



WASP—HS

AI, Education and Children

Report 2023

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Wallenberg AI, Autonomous Systems and Software Program - Humanities and Society (WASP-HS) would like to thank all chairs and participants of the event AI, Education and Children for contributing to the fruitful discussions which this report is based on.

Introduction

In this Community Reference Meeting, we discussed AI opportunities and challenges in the context of children and education. While AI offers the potential to enhance learning experiences and facilitate teaching practices, its use also raises concerns about privacy, data protection, fairness, and the need for children's active participation in the design process. UNICEF's "Policy Guidance on AI for Children" report, which I had the honor to lead, draws attention to these issues and emphasizes the importance of considering children's rights and well-being in the development and deployment of AI technologies in education.

Keynote speaker was professor **Teemu Roos** from Helsinki University, who presented the Generation AI project that targets children and schools, exploring concepts like data agency and epistemic fluency. Extending his work on the well-known Elements of AI open course. Generation AI aims to address societal challenges related to AI, including security concerns, eroding trust, and growing inequality.

The dialog was continued in **three parallel round tables**:

The round table "Growing Up Together" looked at how the increasing presence of AI in children's lives has the potential to transform how they express and understand emotions, shifting towards interactions with machines over people. Children's involvement as co-designers and evaluators of AI can offer valuable insights, although understanding AI's strengths and weaknesses may be demanding for them. Schools must navigate children's expectations of AI usage, incorporating personalized education while addressing restrictions and data protection. However, ethical and legal dilemmas arise when researching children's AI usage while safeguarding their privacy. AI also holds possibilities for supporting children's well-being and enhancing their participation in

education. Achieving a balanced and equitable integration of AI in education requires interdisciplinary collaboration and a focus on AI literacy for children.

The second round table focused on the role of generative AI in education, highlighting both opportunities and challenges. Unregulated use of AI tools could hinder children's cognitive development, emphasizing the need for AI literacy among teachers. While generative AI can enhance teaching practices and tasks like text production and automation, it also presents risks of cognitive offloading and bypassing important skills. Misconceptions about AI's functioning and integration in the education ecosystem were identified, emphasizing the importance of understanding its limitations. Building AI literacy for students, teachers, and educators is crucial, as it prompts a reevaluation of education and the implications of advanced machines. Incorporating AI literacy into digital competence frameworks is necessary for equitable and informed integration.

The third roundtable discussion focused on the impact of AI on children's rights and the need to consider their perspectives in AI system design. Participants emphasized the importance of fairness and accessibility in AI for children. Involving children in the design process was seen as crucial to understanding their needs and interests. However, challenges were identified, such as children's limited expertise and the need for collaboration between adults and children. Policymakers were urged to create regulations that protect children's rights without impeding their access to opportunities. Examples of involving children in AI design were shared, highlighting the importance of considering children's best interests and making their perspectives visible.

Virginia Dignum, WASP-HS director

WASP-HS Community Reference Meetings (CRMs) are meeting places for Swedish private and public organizations and WASP-HS researchers. Each meeting has a specially selected theme with the aim of bringing business and research together to expand knowledge and strengthen collaboration.

This report is based on the discussions and conclusions from the CRM on the topic of AI, education and children. The event took place on 19 April, 2023.

Highlights from Generation AI Project

Keynote Speaker

Teemu Roos, Professor, University of Helsinki, Leader of the AI Education Program at the Finnish Center for AI

I was very excited to join the WASP-HS Community Reference Meeting on AI, Education and Children on 19 April and present some work that we've been doing for the last five years on public AI literacy (the Elements of AI project) and especially starting 2022 on AI literacy for children (the Generation AI project).

The Generation AI project is a large consortium of three universities (University of Eastern Finland, University of Helsinki, University of Oulu) and other partners, with the goal of tackling societal challenges related to AI. Among these challenges the three main ones are: 1) a weakening feeling of security, control, and free will in a datafied society; 2) eroding trust on public authorities, media, science, civil society, and fellow citizens; and 3) rapidly growing inequality related to ICT ability and agency.

