ETHICS IN EDTECH: CONSOLIDATING STANDARDS FOR RESPONSIBLE DATA HANDLING AND USER-CENTRIC DESIGN

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1. FOREWORD

When the Danish Data Protection Agency (Datatilsynet) found that using Google Chromebooks and the associated Google Workspace software in schools violated the General Data Protection Regulation (GDPR), Datatilsynet issued an order ordered for schools in the Helsingør municipality to cease using the Chromebooks. In recent years, Datailsynet repeatedly emphasised the need for compliance with data protection laws and better protection of students' personal data, and the need to prohibit data processing in municipalities using Google services and products until compliance is ensured (Datatilsynet 2022, 2024). The ongoing case in Denmark emphasizes prioritizing students' rights as users, placing them at the heart of ethical considerations. This approach has underscored the necessity of balancing the integration of educational technology (EdTech) with the protection of personal data, particularly children's personal data. It brings to light broader ethical issues in EdTech that urgently need to be addressed by society.

Far from Google's former corporate motto of *Don't be evil*, cases against Google have been reported several times before. For instance, in 2014, the company faced a lawsuit over claims of illegal wiretapping by scanning student email messages to deliver targeted ads through the Apps for Education program. While regulators worldwide increasingly find data protection and privacy breaches in EdTech's data practices, we see primarily big tech companies such as Google being at the centre of these regulatory decisions due to their non-compliance (Atabey & Hooper, 2024). Notably, for example in the UK, Google has faced loud criticism for breaching the data protection laws and undermining children's rights (Livingstone et al., 2024b). In countries such as France, Germany, and Netherlands, we also see significant focus on Google's data protection breaches, especially lack of transparency, putting significant compliance burdens on schools (Kidron et al., 2023). The "Danish Chromebook case" made the headlines and has thus sparked a broader public international debate on the need for balancing the integration of educational technology (EdTech) with the protection of personal information, particularly children's personal data. This incident highlighted that technologies and ethical issues are global, while each state's response is influenced by local and cultural values.

We, the authors of this report, are researching EdTech and ethics from an international perspective but we are based in different countries that colour and influence our perspectives: Cory is based in Sweden, Natalia in Norway, Ayça and Anna in the UK, and Andra in Estonia. Our lived experiences and particular geographical research contexts are also influenced by unique national approaches to social trust. Social trust, is defined as the belief that others will not deliberately or knowingly do us harm, if they can avoid it, and will look after our interests if possible (Delhey & Newton, 2005). The concept of social trust is crucial in how we approach the ethical issues of EdTech. Both technological capabilities and societal definitions of acceptable practices are rapidly evolving, making it challenging to take a definitive stance or make clear statements about acceptable and unacceptable EdTech use.

When privacy laws are a moving target, social trust remains the constant factor (Robinson, 2020). In turn, institutional trust, found to be high in Nordic countries (Sikt, 2023), also shapes our expectations and usage of government services. These expectations of institutional transparency influence our desire for industry to abide by certain related norms. The Nordic region particularly, encompassing Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland, and Åland, has succeeded in generating high levels of social trust, resulting from a combination of historical and modern societal processes such as the historical role of voluntary associations and the function of the state (Andreasson, 2017). Research consistently shows that Nordic societies are characterised by exceptionally high levels of social trust, distinguishing Denmark, Finland, Iceland, Norway, and Sweden from the rest of the world, as no other countries reach comparable levels of trust (Delhey & Newton, 2005).

From this perspective, the Danish Chromebook case is a unique example of how a private actor violated social trust and norms, and of the actions that followed. As state-supported initiatives grapple with ethical lapses of market-leading EdTech companies, questions of fairness, accountability and transparency resonate deeply within our research. The emergence of generative AI has further complicated these discussions, prompting widespread debate on how best to navigate the ethical implications of technological innovation, while safeguarding the values of social trust and societal norms.

As researchers, we are engaged in both evaluating EdTech tools that should be excluded from classrooms for undermining children's privacy and other rights, as well as supporting EdTech improvement to enhance the quality of their design and use. We believe that a careful balance between quality assurance and quality improvement is essential to ensure that these technologies do not harm students and genuinely advance their learning. In other words, while concerns over privacy and security rightfully dominate the current EdTech ethics discourse, it is equally crucial to recognize EdTech's potential for positive impact in learning environments. Over two decades of research attest to the benefits of well-designed EdTech in enhancing educational outcomes (e.g. Mares & Pan, 2013; Egert, Cordes & Hartig, 2022), provided ethical considerations are rigorously upheld.

Considering this duality, we propose **aspirational principles** for EdTech providers that highlight not only what should be avoided but also showcase good practices and leadership in ethical aspects. We adopt this stance for two reasons:

First, amid calls for better regulatory measures, such measures should take into account the needs and practical realities of all EdTech companies, including smaller EdTech companies. In the absence of adequate guidance and understanding the challenges EdTech companies might be facing in practice, regulation might affect innovation unequally. Smaller EdTech firms, with limited resources to navigate complex regulatory landscapes, can face particular challenges in this environment. As Sparks (2024) notes, the navigation of complicated privacy and security regulations can be especially burdensome for smaller EdTech companies with limited resources. If these regulations are hard to navigate, they may inadvertently put large EdTech companies with larger resources in an advantageous position, leading to market monopolies that are difficult for states to resist. While large technology companies can absorb hefty fines, smaller companies can be crowded out, reducing market variety, leading to unfair competition, and leaving states with fewer alternatives. When technologies are banned, what replaces them, and is the alternative better?.

Second, we respond to the need for a new culture in the ethical debates around EdTech, a culture that is not solely punitive but views EdTech providers as partners in dialogue. We believe that through partnerships and dialogue we can identify constructive solutions and uphold social trust. With a significant prevalence of quality assurance reports and debates in Europe and North America, we aim to offer something different and additional in this report. We aim to shift the focus from punitive measures to aspirational principles in EdTech and seek to cultivate a culture of ethical leadership within the industry

By championing exemplary practices, we propose to foster dialogue with the EdTech industry to jointly build social trust in digital education.

Striking a balance between robust oversight and fostering a diverse, competitive market is essential to ensure equitable access to innovative educational tools. Proper and sound regulation and technological innovation are not mutually exclusive goals. In fact, regulation can support and enhance innovation. But in addition to regulation, we need aspirational principles for the industry to follow to improve quality. Therefore, we aim to propose these principles for EdTech, outlining best practices that can lead to ethically sound, high-quality EdTech.

Our report is an invitation to engage in the dialogue on aspirational principles for EdTech, fostering collaboration and mutual growth in the pursuit of ethical excellence in the field. Our dialogic stance builds on previous reports in this series, focused on ambitious principles for EdTech efficacy, effectiveness and equity. We intend to prompt a conversation with and within the EdTech industry, policy-makers, teachers/practitioners and fellow researchers to shape an EdTech culture where technology in education upholds the highest ethical standards, benefiting learners, educators, and society as a whole.

2. INTRODUCTION

This report focuses on ethics, that we define as the principles of right and wrong that guide individuals or groups in making moral decisions and conducting themselves responsibly. We particularly focus on ethics with educational technology (EdTech), defined as platforms, apps, and tools designed or used with the explicit and specific goal to advance education.

