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Innovation, integration and modern problems in the scientific activities of young
researchers and students: theory and practice collection of materials of the
international scientific and practical conference on the topic

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In the collection of materials of the conference, the role and role of Science, Education and production in the era of globalization, the pressing problems of the issues of interaction of these processes, feedback on their solutions were presented by mature specialists of the field.

In addition, research on the scientific and practical topic, carried out in the economics, Exact Sciences, Natural Sciences and socio-humanities during the globalization period, information is presented in the scientific and practical fields, which includes the latest innovative technologies in the fields of production.

It can be argued that this collection is one of the specific intersections of current thoughts and innovative ideas of the world of science. This scientific and practical conference was actively attended by professors and scientific researchers engaged in scientific research in Uzbekistan and foreign countries. In increasing the position of the scientific and practical conference, the professors and teachers of domestic and foreign higher educational institutions made a significant contribution.

Professors and teachers of foreign higher educational institutions who actively participated in the work of the conference made a worthy contribution to the high level of interaction with scientists of our country. The processes of international cooperation with foreign countries and exchange with them in the field of Science in the era of globalization have a positive effect on the development of Higher Education, the fields of Science and production. The materials of this conference are special in that they include a wide range of research, from theoretical developments to practical solutions, demonstrating the diversity of approaches and directions in this area.

In conclusion, it should be noted that this scientific and practical conference will be a very useful collection for everyone who is interested in modern research in the fields of further development of Higher Education, Science, Education and production in the era of globalization. The authors are responsible for the content and quality of the articles and abstracts included in the collection.

SAFER DIGITAL SPACES FOR CHILDREN: INTEGRATING FAMILY GUIDANCE AND TECHNOLOGICAL SAFEGUARDS

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Abstract: The rapid expansion of digital platforms has transformed childhood socialization, learning, and communication. While virtual environments provide educational and creative opportunities, they also expose minors to algorithmic risks, privacy threats, and harmful content. This paper examines child online safety from a computer science perspective, emphasizing AI-driven content systems, cybersecurity risks, and protective mechanisms. It proposes an integrated framework combining safety-by-design technologies, digital literacy, parental mediation, and regulatory safeguards. The study argues that responsible algorithm design and collaborative governance are essential for ensuring safe digital environments for children.

Keywords: child online safety, artificial intelligence, recommender systems, digital literacy, cybersecurity, privacy protection, content moderation, parental mediation, algorithmic transparency, human-centered computing

Digital technologies are no longer simply tools for communication and learning; they have become environments in which childhood itself is experienced and shaped. Over the past decade, virtual spaces such as social media platforms, online gaming ecosystems, streaming services, and messaging applications have transformed how children interact, learn, and construct social identity. Unlike traditional social institutions including family, school, and community, digital platforms operate continuously and globally, exposing minors to vast streams of information and algorithmically personalized content. Children and adolescents are increasingly described as digital natives because their cognitive development occurs alongside constant digital interaction. While these technologies provide unprecedented access to educational resources, creativity tools, and global communication networks, they also introduce complex challenges related to cognitive development, digital safety, privacy protection, and ethical awareness. International data indicate that children are among the most active internet users worldwide, highlighting the central role of digital environments in youth development and socialization. As physical and virtual realities continue to merge, understanding how digital ecosystems shape minors' perception, behavior, and

decision-making has become a critical concern in computer science, education, and digital governance.

Modern digital ecosystems are powered by artificial intelligence, machine learning algorithms, and large-scale data analytics that personalize content delivery and optimize user engagement. These systems collect behavioral data, analyze interaction patterns, and deliver content predicted to maximize retention and interaction. Although personalization enhances accessibility and usability, engagement-driven optimization may expose minors to inappropriate, misleading, or emotionally manipulative material because recommender systems prioritize engagement rather than developmental suitability. Children, whose cognitive capacities are still developing, are particularly vulnerable to misinformation and algorithmically amplified narratives.⁶⁷ Furthermore, AI-driven profiling increasingly influences access to information and opportunities, meaning digital literacy is necessary even when children are not actively using platforms. Emerging generative AI technologies introduce additional risks such as deepfakes and synthetic media manipulation, complicating children's ability to distinguish between authentic and fabricated information.⁶⁸ Consequently, digital environments must be understood not merely as communication tools but as computational ecosystems that shape cognition and social perception through data-driven personalization.

Within these environments, algorithmic architecture structure socialization processes by influencing what children see, how they interact, and which behaviors are reinforced. Social media systems reward visibility, interaction frequency, and emotional engagement, encouraging rapid information consumption and validation-seeking behavior. Research in human-computer interaction indicates that feedback loops reinforcing attention-seeking behaviors can reshape self-perception and social interaction patterns among younger users.⁶⁹ Exposure to idealized lifestyles and viral trends may influence self-esteem, social comparison, and emotional regulation. Moreover, digital platforms can expose minors to cyberbullying, toxic discourse, and harmful online communities, normalizing aggressive communication patterns and reducing sensitivity to ethical boundaries. Studies of online safety frameworks identify risks related to harmful content, unsafe contacts, and exploitative interactions, emphasizing the need for coordinated technical and policy responses.⁷⁰ These risks demonstrate that digital socialization is structured by technological design choices that shape behavioral norms and social expectations.

