and collaborative discussion. Through interactive sessions and World Café–style breakouts, participants will map the current landscape of practice, surface design strategies and tensions, and begin to articulate a shared research agenda for child-centred data visualization and physicalization. Ultimately, the workshop aims to foster sustained interdisciplinary exchange and create a platform for sharing practices, challenges, and future directions in this emerging design space.

2 Workshop Goals

The main goal of this workshop is to bring together researchers, educators and practitioners from education, data visualization, child-computer interaction and related fields to map out and discuss current practices and challenges when designing and running data-driven activities with children. Workshop activities will touch upon questions regarding activity design, activity context, the role of collaboration, ethical considerations, and evaluation, for example: a) What is the role of play, curiosity, and open-ended exploration when designing data-driven activities for children?, b) How can data-driven activities be integrated into different subject areas (e.g., STEM learning, arts, languages)?, c) How do different material choices and modalities (e.g., visual vs. physical, digital vs. analogue) influence activity dynamics and uptake?, d) What ethical aspects need to be considered when designing data-driven activities with and for children?, e) How can data-driven activities leverage shared experiences and collaborative thinking?, and f) How can we evaluate data-driven activities in terms of engagement and learning, data- and visualization literacy?

3 Workshop Plan & Structure

We plan a half-day, in-person-only workshop that will include hands-on activity explorations, panel discussions, and a World Café-style breakout group session. The workshop will require a standard conference room that can accommodate 20-30 participants, with sound/visual equipment, internet access, and, preferably, large circular tables and chairs that can be moved for the breakout group setup. We would need one student volunteer that is supporting the organizers on-site. A call for participation will be shared across popular mailing lists (e.g., ACM CHI, IEEE VIS), social media, and our personal network of collaborators that includes educators, designers, and practitioners. A dedicated workshop website will help distribute our call for participation, coordinate submissions, and serve as a platform for sharing materials before and after the workshop. This site will provide a central hub for participants to access key resources and updates. We will also open a Discord channel for participants to connect prior to the workshop.

Submission Format. Inspired by previous workshops [1, 5], we welcome two types of submissions that will be peer-reviewed by two PC members and one workshop organizer ; **Activities:** Documentations (4–6 pages) of data-driven activities designed for children, including the context of the activity, targeted age group, instructions on how the activity is run, what materials are required, and potential findings and challenges encountered. A dedicated activity template will be made available on the workshop website. **Reports:** Short template-agnostic reports (1-2 pages) to discuss challenges or reflections on activities around visual, physical, tangible representations for play and data literacy.

3.1 Workshop Activities, Schedule and Post-Workshop Plans

Workshop Activities. The workshop includes hands-on activity sessions, discussion panel, and World Café-style breakout group session ; (a) **Hands-on Activity Demos & Discussions:** Authors will pitch their data-related activities; participants will try them out and discuss them i small groups. (b) **Report Discussion Panel:** Authors of accepted reports will be invited to a panel, presenting their work in the form of a 2-3min lighting talk, followed by a moderated panel discussion. The exact timing will depend on the submissions. (c) **World Café Breakout Groups:** Focused, small-group discussions on topics collected during workshop sessions. Participants will be invited to swap groups 1-2 times throughout the session, fostering a diverse exchange and broadening the scope of conversations. After this, we will reconvene in plenary to share highlights and takeaways from discussion. We anticipate 10-15 submissions to fuel the activities. However, should we receive fewer submissions, we plan to invite a keynote speaker or panellists.

Tentative Workshop Schedule. The half-day workshop will begin with a brief opening and welcome (9:00–9:10), followed by short activity pitches (9:10–9:30) that introduce the contributions. Participants will then engage in hands-on activities (9:30–10:30), followed by a coffee break (10:30–10:50). The second half of the workshop will feature short report pitches and a moderated discussion panel (10:50–11:30), leading into World Café–style breakout group discussions (11:30–12:15). The workshop will conclude with a closing discussion (12:15–12:30), followed by an informal lunch.

Post-Workshop Plans. As organizers, we will document all sessions and disseminate outcomes via a shared repository (e.g., Google Drive) and the workshop website. We will set up a dedicated Discord channel already prior to the workshop as a platform to continue discussions after the workshop, share resources, and to facilitate emerging collaborations.

4 Workshop Organizers

Dushani Perera ⚇ is a postdoctoral research associate at the University of Edinburgh. Her research lies in the intersection of HCI and CSCW, with a particular interest in data vis/phys and sustainability domains.

Christina Stoiber ⚇ is a post-doctoral researcher & lecturer at the University of Applied Sciences St. Pölten, Austria. Her research interests are data visualization, HCI, visualization education and literacy, games and playful activities. She has co-organized the IEEE VIS EduVis & the EuroVis VisGames workshops.

Andrés A. Ramírez-Duque is a Research Associate at the University of Glasgow, his research focuses on Child-Robot Interaction and the responsible and ethical design of children's assistive technologies for healthcare and education.

Jonathan Hancock is a Postdoctoral Research Fellow at Moray House School of Education and Sport, University of Edinburgh. His work focuses on transdisciplinary research methodologies applied in the areas of outdoor education and education for sustainability with teachers and students in schools and higher education.

Ayca Atabey is a postdoctoral research associate at University of Edinburgh, conducting interdisciplinary research at the intersection of AI governance and Child-Computer Interaction, focusing on fairness in AI-EdTech. A former PhD Awardee at the Alan Turing Institute, she focused on child-centred AI and ethical personal data use.

Kim Sauvé 👤 is a Lecturer at the University of the West of England (UWE) Bristol, specializing in Human-Data Interaction (HDI) and data physicalization. Her research blends empirical studies with explorative design practice . She has organized multiple workshops on data visualization/physicalization at ACM venues such as CHI and DIS.

Susan Lechelt 👤 is a Lecturer at the University of Edinburgh, focusing on how design interventions, tools and prototypes can promote discussion and reflection about the role of technologies in children's lives. She is an experienced facilitator, having organised and led >70 interactive public engagement events, and workshops at CHI, DIS and NordiCHI.

Andrew Manches is a Professor of Children and Technology at the University of Edinburgh. His research explores interaction in learning and its implications for pedagogy and design, connecting with industry on gesture and tangibles.

Uta Hinrichs 👤 is a Reader in Data Visualisation at the University of Edinburgh. Her research explores how visualization and physicalization activities and processes can foster (self-)reflection, learning, critical thinking, and collaboration across different age groups and disciplines. She has run a large range of visualization and physicalization workshops in different academic (ACM CHI, DIS, TEI, DRS, IEEE VIS, DH) and non-academic settings.

Advisory Board. We have formed an advisory board to provide expert guidance: *Stephen Brewster*, Professor of Human Computer Interaction, University of Glasgow ; *John Vines*, Chair of Design Informatics, University of Edinburgh.

5   Call for Participation

The main goal is to bring together researchers, educators and practitioners from education, data visualization, child-computer interaction and related fields to discuss current practices and challenges when designing and running data-driven activities with children. We plan a half-day, in-person-only workshop that will include hands-on activities, panel discussions, and a World Café-style group session. We accept double/single-blind submissions emailed to the lead author. At least one author of each submission must register and attend the workshop. **Submission Format:** We welcome two types of submissions that will be peer-reviewed by workshop organizers ; *Activities*: 4–6 pages (template available on the website) of activities designed for children, including the context of the activity, targeted age group, instructions on running the activity, materials required, and potential findings and challenges encountered. *Reports*: Short template-agnostic reports (1-2 pages) to reflect on activities around visual, physical, tangible representations for play and data literacy.

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