EdTech is not only a burgeoning industry but a transformative force, projected to soar to more than 400 billions of dollars in value in the coming years. With millions of children (and adults) worldwide engaging with EdTech on a daily basis, its impact on learning outcomes and social development is profound. Despite its vast potential, however, concerns persist regarding the quality of EdTech offerings. UNESCO (2023) has flagged the current low quality of many popular EdTech solutions, prompting ongoing efforts to bolster their efficacy and effectiveness. These endeavours aim to optimise EdTech's capacity to enhance learning experiences and foster positive social outcomes for primarily young learners. Increasingly, and especially with the advent of generative Artificial Intelligence (AI), questions emerge around ethical design, implementation, and scale of EdTech.

The widespread adoption of AI-powered EdTech tools, coupled with the shift to distance learning during the pandemic, along with implementation of GDPR (EU 2016) and AI Act (European Parliament 2024), has brought to the forefront the risks and ethical considerations associated with the implementation of AI in EdTech. This has become a pressing concern for all stakeholders: EdTech providers, researchers, users/consumers, municipalities that deploy/utilise software solutions, and anyone else involved, further spurred by public demand for greater equity and openness in the development and deployment of these tools. While recognizing the interconnectedness of equity and ethics, we made a deliberate choice to address them in two separate reports, with a focused attention to research pertinent to each aspect. Given our team's prior work on a dedicated equity-focused report (Lindroos Cermakova, Prado & Kucirkova, 2024), focusing solely on ethics in this report allows for a more in-depth analysis and a thorough examination of the ethical considerations specific to EdTech. This approach complements the equity-focused report by providing a comprehensive exploration of ethical concerns in EdTech software and technologies.

As a result, we did not include discussions of topics that overlap with equity considerations, such as fairness, accessibility, and addressing biases, because these are already covered extensively in the accompanying *Equity in EdTech by Design* report.

There is also a notable intersection between ethics and environmental considerations, particularly in contemporary approaches to sustainability in digital and green education. These new integrated approaches transcend the traditional view of sustainability as merely an environmental concern, instead they emphasise the ethical dimension of sustainable practices and advocate for a values-driven approach to sustainability led by the EdTech industry. This report acknowledges the importance of environmental issues but does not delve into them specifically, as they are addressed in a forthcoming separate report dedicated to environmental concerns in EdTech. Our focus here is thus narrowly and specifically on addressing the ethical issues in EdTech, as part of a concerted effort to develop a comprehensive set of reports on Equity, Ethics, Environment, Efficacy, and Effectiveness within the "5Es" framework (Kucirkova, 2023, 2024).

2.1 OUR AIMS AND OBJECTIVES

For the purpose of the discussion in this report we define quality EdTech as technology that enhances education without causing harm and upholds ethical standards. This includes fair and transparent data governance and age-appropriate design that responds to user feedback while prioritising duty of care. Our aim is to synthesise these criteria from published research, existing initiatives, and policy reports by global agencies such as UNESCO, the World Bank, and OECD. The goal is to establish a consolidated, research-based benchmark for ethical standards in EdTech that become aspirational standards for the industry to follow.

In this report, our objectives are threefold:

1. To conduct a rapid literature review examining the intersections of ethics and educational technology (EdTech).
2. To identify and derive key best practices demonstrating how EdTech can effectively address ethical challenges in K12s
3. To propose common benchmarks for evaluating the impact of EdTech initiatives specifically in relation to ethics objectives, fostering accountability and guiding future development efforts.

Our guiding questions in arriving at the common benchmarks were:

- What ethical challenges regarding EdTech and children have been identified?
- Who is responsible for addressing these challenges?
- How can the challenges be addressed or overcome to support children's learning, wellbeing, and education?

For all questions, we aimed to highlight positive examples of ethical practice in EdTech to incentivise the EdTech industry to benefit all learners.

2.2 AGE GROUP SPECIFICATION

EdTech affects all areas of education, from "pre to grey", and ethical considerations are relevant for all age groups. In this report, we primarily focus on K12 educational technologies and provide a detailed exploration of specific issues within this educational domain. We take a broader approach in that we cover literature across the different age groups but make it clear which ethical issues are salient for which age bracket. For practical considerations for the EdTech industry, we divide up our considerations in terms of their relevance to Early Childhood (3 to 5 years), Middle Childhood (6 to 11 years), and Adolescence (12 years to adulthood), see Figure 1.

As children get older, their dependence on adults for technology guidance is lowered and so is the level of inherent risk of these technologies. Conversely, the responsibility for younger children's data governance, fairness and inclusivity of data practices tend to be on the caregivers, reducing children's agency.

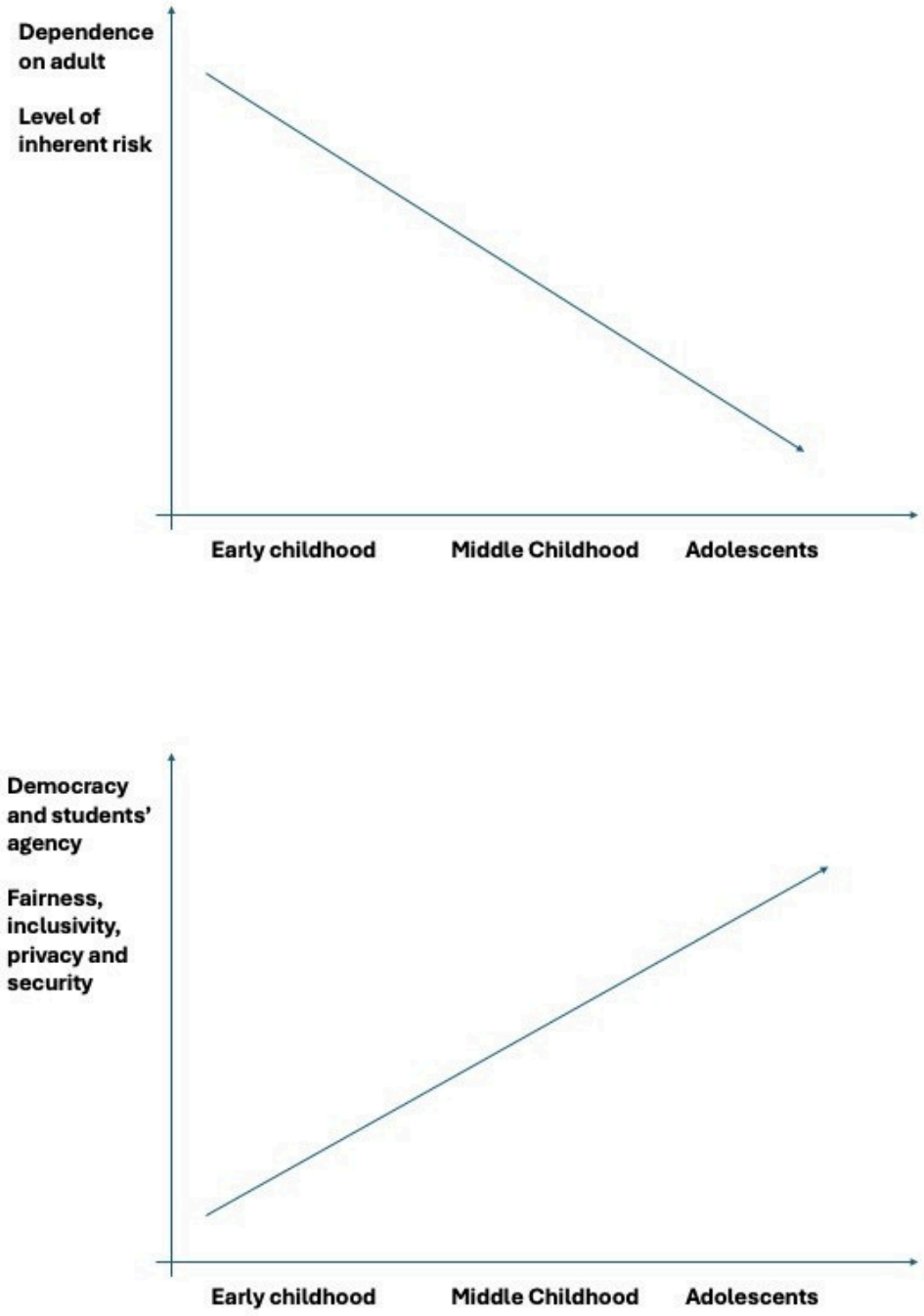

Figure 1. Ethical considerations distributed by topic and age.