While the Elements of AI online course, which has about 1M users in over 170 countries worldwide, offers basic knowledge of AI to the adult population, the Generation AI project is focused on children and schools. The main research questions involve concepts like data agency, data-driven design, epistemic fluency, and identifies new notions required to capture important dynamics related to AI and machine learning systems. One framework for dealing with such notions that we discussed in the meeting is the Computational Thinking 2.0 framework introduced by Matti Tedre and others.



Teemu Roos, Professor. Photo: Maarit Kytöharju

I also brought with me a bunch of questions to the meeting, focused on new thinking tools required to better understand the dynamics of social media (filter bubbles, polarization, misinformation, etc.), which lead to very inspiring discussions.

How Can We Ensure Algorithmic Fairness to Protect Children?

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Main Challenges

- Ensuring that AI systems take children’s best interests and perspectives into account, especially in terms of fairness and accessibility.
- Finding ways to involve children in the design process while also considering the challenges of their participation, such as their level of expertise and accountability.
- Balancing the need to protect children’s rights and regulate AI systems with the need to promote children’s access to opportunities for involvement in research and design processes.

In today’s digitalized society, artificial intelligence (AI) is an indispensable part of many of our digital systems. It has also become one of the most profitable businesses in the world. Although children and young people represent a significant portion of the users of these systems, they lack enough influence over their design. This can have consequences for their future and development, and it is therefore important to consider their perspective in the discussions of AI. The roundtable discussion focused on the impact of AI on children’s rights and how to ensure algorithmic fairness in order to protect them. The conversation was guided by the following two questions: Are children’s best interests, such as fairness, a primary consideration in AI system design? And how can children participate in the design of AI systems? The UNICEF report “Policy Guidance on AI for Children” (2021) triggered the discussion. This report emphasized the little attention paid to how AI systems affect children and their rights (including fairness) and the lack of opportunities to communicate their opinions and advocate for their rights. However, children want to be heard and have ideas about what they want and need in their digital life (Digital Future Commission-5Rights Foundation, 2023).

During the session, participants shared their experiences related to the guiding questions, emphasizing the importance of considering children’s best interests and the challenges of involving them in the design process. It was agreed that current AI systems do not take children’s interests in fairness into account, and the need for accessibility and fairness in AI was highlighted. Involving children in the design process was stressed as important to better under-

stand their needs and interests, given their unique perspectives on how the digital world should work and how to use it. Additionally, the discussion addressed how AI designed for children can benefit other user groups. As one participant put it: “What is good for children is good for adults, too.”

While the need to include children’s perspectives on the design of AI was evident during the roundtable, it also became apparent that involving them is a complex question with several challenges. The group had different experiences and thoughts on whether children could be considered experts. While children can provide insights into their needs, they may not be knowledgeable in all areas and cannot be held accountable in the same way as adult experts. Therefore, they may lack the resources to respond to examples of bias or correct misconceptions in the data (UNICEF, 2021). Moreover, there is a risk that not all children have good intentions. Well organized collaboration between adults and children was suggested as beneficial, allowing both parties to learn from each other and leverage their respective areas of expertise.

Another topic that arose was the roles and obligations of different parties in contexts involving children. For example, in education, there may be specific obligation bearers, which can vary greatly across different cultures. The issue of defining fairness was discussed as being dependent on context, highlighting the importance of considering various cultural and contextual factors that shape different views on fairness in the design and use of technologies intended for children.

The discussion also addressed policymakers' roles in creating regulations for AI and protecting children's rights, which emerged as a matter of concern. Regulations such as the GDPR (General Data Protection Regulation) were noted as potentially too restrictive. The GDPR makes it challenging for companies to collect and process personal data about children. Children are not involved in the data collection process because of this. While protecting children's rights is essential, it may also impede their access to opportunities and limit their involvement in the research and design process. Therefore, policymakers must strike a balance between protection and involvement.

Although several challenges related to children's participation in the design of AI were identified, examples of research were presented where children have been involved in the design process. One such project was a Swedish initiative where children design robots and chatbots based on their need for a neutral space where they can talk without feeling judged. Moreover, possible methods were described to explore children's narratives about AI.

In summary, the discussions highlighted that children should not be treated as an exception or an afterthought. Their best interests must be considered in the design of AI systems and their perspectives need to be made visible.

To achieve a fair and sustainable development of AI systems, we need to continue exploring how we can involve children in the design process while ensuring their protection and rights.