Beyond behavioral risks, cybersecurity and privacy concerns present serious challenges for minors navigating digital ecosystems. Digital platforms collect extensive personal data including behavioral metrics, location information, and interaction histories, often without minors fully understanding consent implications. Children frequently underestimate privacy risks and may share personal information without recognizing long-term consequences, increasing vulnerability to identity theft, phishing schemes, and exploitation. AI systems rely heavily on data collection

⁶⁷ Valkenburg & Piotrowski. *Plugged In: How Media Affect Youth*.

⁶⁸ Chesney & Citron. Deepfakes and Synthetic Media Research

⁶⁹ Shneiderman, B. *Human-Computer Interaction*.

⁷⁰ EU Kids Online Research Network Report.

and monitoring, which may produce behavioral influence through perceived observation effects. Targeted advertising and behavioral profiling raise ethical concerns about manipulation and consent, particularly when children cannot recognize persuasive intent. International organizations emphasize privacy-by-design principles and child-centered safety architectures as essential safeguards for protecting minors' data and digital rights.⁷¹ Integrating secure system architecture with accessible privacy controls is therefore critical in protecting children in data-driven environments.

Despite these risks, digital technologies offer substantial opportunities for cognitive development and technological skill acquisition when guided appropriately. Adaptive learning platforms enable personalized instruction, while coding environments, robotics tools, and digital creation platforms foster computational thinking and problem-solving skills essential for the digital age. Artificial intelligence can enhance accessibility and support inclusive education when implemented responsibly.⁷² However, unequal access to digital resources and varying levels of digital literacy may widen educational inequalities, emphasizing the importance of inclusive digital access strategies. International policy guidance stresses that children's ability to benefit from AI technologies depends on access, trust, skills, and protective safeguards. Therefore, the challenge is not to restrict digital exposure but to guide minors toward constructive engagement through digital literacy education and ethical technology use.

Artificial intelligence plays a central role in shaping children's digital experiences through recommender systems, automated moderation tools, and personalization engines, making algorithmic safety a critical priority. While AI enables scalable detection of harmful content, algorithmic amplification may unintentionally increase exposure to harmful material when optimization objectives prioritize engagement metrics. Emerging research highlights the importance of child-specific AI safety benchmarks to evaluate whether systems appropriately prevent harmful interactions. Studies of child-AI interaction also emphasize risks related to bias, toxic outputs, and cultural insensitivity, underscoring the importance of ethical design and safety evaluation.⁷³ Hybrid moderation systems combining AI detection with human oversight provide more reliable protection in contexts requiring cultural nuance and contextual understanding. Ethical AI frameworks emphasize transparency, fairness, and accountability to ensure automated systems do not expose children to harm.⁷⁴ Safety-by-design approaches prioritize well-being by integrating age-appropriate filtering, risk detection systems, and protective default settings.

While technological safeguards are essential, family guidance remains one of the most effective protective factors in fostering safe digital behavior. Active parental mediation, including co-use of digital media, open dialogue about online experiences, and guided interpretation of digital content, strengthens children's

⁷¹ OECD. *Children in the Digital Environment*.

⁷² Holmes et al. *Artificial Intelligence in Education*.

⁷³ OECD AI & Children Safety Studies.

⁷⁴ IEEE. *Ethically Aligned Design*.

critical thinking and resilience against online risks. Families that establish balanced screen routines, encourage offline interaction, and model responsible technology use support healthy cognitive and emotional development. Educational institutions complement family efforts by integrating digital literacy, cybersecurity awareness, and ethical technology use into curricula. Digital literacy includes evaluating information credibility, recognizing manipulation techniques, and practicing responsible online participation. International organizations emphasize that building safe digital environments requires collaboration among governments, technology companies, educators, and families to protect children's rights and well-being. This multi-stakeholder approach recognizes that child online safety is a shared responsibility across technological, social, and regulatory domains.

In Uzbekistan, rapid digitalization and increasing internet accessibility have expanded educational and communication opportunities for young people while simultaneously raising concerns about online safety and digital literacy. National strategies aimed at developing a digital economy and expanding broadband access have increased children's exposure to online platforms, making cybersecurity awareness and responsible technology use essential components of youth education. Government initiatives promoting digital literacy and information culture seek to equip young citizens with skills necessary to navigate digital environments safely while preserving cultural values and social responsibility. Strengthening collaboration between families, schools, and public institutions is therefore critical in ensuring that digital transformation supports youth development rather than exposing minors to unmitigated risks.

Ultimately, the expansion of digital ecosystems has transformed childhood experiences, making online environments central to learning, communication, and social development. While virtual platforms provide significant opportunities, they also introduce risks associated with algorithmic exposure, cybersecurity threats, misinformation, and privacy vulnerabilities. Protecting minors requires coordinated efforts integrating safety-by-design technological solutions, digital literacy education, family guidance, and regulatory safeguards. International frameworks emphasize that children's rights must be protected in digital environments and that AI systems should be designed to support safety, inclusion, and well-being. Rather than restricting digital participation, societies must focus on creating safer digital ecosystems that empower children to navigate online environments responsibly and ethically. By combining technological innovation with human-centered safeguards, it is possible to build digital spaces that support healthy development, protect fundamental rights, and prepare future generations for responsible participation in an increasingly interconnected world.

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