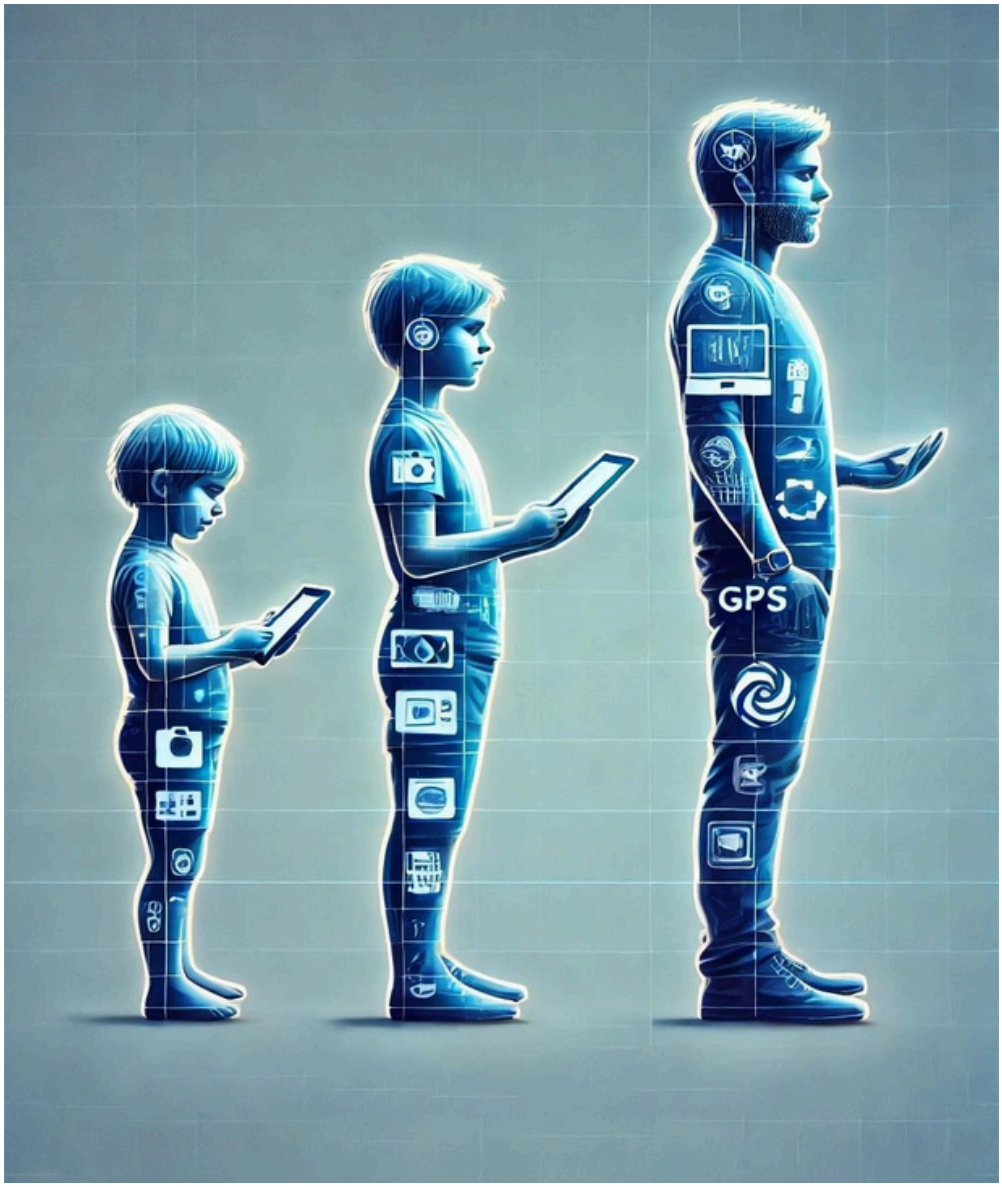

Image 1. Technological integration from childhood to adulthood.

Note: This image was created based on the following prompt:
I want you to create a human figure standing vertically. The human figure could be segmented into 3 parts (either vertically or horizontally, depending on what works best visually), with each part representing a different life stage. The technology most relevant to each stage could be overlaid on the corresponding section of the body. For example, in the "adolescence" section, we could depict the use of a GPS tracker or a smartwatch.

It is interesting to note that the system generated a human figure resembling a white male person, directly reflecting the limited training data and bias it operates with.

2.3 BEYOND MINIMAL STANDARDS

Efforts at the European Commission level and other regulatory bodies are being made to establish minimal ethical criteria that need to be in place before technologies reach children's hands. These include aspects anchored in the UN Convention on the Rights of the Child from 20 November 1989 such as centering the child's best interests which is "the full and effective enjoyment of rights" and "the holistic development of the child" (UN Committee on the Rights of the Child, 2013) but crucially "is not a replacement for other or all of children's rights, nor are children's rights a matter of pick and mix" (Livingstone et al., 2024a, p. 2). It follows that EdTech that deliberately misuse or commercialise children's data without their consent are against this rule and do not meet the minimal quality standards for their acceptance to schools.

In this report, we go beyond minimal standards (the "red tape") and focus on aspects that can be used as quality parameters, or measurable impact benchmarks. This focus is important to facilitate incentivisation in the EdTech industry for improving their products according to clearly delineated research-based criteria.

2.4 BEYOND AI ETHICS

AI impacts education in five primary ways: 1) large changes in data gathering, including combination of data with sensor data, 2) through Machine Learning (ML), deduction of future behaviours are possible, 3) new patterns and new understanding are possible with big data, 4) human learning is supported and tutored through natural human-machine interaction, 5) AI has large societal impacts (necessary infrastructure is vast, and its direct impact on individual and societal levels of people's lives cannot be denied) (Niemi, 2021; Roschelle, Lester, & Fusco, 2020; Wong et al., 2020). In today's era of big data, where information holds immense value, as well as potential for misuse, EdTech developers must exercise caution to safeguard student well-being and pay attention to several ethical considerations, including:

1. Analog and digital **security of student data** is paramount. The repercussions of data breaches, whether intentional or accidental, are significant - including life-long discrimination, financial loss, reputation damage and others. Therefore, institutions and EdTech providers must implement rigorous security and anonymization measures to protect data. This would not only help EdTech providers to comply with relevant laws but also ensure that their end-users are treated fairly in an ethical manner.

2. **Data ownership** poses a crucial issue. Determining who owns the data generated by students - whether it's the institution, the student, or the EdTech provider - has profound legal implications. The critical issue here is about who bears the responsibility for handling personal data. Does the municipality or state utilising the software practice co-ownership of data? Should parents of school children be a stakeholder in data ownership? Should EdTech regulators perhaps seek inspiration from the highly regulated tech cousins, BioTech and FinTech, in this respect? Crucially, in addressing such critical questions, it is essential that students themselves are heard and involved in discussions. This inclusion would contribute to user-centered and value-sensitive approaches in data processing.