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Growing Up Together: Children and Artificial Intelligence

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Main Challenges

- How will AI change the way we express and understand emotions and interact with other social beings?
- How do we handle the ethical and legal dilemma of the need to research children's AI usage while maintaining and respecting their privacy?
- Can children, as co-designers, evaluate the strengths and weaknesses of AI?
- How will schools and educators handle children's expectations of AI usage when at school?

Introduction

This roundtable brought together a diverse group of participants from research and practice, representing perspectives on the digitalization of society, AI legalization, AI in education, children's development, and children-technology relations. One focus of this roundtable was on how AI technologies impact children at an early age. In northern Europe, most children have grown up in a world that is intimately connected to technology. They have been exposed to various devices, from home computers and smartphones to digital games and social media platforms. These technologies have provided children with pre-designed interaction possibilities that are limited to the parameters set by the designers. However, with the advent of AI-powered devices, children now have the opportunity to interact with a system that can learn by input and act as an artificial companion.

AI vs children's emotions and interactions with social beings

Children do not differentiate between physical life and digital life regarding social existence and practice. This shift in the nature of interaction has the potential to have a significant impact on children. With AI-powered devices becoming increasingly prevalent in our lives, it is possible that they may become a primary source of emotional support for some individuals. This could lead to a shift in how we understand and express emotions, as we become more accustomed to interacting with machines rather than other people. It is not until children are between six and

ten years old that they are capable of reading and understanding other people. Therefore, we have to pose the question: if we need to limit children's interaction with technology at an early age, when and how should we introduce them to technology? Is education the appropriate place for such introduction? To answer these questions, we need to understand how children use and interact with technology, and how it impacts them. We also need to research how AI technologies can be used in education.

Children's expectations of AI usage when at school

Children becoming more familiar with AI-powered devices in their daily lives will likely have certain expectations of what is possible in the school setting. They may expect their education to be personalized and tailored to their needs, based on their previous interactions with technology. This could lead to a significant shift in how we approach education, as teachers and educators seek to incorporate AI-powered devices into the classroom. Furthermore, as children become more familiar with AI-powered devices, they will likely have certain expectations of what is possible regarding educational technology. For example, they may expect their devices to be able to answer their questions and provide guidance and support in a way that is tailored to their individual needs. Schools, however, may have restrictions in place both for examination purposes and with regard to data protection. Restrictions may also concern protecting children from harm.

Risks, concerns and possibilities related to children's interaction with AI technologies

Save the Children works broadly with issues related to children and gaming. One primary focus is the development of an AI solution that can identify children and young people in need of support on online gaming platforms. There are behavioral indicators from children in need of support that can be detected online. Indicators could reveal to what extent and during which hours a child is online, if a child express resignation, or if a child begins to reject invitations from friends. AI can be a future support for children, as it can detect behavioral changes, and maybe even nudge the child in another direction or offer support directly. Another example is technologies that assist children unable to participate at school (due to illness, unwillingness, or for other reasons), in participating in the classroom virtually or by using a robot.

To ensure that children are prepared for a world where AI is ubiquitous, we must adopt a three-pronged approach: learning with AI, learning about AI, and adapting education due to AI. Learning with AI: AI-powered tools can offer personalized learning experiences that cater to each student's unique needs and abilities. Learn about AI: AI literacy is becoming increasingly vital in today's world, and children need the knowledge and skills to navigate it. Adapting education due to AI: Schools have a crucial compensatory mission to prevent the creation of a parallel society where some individuals can use AI-powered tools while others cannot. This adaptation necessitates that all children have access to AI-powered tools and are equipped with the skills to use them effectively. However, researchers today have not reached a consensus on the extent to which technologies in education support or limit learning, or at what ages. Hence, there is a risk that we create new problems by solving others.

Ethical and legal dilemmas

The ethical and legal dilemmas of researching children's AI usage while respecting their privacy will be challenging to navigate. On the one hand, researchers and developers need to collect data to understand how children interact with AI technologies and how they affect their development. On the other hand, there is a risk of infringing on children's privacy, which can have severe consequences. However, suppose we instead were to invite children as co-designers, contributing with knowledge on how they interact with technologies and why. In that case, we also expect them to understand AI and express their needs in design and use. In other words, we would require them to understand the strengths and weaknesses of AI. That may be quite demanding to require from

a child, especially when we do not know the transfer effects and disengagements between systems used at home and the systems used in school. Therefore, it appears that new technologies require new methods for design and co-creation, where we first and foremost need to protect children's rights. Legalization is one way forward.

Strength and weakness of AI

As AI will play an increasing role in our lives, it is important for children to understand the strengths and weaknesses of this technology. However, it may be a challenge for children due to its complexity. Adults can support children's understanding of and interaction with technology. The majority of adults today can remember life without internet, whereas children grow up with internet and technological development at an intense speed. Can these generations find ways forward and strike a balance between possible use and preferred non-use of AI technologies? One such example is AI-generated bedtime stories, where children are co-creators of AI-written stories. It is a way for young children, under the supervision of adults, to create their own bedtime stories together with an AI-system.

Summary

Schools play a crucial role in teaching children about AI literacy and ensuring that all children have access to AI-powered tools. By doing so, we can ensure that AI enhances education, leading to a more equitable and just society. The impact of AI-powered devices on children is a complex and multifaceted issue. AI will most likely both positively and negatively affect children's social, emotional, and educational development. As such, researchers and practitioners from a range of disciplines must come together to explore these issues and develop strategies to ensure that the benefits of this technology are maximized while minimizing any potential negative impacts. Interdisciplinarity is one the way forward, but we still have much work to do.

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Artificial Intelligence in Education: Who is Being Left Behind?

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Main Challenges

- Generative AI offers a host of new opportunities and challenges from a teaching and learning perspective.
- The unregulated rollout of generative AI tools could lead to practices that are not conducive to children's cognitive development.
- Teachers need to develop AI literacy in order to meet the challenges as well as take advantage of the affordances of generative AI in the education sector.

The aim of the event was to engage in wide-ranging discussions about the role of AI in education, with a view on the recent emergence of generative AI applications, such as ChatGPT. Conversations revolved, in part, around potential opportunities and related risks of an unregulated use of AI tools and systems in the education sector, and in part, about the importance of enhancing teachers' and students' AI literacy.

A host of affordances were identified, where AI in education settings could be seen to facilitate pupils' learning and enhance teachers' practices. Examples include teachers who have engaged with large language models (LLMs) finding them beneficial for preparing lessons, managing administrative tasks, and teaching procedures like programming. When used judiciously and for inspiration, these models can be helpful for tasks involving text production and enhancement, such as adjusting a text's style, generating questions based on a text, and automating tasks that involve summarizing, rephrasing, or teaching specific tools or procedures.

From a cognitive and learning sciences perspective, generative AI presents challenges when used by pupils to write texts, as it involves a cognitive offloading. The main risk of such "offloading" lies not in potential cheating with AI chatbots, but in the temptation to simplify or bypass skills requiring extended engagement and perseverance. Handwriting, for instance, is a fundamental first step for young children's learning, as shown in several studies. Consequently, if technologies like AI chatbots are introduced too early they could pose risks to children's cognitive development.

Other challenges associated with AI in education were also identified. Many of these arise from misconceptions about their functioning, capabilities, limitations, and their integration into a technology ecosystem driven by commercial interests and transnational policy. For example, it is crucial to understand that LLMs do not learn, or understand, but they generate output based on statistical probability.

Furthermore, powerful technologies such as LLM's enable interoperability with various services across different domains, enabling the development of plugins and third-party solutions. However, this adoption does not address the broader implications of introducing AI in education, which involves not only comprehending the technology's functionality and its applications in teaching and learning but also understanding the human dimensions of AI and its short-term and long-term consequences.

As AI technologies gain prominence, concerns arise about the necessary competencies to understand these tools and their appropriate roles in education. This leads to increased emphasis on the need for students, teachers, and teacher educators to grasp AI both in theory and practice.

In conclusion, the presence of AI in education urges us to reconsider various aspects of education, such as what it means to learn, what knowledge is and what being human means in a world with increasingly advanced and "intelligent" machines. To prevent learners and teachers from being left behind, AI literacy should be incorporated into a wider digital competence framework and continue to be studied rigorously.

This Report

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For more information please visit www.wasp-hs.org.

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