3. **Informed consent** is an ethical concern that needs to be embedded in EdTech cycles. When students and educators engage with EdTech platforms, they often share personal information, sometimes unknowingly. It is imperative to ensure that users fully comprehend the implications of data sharing and are capable of practising fully informed consent; the consent must, therefore, be worded in age-appropriate manner.

4. Ethical **data utilisation** is another critical societal and legal concern. Educational institutions and EdTech companies must adopt responsible practices for navigating and using the data they collect. This should ensure fairness in data processing as well as fair treatment of end-users. It involves striking a balance between leveraging data to enhance learning experiences and protecting students from intrusive surveillance or commercially exploitative tactics, such as using dark patterns for monetary gains. Aligned with existing data protection laws, using data fairly involves more than just ensuring strict privacy settings and protecting data; it also requires handling data in an ethical and rights-respecting manner, which includes ensuring beneficial uses of data in educational settings.

5. **Responsible data handling** is especially acute with numerous reports on topics like GenAI flooding the scene; EdTech providers find themselves in a maze of conflicting priorities and uncertainty. To bring clarity, the EdTech field requires consolidation and the development of a rubric outlining expectations and aspirational principles. For instance, at a minimum, responsible data handling in accordance with legal requirements such as GDPR (2016/2018), COPPA (1998), and FERPA (1974) should be prioritised.

In this report, we focus on the implications of AI for K-12 EdTech, while intentionally not centering our ethical considerations solely on AI or generative AI. This deliberate approach aims to meaningfully expand the current body of literature and range of reports on ethics in digital education, which have surged following the public release of ChatGPT in November 2022.

2.5. THIS REPORT

The report is organised as follows: Section 3 (Literature review) of the report gives an overview of the relevant academic literature and reports (section 3.2), existing laws and regulations (section 3.3) and applicable technical standards (section 3.4) followed by leading ethics frameworks (section 3.5). Section 4 discusses some of the key concepts from the academic literature review highlighting key ethicals challenges (section 4.1), addresses the question of 'who is responsible?' (section 4.2) and incentivisation of good use (section 4.3). Section 5 outlines the emerging EdTech technical standards together with the aspirational ethical benchmarks (section 5.1), while also outlining implications for the industry, research and policy (section 5.2).

3. LITERATURE REVIEW

3.1 METHODOLOGY

Due to the abundance of grey literature in this field—such as white papers and reports from think tanks, prominent alliances, and professional groups—reflecting the swiftly evolving landscape of ethical standards in EdTech, we found a conventional systematic review of academic journals to be insufficient. Academic databases alone would not capture these vital reports. Hence, we chose to conduct an "umbrella review", which is a method that consolidates evidence from multiple reviews into one comprehensive document (see Grant & Booth, 2009). An umbrella review focuses on addressing broad conditions or problems with competing views, emphasising reviews that analyse studies, trends and interventions, and their outcomes.

By undertaking an umbrella review, we conducted a rigorous quality assessment of the studies included in component reviews as well as of the reviews themselves. This approach aimed to establish what is currently known and provide recommendations for practice, while also identifying areas that remain unknown and offering suggestions for future research. During our literature review, we identified some key studies that we determined to be particularly relevant for developing ethical standards for EdTech. We identified these key studies through dialogue between us, the authors of this report. As such, the selected studies are by no means fully representative of the field: rather, they represent our collective view on the key issues discussed in the literature.

To facilitate readers' understanding of the key academic papers selected for this report, we provided a tabular summary of results, accompanied by narrative commentary on the available literature and its pivotal relevance to ethics in EdTech. Specifically, we further analyzed studies marked with an asterisk in Table 1 (see also section 3.2 for discussion) to derive key themes for the report's second objective: identifying best EdTech practices for ethical impact.

By broader themes we refer to the social and moral implications of EdTech, which do not apply to EdTech only but extend more broadly.

By EdTech-specific issues we mean issues that are unique to technology, or even educational technology, such as data privacy, learner anonymity, surveillance and others.

3.2 ACADEMIC LITERATURE AND REPORTS

Table 1 represents a collection of some of the key studies and reports that we consider relevant for our research objectives in this report. The table further specifies the type of study (e.g. report, journal article), what specific issues the study focuses on and their broader context.

Reference	Type of report	EdTech -specific issues	Broader issues
Accountability Report 2.0: An independent evaluation of online trust and safety practice. The Internet Commission March 10, 2022. [https://inetco.org/report]	Report	Internet safety	Ethical content, contact and conduct
Artificial intelligence and future of teaching and learning. (2023). US Office of Educational Technology. Washington DC, U.S. Department of Education. [https://www2.ed.gov/documents/ai-report/ai-report.pdf]	Report (policy)	AI in education	AI implications for EdTech targeting curricula

Akgun, S. & Greenhow, C. (2021). Artificial intelligence in education: Addressing ethical challenges in K-12 settings. *AI and Ethics*, 1–10. https://doi.org/10.1007/s43681-021-00096-7	Academic journal article	AI in K-12 classrooms	Privacy, surveillance, autonomy, bias, and discrimination
Atabey, A. & Hooper, L. (2024). *International regulatory decisions concerning EdTech companies' data practices.* Digital Futures for Children centre, LSE and 5Rights Foundation.	Brief	Data processing in education	Data protection, privacy, EdTech regulation
Chaudhry, M. A., Cukurova, M. & Luckin, R. (2022). A transparency index framework for ai in education. In 'Artificial Intelligence in Education'. Posters and Late Breaking Results, Workshops and Tutorials, Industry and Innovation Tracks, Practitioners' and Doctoral Consortium: 23rd *International Conference, AIED 2022,* Durham, UK, July 27–31, 2022, Proceedings, Part II, 195–198. Springer.	Conference proceedings article	AI in education	Transparency
Child Online Safety Toolkit. 5Rights Foundation (no date, accessed June, 2024) [https://childonlinesafetytoolkit.org/]	Non-legal report	Internet	Child online safety
Children's data protection in an education setting - Guidelines. (2021). Council of Europe. [https://edoc.coe.int/en/children-and-the-internet/9620-childrens-data-protection-in-an-education-setting-guidelines.html?&focusjump=The%20Guidelines%20on%20Children%E2%80%99s%20Data%20Protection%20in%20an%20Education]	Report	Data and internet	Data processing

*Day, E., Pothong, K., Atabey, A. & Livingstone, S. (2022). Who controls children's education data? A socio-legal analysis of the UK governance regimes for schools and EdTech. *Learning, Media and Technology*, 1–15. https://doi.org/10.1080/17439884.2022.2152838	Academic journal article	Data	Data governance, processing, and ownership
Ethical Dimension of EdTech: Transforming Risks into Strengths - UNESCO IITE Webinar. [https://www.unesco.org/en/articles/ethical-dimension-edtech-transforming-risks-strengths-unesco-iite-webinar]	Webinar transcript	AI-driven EdTech	Transpa-rency, accountabi-lity, fairness, and privacy
Global Threat Assessment 2023. WeProtect Global Alliance. [https://www.weprotect.org/global-threat-assessment-23/]	Non-legal guidance report	Internet / harmful content	Child online safety
*Hillman, V. (2023). Bringing in the technological, ethical, educational and social-structural for a new education data governance. Learning, *Media and Technology,* 48(1), 122-137.	Academic journal article	Data gover-nance and proce-ssing of data	Student agency
Holloway, J., Lewis, S. & Langman, S. (2023). Technical agonism: embracing democratic dissensus in the datafication of education. *Learning, Media and Technology*, 48(2), 253-265.	Academic journal article	'Datafi-cation' in schools, use of analytics and AI	Democracy
Hooper, L., Livingstone, S. & Pothong, K. (2022). *Problems with data governance in UK schools: the cases of Google Classroom and ClassDojo*. Digital Futures Commission, 5Rights Foundation.	Report	Data	Data governance, processing

Hooper, L., Atabey, A. & Pothong, K. (2024). *Enforcement action improves privacy for children in education: more is needed. A brief analysis of recent changes to policies and practice in Google's Workspace for Education.* Digital Futures for Children centre, LSE and 5Rights Foundation.	Brief	Data	Data governance, processing
Kidron, B., Pothong, K., Hooper, L., Livingstone, S., Atabey, A. & Turner, S. (2023). *A Blueprint for Education Data: Realising children's best interests in digitised education.* Digital Futures Commission, 5Rights Foundation. [https://digitalfuturescommission.org.uk/wp-content/uploads/2023/03/A-Blueprint-for-Education-Data-FINAL-Online.pdf]	Report	EdTech	Data processing
Kousa, P. & Niemi, H. (2023). Artificial Intelligence Ethics from the Perspective of Educational Technology Companies and Schools. In H. Niemi, R.D. Pea & Y. Lu (Eds), *AI in Learning: Designing the Future.* Springer, Cham. https://doi-org.ezproxy.utlib.ut.ee/10.1007/978-3-031-09687-7_17	Book chapter	AI in EdTech	Beneficence, non-maleficence, autonomy, justice, and explicability
Grimes et al (2024). *Responsible AI and Children: Insights, Implications, and Best Practices.* CIFAR & AI Insights.	Report	AI in EdTech	Privacy, data processing, data governance, responsible AI

Livingstone S. & Pothong, K. *The problem and the potential of children's education data.* (no date, accessed June 2024) [https://educationdatafutures.digitalfuturescommission.org.uk/essays/introduction/problem-potential-childrens-education-data]	Collection of essays commissioned by Digital Futures, UK	Quantity of data collected by big EdTech, commercial nature of EdTech data	Privacy
Livingstone, S., Cagiltay, K. & Ólafsson, K. (2015). EU Kids Online II Dataset: A cross-national study of children's use of the Internet and its associated opportunities and risks. *British Journal of Educational Technology,* 46(5), 988-992.	Academic journal article	Online access and Internet usage by children	Access inequities
*Marshall, R., Pardo, A., Smith, D. & Watson, T. (2022). Implementing next generation privacy and ethics research in education technology. British *Journal of Educational Technology,* 53(4), 737-755. https://doi.org/https://doi.org/10.1111/bjet.13224	Academic journal article	EdTech	Data Privacy
Parsons, T.D. (2019). Neuroethics in Educational Technology: Keeping the Brain in Mind When Developing Frameworks for Ethical Decision-Making. In T.D. Parsons, L. Lin, & D. Cockerham (Eds), *Mind, Brain and Technology. Educational Communications and Technology: Issues and Innovations.* Springer, Cham. https://doi.org/10.1007/978-3-030-02631-8_11	Book chapter	Educational neuro-technologies	Framework for ethical principles for educational technology from neuro perspective

*Peloquin, D., DiMaio, M., Bierer, B. & Barnes, M. (2020). Disruptive and avoidable: GDPR challenges to secondary research uses of data. *European Journal of Human Genetics,* 28(6), 697-705.	Academic journal article	Data	Data ownership
Policy Guidance on AI for Children (2021). UNICEF. [https://www.unicef.org/globalinsight/media/2356/file/UNICEF-Global-Insight-policy-guidance-AI-children-2.0-2021.pdf]	Report	Data and AI	Data processing
*Resnick, M. (2024). *Generative AI and Creative Learning: Concerns, Opportunities, and Choices. An MIT Exploration of Generative AI,* March. https://doi.org/10.21428/e4baedd9.cf3e35e5.	Essay	Generative AI technologies, such as ChatGPT	Learner agency, creativity, connection with others
Rodriguez-Segura, D. (2021). EdTech in Developing Countries: A Review of the Evidence. *The World Bank Research Observer,* 37(2), 171-203. https://doi.org/10.1093/wbro/lkab011	Article	EdTech	Equity issues in ethical practices of EdTech
Sallay, D. (2024). *Vetting Generative AI Tools for Use in Schools, Future of Privacy Forum*.	Policy brief	AI-driven EdTech	Privacy
*Sharples, M. (2023). Towards social generative AI for education: theory, practices and ethics. *Learning: Research and Practice,* 9(2), 159-167.	Academic journal article	Generative AI and persistent conversations	Nature of learning, conversation, truth

Sinaci, M. & Hasmaṭuchi, G. (2023). Education, Neurotechnologies, and Ethics. An overview. *Eon 4*(1) (June 6, 2023), 161-176.	Article	Educational neurotechnologies	Neurogovernance, cognitive wellbeing, discrimination, confidentiality of data
Warren, S. & Beck, D. (2023). The Ethical Choices with Educational Technology Framework. In M.J. Spector, B.B Lockee & M. D. Childress (Eds), *Learning, Design, and Technology.* Springer, Cham. https://doi.org/10.1007/978-3-319-17727-4_193-2	Book chapter	Ethical decision-making regarding choice to use EdTech	Teachers' choice and empowerment
Williamson, B. (2022) The future of datafication in education? Clouds, bodies and ethics. In L. Pangrazio & J. Sefton-Green (Eds), *Learning to Live with Datafication.* London: Routledge.https://doi.org/10.4324/9781003136842-13	Book chapter	Datafication in education	Protection of data
Yan, L., Sha, L., Zhao, L., Li, Y., Martinez-Maldonado, R., Chen, G., Li, X., Jin, Y. & Gašević, D. (2023). Practical and Ethical Challenges of Large Language Models in Education: A Systematic Literature Review. *British Journal of Educational Technology* (https://doi.org/10.1111/bjet.13370)	Academic journal article	Large Language Models in Education	Transparency, privacy, equality, beneficence
Yuste, R., Goering, S., Arcas, B. et al. Four ethical priorities for neurotechnologies and AI. *Nature* 551, 159–163 (2017). https://doi.org/10.1038/551159a	Article	Educational neurotechnologies	Privacy, consent, augmentation, bias

3.3 LAWS AND REGULATIONS

In addition to collating key academic papers, our umbrella review aggregated the key laws and regulations relevant to ethics and EdTech. This is the latest but not exhaustive list.

Several laws and regulations set rules on processing individuals' data that are highly relevant for handling students' data in EdTech context. These legal frameworks include for example FERPA (Family Educational Rights and Privacy Act), COPPA (Children's Online Privacy Protection Act), and CCPA (California Consumer Privacy Act) in the US and EU GDPR (General Data Protection Regulation) and UK Data Protection Act 2018 and UK GDPR. FERPA safeguards the privacy of student education records and grants parents rights to review them. COPPA regulates the collection of personal information from children under 13, requiring parental consent for data collection. The GDPR imposes requirements concerning the processing of personal data of individuals and setting rules for organisations that design and develop technologies that process data (including EdTech services and products). In addition to these, according to UN records (https://unctad.org/page/data-protection-and-privacy-legislation-worldwide), 128 out of 194 countries have some form of privacy legislation in place.

IEEE 2089-2021 standard for an "Age Appropriate Digital Services Framework Based on the "5Rights Principles for Children" establishes a framework for organisations to ensure that their services are age-appropriate. Rooted in the UK work of the 5Rights Foundation, the framework supports the growing trend among organisations to consider children when designing digital products and services, aligning with their rights under the United Nations Convention on the Rights of the Child (Livingstone et al., 2024). Crucially, the impact data processing can have on children's lives and rights are significant and deserve particular attention (Council of Europe 2021; UNICEF 2021). While some of the mentioned frameworks do not specifically refer to EdTech, relevant regulatory guidance documents significantly address their relevance in educational settings. The design related frameworks outline processes throughout the development, delivery, and distribution lifecycle to help organisations assess their services, identify risks and opportunities for students, fairness and age appropriateness of data and design practices, and take steps to mitigate risks while enabling students to benefit from innovation.

In addition to the robust data processing, and design-related legal frameworks such as GDPR and DSA (Digital Services Act Regulation 2022 (EU) 2022/2065), there is a significant focus on interpretation of these existing laws to address the risks that relate to the increasing use of AI systems, especially in education contexts.

Moreover, the recently enacted EU AI Act (2024) puts a specific focus on the use of AI in education and the need to protect children's rights under several provisions. This is not surprising considering that the rise of generative AI has brought about significant concerns regarding privacy and data mining, which also has led regulators worldwide to scrutinise how Generative AI (GAI) tools collect data and generate outputs, as well as how companies train their AI systems - important components of both the GDPR and the recent EU AI Act.

Notably, fairness is a key concept that we see in the existing as well as newly emerging legal frameworks that is crucial to consider in ethics discussions. For example, fairness in the GDPR is strongly linked to ethical data handling and considering both risk and benefits of data processing and what implications these have for individuals' rights.. While many discussions mostly refer to fairness as a tool to mitigate discrimination and bias, we underscore that the GDPR is more than preventing or avoiding unfairness in AI systems, it covers a more holistic and human rights respecting approach that includes but is not limited to right to non-discrimination and its design considerations have significant implications for ethical and user-centred approaches in EdTech.

In the EU specifically, recent regulatory guidance documents were published by several regulatory and supervision authorities on legal implications of use of GenAI (EDPS 2024). In data privacy related discussions, the focus is particularly on data collection practices and ensuring fairness, accountability, and transparency among other core data protection principles such as data minimisation that require companies to carefully consider why and how they process data and what impact their data practices can have on individuals.

The significant relevance of GDPR for the EdTech field has been recognised by public authorities across the globe. Especially in the EU, for example, in France, CNIL (2023) published GDPR compliance sandbox for EdTech; in the UK, the ICO (2023) published guidance for EdTech on their responsibilities for compliance with the UK GDPR. Some of the key considerations in the GDPR are particularly crucial for the AI Act and other frameworks such as the DSA which also puts significant focus on fairness, transparency, and accountability. However, given their recent enactments, there is less guidance and regulatory decisions specific to EdTech in the AI Act and DSA. These issues, including acceptable use policies and transparent data practices, are vital not only for EdTech but also for various other types of technology. For technology more broadly, we consider these legal and policy frameworks as field-defining:

INTERNATIONAL

- UNESCO (2019). *Beijing Consensus on Artificial Intelligence and Education* (https://unesdoc.unesco.org/ark:/48223/pf0000368303)
- UN General Assembly resolution promoting safe and trustworthy AI aligned with human rights (2024). (U.S.-led) (https://news.un.org/en/story/2024/03/1147831)
- UNICEF (2021). *Policy Guidance on AI for Children.* (https://www.unicef.org/globalinsight/media/2356/file/UNICEF-Global-Insight-policy-guidance-AI-children-2.0-2021.pdf)
- OECD (Organisation for Economic Co-operation and Development) (2019). *The OECD AI Principles.* (https://oecd.ai/en/ai-principles)
- World Economic Forum, *AI Governance Alliance* (launched in 2023, for "promoting the development and deployment of AI systems that are transparent, inclusive and ethically sound") (https://initiatives.weforum.org/ai-governance-alliance/home)

EUROPEAN UNION

- GDPR (2018). (https://gdpr-info.eu/)
- Digital Services Act (DSA) (2022. (https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/digital-services-act-ensuring-safe-and-accountable-online-environment_en)
- EU AI Act (2024). (https://artificialintelligenceact.eu/)
- Council of Europe (2021). Children's data protection in an education setting - guidelines.(https://edoc.coe.int/en/children-and-the-internet/9620-childrens-data-protection-in-an-education-setting-guidelines.html?&focusjump=The%20Guidelines%20on%20Children%E2%80%99s%20Data%20Protection%20in%20an%20Education)

US

- *Blueprint for an AI Bill of Rights (2022).* The White House. (http://www.whitehouse.gov/ostp/ai-bill-of-rights)

- *The Americans with Disabilities Act and the Use of Software, Algorithms, and Artificial Intelligence to Assess Job Applicants and Employees* (2022). US Equal Employment Opportunity Commission. (https://www.eeoc.gov/laws/guidance/americans-disabilities-act-and-use-software-algorithms-and-artificial-intelligence)

JAPAN

Contract Guidelines on Utilization of AI and Data (2019). The Ministry of Economy, Trade and Industry, Japan. (https://www.meti.go.jp/policy/mono_info_service/connected_industries/sharing_and_utilization/20180615001-1.pdf)

NOT-FOR-PROFIT ORGANISATIONS

- *Generative AI Regulation and Cybersecurity* (2024). The Aspen Institute (US based think tank) (https://www.aspendigital.org/report/generative-ai-regulation-and-cybersecurity/)

- *Understanding artificial intelligence, ethics and safety* (2019). David Lesley, The Alan Turing Institute (UK based). (https://www.turing.ac.uk/sites/default/files/2019-06/understanding_artificial_intelligence_ethics_and_safety.pdf)

While the above listed laws and policy frameworks predominantly focus on data and design practices of data-driven technologies (including AI systems), it is crucial to remember that to comply with the laws and translate the policy requirements into practice, there is a need for technical considerations and hence careful consideration of international technical standards. The need to adopt international standards has been suggested by emerging data protection specific compliance requirements in education data governance frameworks (Kidron et al., 2024). Notably, key principles and rules in these frameworks require EdTech companies to look beyond the legal considerations and carefully take into account how international standards can help them to adopt technical safeguards and measures that are needed for them to comply with the requirements in both legal and policy frameworks. For example, the GDPR and the UK Age Appropriate Design Code (ICO 2020) ask data controllers (also including EdTech companies) to ensure that they embed core data protection principles such as fairness into the design of technologies and ensure high privacy by design and by default standards. To comply with these requirements, international standards would significantly benefit EdTech companies. Below in Section 2.4, we list some of the key international technical standards that EdTech companies need to take into account.

3.4. TECHNICAL STANDARDS

Several ISO standards were developed for privacy and security of information technology, some directly concern EdTech and some have broader scope, we list some of the key ISO standards below:

- ISO/IEC TS 20748-4:2019(en) Information technology for learning, education and training — Learning analytics interoperability — Part 4: Privacy and data protection policies which focuses on privacy and data protection requirements and attributes to inform design of learning analytics systems and learning analytics practices in schools, universities, workplace learning and blended learning settings.
- ISO 31700-1:2023(en) Consumer protection — Privacy by design for consumer goods and services — Part 1: High-level requirements which sets out high-level requirements for privacy by design to protect privacy throughout the lifecycle of a consumer product, including data processed by the consumer.
- ISO/TR 31700-2:2023(en) Consumer protection — Privacy by design for consumer goods and services — Part 2: Use cases, which gives examples of use cases, with associated analysis, chosen to assist in understanding the requirements of 31700-1 that is given above.
- ISO/IEC TR 27563:2023(en) Security and privacy in artificial intelligence use cases — Best practices, which provides best practices on assessing security and privacy in artificial intelligence use cases, covering also particularly those published in ISO/IEC TR 24030. It addresses an overall assessment of security and privacy on the AI system of interest; security and privacy concerns; security and privacy risks; security and privacy controls; security and privacy assurance; and security and privacy plans.
- ISO/IEC 24751-1:2008(en) Information technology — Individualised adaptability and accessibility in e-learning, education and training — Part 1: Framework and reference models, which provides a framework to define learner needs and preferences and describe corresponding digital learning resources and aiming to ensure that individual learner preferences are matched with suitable user interface tools and learning resources.
- ISO/IEC 23127-1:2021 Information technology — Learning, education, and training — Metadata for facilitators of online learning —

Part 1: Framework specifies a metadata structure to store, present and exchange online learning facilitator (OLF) information by specifying the data elements and their attributes to describe facilitator's information on various kinds of online education platforms. Notably, for metadata with privacy, the ISO notes that the application profile in ISO/IEC 19788-1 can be used to tag data elements concerning privacy and define them with conditions.

- ISO/IEC 29140:2021(en) Information technology for learning, education and training - Nomadicity and mobile technologies
- ISO Putting the real world back into online education (https://www.iso.org/news/ref2589.html)
- ISO/IEC TR 24368:2022(en) Information technology — Artificial intelligence — Overview of ethical and societal concerns
- ISO/IEC JTC 1/SC 42 - Artificial Intelligence
- ISO/IEC 27032: 2012(E). Information Technology – Security Techniques – Guidelines for Cybersecurity
- ISO/IEC 27010:2015 Information Technology – Security Techniques – Information Security Management for Inter-Sector and Interorganizational Communications.
- ISO/TR 29996:2024 - Education and learning services — Distance and digital learning services (DDLS) — Case studies
- ISO/IEC 42001:2023 - Artificial intelligence — Management system, ISO/IEC 42001 is an international standard outlining requirements for establishing, implementing, maintaining, and improving an Artificial Intelligence Management System (AIMS) in organisations. It ensures responsible AI development and use for entities providing or utilising AI products or services. As the first global AI management system standard, ISO/IEC 42001 offers essential guidance for the rapidly evolving AI field. It addresses AI's unique challenges, including ethical considerations, transparency, and continuous learning. For organisations, it provides a structured approach to managing AI-related risks and opportunities, balancing innovation with governance.
- ISO/IEC 23894:2023 - Information technology — Artificial intelligence — Guidance on risk management
- ISO/IEC 23053:2022 - Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)
- ISO/IEC 22989 - AI concepts and terminology and ISO/IEC 42001 - AI management systems.

In addition to the above standards, it is also critical to consider several standards and technical considerations in relation to AI and ethics by further looking into existing and currently under development stage standards that are provided in ISO's considerations under ISO *Tech Risks* (ISO, 2024), especially within the remits of technical committees on AI (ISO/IEC JTC 1/SC 42) and information technology (ISO/IEC JTC 1).

3.5. LEADING ETHICS FRAMEWORKS

In addition to the literature review above (sections 2.2 to 2.4) we also considered the leading policy and regulatory ethics frameworks recommendations available globally. These included (in no particular order):

1. **OECD's Recommendation of the Council on Artificial Intelligence** (2019, amended 2024, OECD Legal Instruments, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449). The OECD AI Principles, adopted in 2019, were updated in 2024 to ensure they remain robust and fit for purpose. They support the development of trustworthy AI providing policymakers with recommendations for effective AI policies, including building a foundation for global interoperability between jurisdictions. The principles are based on values of inclusive growth, sustainable development and well-being; human rights and democratic values, including fairness and privacy; transparency and explainability; robustness, security and safety; and accountability. Recommendations for policy makers include guidance on investing in AI research and development, fostering an inclusive AI-enabling ecosystem, shaping an enabling interoperable governance and policy environment for AI, building human capacity and preparing for labour market transition, and international co-operation for trustworthy AI.

2. U.S. National Institute of Standards and Technology's (NIST) **AI Risk Management Framework** (AI RMF) (https://www.nist.gov/itl/ai-risk-management-framework) is a comprehensive guideline designed to help organisations manage the risks associated with artificial intelligence. Released on April 29, 2024, it specifically addresses the risks of Generative AI. The framework aids organisations in identifying and mitigating unique AI risks through a structured approach.

3. **UNESCO Ethical Impact Assessment** (Ethical impact assessment: a tool of the Recommendation on the Ethics of Artificial Intelligence - UNESCO Digital Library) is a tool designed to evaluate the alignment of specific algorithms with the principles set by the recommendation and ensure transparency in AI system development. The ethical impact assessments aim to address increasing focus and need to conduct impact assessments in the regulations such as the EU AI Act which mandates impact assessments for high-risk systems and proposed in the Council of Europe's AI Convention discussions. The UNESCO Recommendation considers the entire AI lifecycle, with the EIA including both ex-ante and ex-post requirements. It emphasises quality data, team diversity, algorithm robustness, transparency, auditability, and development checkpoints.

4. The **SAFE Framework** (https://www.edsafeai.org/safe) was developed in 2021 by the Edsafe AI Alliance by combining 24 global AI safety, trust and market frameworks. It focuses on 1) safety (data protection and cybersecurity); 2) accountability (involves collaboratively setting benchmarks with diverse stakeholders, ensuring standards that align with policies and address educational needs transparently); 3) fairness (includes transparency particularly in the procurement of materials produced by AI outputs) and 4) efficacy (includes focus on educational outcomes).

   While these frameworks are important, they demonstrate considerable variation in how they approach ethics and EdTech and the extent to which they incorporate insights from academic literature, existing legal and technical standards. Our literature review confirmed the need for a synthesis of the available frameworks with the specific attention to ethics and EdTech.

4. SYNTHESISED INSIGHTS FROM THE UMBRELLA REVIEW

Our review of the academic literature, technical and legal standards reveals a central focus on broader ethical issues surrounding children's rights and human rights perspectives, including agency, privacy, and democracy, alongside principles of ethical conduct such as transparency, accountability, and fairness. These ethical considerations take on critical importance with EdTech in that they involve ensuring the protection of children's privacy balanced up with access to diverse content, empowering children with agency while providing automatically personalised content, and fostering democratic access to educational resources, while safeguarding market innovation.
Three conceptual themes govern these considerations:

1. **Transparency** emerges as crucial, demanding clear disclosure of how EdTech operates and handles data.

2. **Accountability** requires that EdTech providers are held responsible for the ethical implications of their innovations on children's learning and well-being.

3. **Fairness** dictates the equitable distribution of educational opportunities through technology, addressing potential biases or disparities. Fairness in data processing is about treating students and their data fairly, prioritising their best interests.

These ethical imperatives underscore the need for conscientious design and implementation of EdTech solutions that not only enrich educational experiences but also uphold fundamental rights and ethical standards. Reflecting on these conceptual themes, we further analysed the literature with a focus on the relationship between ethical questions and the EdTech industry.

In selecting the criteria to be consolidated for an international benchmark specific for the EdTech industry, we have integrated insights from the academic literature, technical, legal and summary frameworks that respond to the three key questions of ethics. This conceptual analysis was guided by the three questions that we set out at the outset of our aims with this report:

- **What** ethical challenges regarding EdTech and children have been identified?

- **Who** is responsible for addressing these challenges?

- **How** can the challenges be addressed or overcome to support children's learning, wellbeing, and education? In which ways could positive examples of Ethics in EdTech incentivise the EdTech industry to benefit all learners?

4.1. KEY ETHICAL CHALLENGES REGARDING EDTECH AND CHILDREN

One notable finding arising from the literature review is the significant overlap between equity and ethics in EdTech. This raises questions about whether certain practices favour certain groups of students while overlooking disadvantaged, historically marginalised ones, and the extent to which equity is a central consideration in ethical design.

Two thought leadership pieces by Resnick (2024)and Sharples (2024) touch on the theme of student agency in contemplating the ethical implications of generative AI for education. The opportunities mirror the concerns in, for example, supporting human connections or creativity and providing choices (and by extension supporting learner agency).

As for data governance, a key challenge is the lack of ethical approvals for data repurposing: the research reveals a concerning lack of prior ethical approvals for repurposing data, defined as secondary usage (Peloquin et al., 2020), captured by EdTech providers, with limited evaluation of EdTech's ethical data practices. Hillman (2021), in her US based study, raises concerns about data governance as well. She points to a particular problem of schools not being able to fully control their students' data due to various loopholes in the legal system and highlights that in practice no clear ethical review procedures for EdTech providers are in place. Moreover, it is apparent that parents/guardians, despite "the breadth and depth of data collection" (Hillman, 2021), are generally unaware of the data transactions that happen between the various stakeholders, e.g., districts and EdTech providers. Adopting the social-structural lens, Hillman (2021) asks broader questions in relation to data collection needs and practice in education.

In addition to inadequate data governance, Hillman (2021) further discusses the ethical considerations surrounding EdTech interoperability. While it is fundamentally a commendable effort, the current trend in the US has led to the development of data pipelines across districts and states, fostering a new perspective on education that aligns more closely with workforce market needs. Similarly, in the UK, there is a vision for aligning learner and workforce data (DfE, 2021). Data interoperability enhances the visibility of teaching and learning processes and provides an opportunity to tailor learning to students' needs. However, interoperability also raises ethical concerns, according to Hillman (2021), who worries that “students will be pushed aside as reactive participants”.

Insufficient resources and expertise in schools are a challenge : not all schools have the expertise and resources to hold EdTech providers accountable for data processing, and providers have considerable freedom in interpreting legal frameworks. Day and colleagues (2022), while considering the UK context, point to the insufficient expertise and/or resources in schools, and the limited mechanisms at their disposal “to hold EdTech providers accountable for processing children’s data” on one hand and EdTech providers on the other, who have considerable latitude in interpreting the current legal framework. Day and colleagues (2022) issue a call primarily aimed at policy makers “to systematically enforce data protection laws”, while also encouraging EdTech industry “to raise standards regarding both the proven educational benefits of EdTech and their compliance with data protection laws”.

There is a consensus in the literature that we reviewed that to uphold ethical standards in EdTech, there is a need for systematic enforcement of Data Protection Laws. This was highlighted by Marshall and colleagues (2022), who offer an example of a collaborative research project that addresses the technical and procedural challenges of running a data-driven project within an agreed set of privacy and ethics boundaries. The authors point to the importance of extending ‘Privacy by design’ to ‘Privacy by design and default’ (data protection by design and by default a GDPR requirement) by drawing on the example of a reference architecture for ethical research collaboration and a framework for privacy-preserving analytics.

International variation is not helpful in this regard: for instance in the UK, assessments primarily focus on data privacy impact, while in Australia, evaluations encompass security, privacy, interoperability, and online safety. Despite legal frameworks like GDPR, COPPA and FERPA governing data usage, repurposing collected data remains ambiguous, leading to concerns about unauthorised research and data misuse. The absence of ethical reviews and clear conditions exacerbates the challenge, raising questions about transparency and data literacy within education data governance frameworks.

The review of literature on big data underscores the challenge of transparency and accountability in its utilisation within education. The development of advanced digital infrastructures and personal computing technologies, combined with the abundance of data and advancements in big data practices and algorithms, has enabled the integration of AI in education. Over the past decade, AI tools, including predictive and diagnostic learning analytics, have gained prominence, alongside widespread adoption of digital transformation strategies (Luckin et al., 2016). The authors of the reviewed papers focused on transparency and AI integration stress the necessity of clear guidelines governing data collection, analysis, and utilisation to inform instructional decisions.

In the context of ethics, as proposed by Khosravi and colleagues (2023), AI-powered educational systems need to consider fairness, accountability, explainability, safety, and interpretability, i.e. aspects which are all closely related to system transparency. However, it is important to note that what might be considered transparent for one person, might be a black box for another. Hence, as “a transparent product development pipeline for an AI practitioner might be a complete black box for an end-user like an educator who is not a tech expert but is impacted by that product”. Connecting to this topic, Chaudry, Cukurova and Luckin (2022, p. 1) have proposed a ‘Transparency Index Framework’ covering the whole AI product development timeline for the EdTech. Put simply, it is crucial that users are included in developing meaningful and impactful educational technologies (Khosravi et al., 2022) and the lack of this inclusion as standard practice is a key challenge.

Other issues apparent in AI and tech include ownership of data collection, and relatedly, agency (Kousa & Niemi, 2023). Furthermore, privacy, moral responsibility, and justification of machine-based decisions, amongst many,

were identified as challenges by Kousa and Niemi (2023). In their study, Kousa and Niemi (2023) found four main themes regarding companies conceptions about ethical AI-related challenges: 1) inequalities in human learning, 2) lack of ability to judge societal consequences, 3) ambivalence of laws and rules, and 4) ethical dilemmas in Machine Learning. Large-language models (LLMs) based innovations, which are also increasingly used in education, also reveal different ethical challenges, including concerns about beneficence, privacy, and accessibility of stakeholders from different backgrounds (Ferguson et al., 2016).

4.2. WHO IS RESPONSIBLE?

Views on who is responsible for addressing ethical challenges in EdTech use in classrooms vary, with different emphasises placed on various stakeholders by different authors. What is crucial to understand is the specific roles and responsibilities of each stakeholder in addressing ethical considerations. Collaboration and shared responsibility among educators, students, parents, administrators, technology developers, and policymakers are essential to ensure ethical practices in EdTech.

At the same time, as noted by others (e.g., Morley et al., 2020), most of the guidelines developed about the ethical use of AI, tend to focus on naming the ethical challenges that exist, rather than what actions are crucial to be undertaken to ensure ethical goals are met in practice.

Many authors shift the responsibility for addressing ethical challenges in EdTech to the accountability of the industry itself, departing from the ecosystem view and placing the onus solely on the vendors. For a sector, where one of its major players, Google, publicly stated *Do no evil*, with actions often contradicting itself, it can be easy to place blame solely on vendors. Indeed, the EdTech vendors are often portrayed as intentional violators of ethical practices, especially regarding data collection, given that there have been several cases of companies misusing data for commercial purposes. It is challenging to determine the extent to which the lack of ethical practices is due to ignorance, lack of guidance, or deliberate action. The literature suggests that EdTech companies are aware of their ethical challenges (Kousa & Niemi, 2023) and that cultural differences in regulation play a role; for example, the U.S. government allows industry self-regulation of personal data,

whereas the European market favours formal legal regulation (Bowie & Jamal, 2006). In Nordic countries, where teachers' autonomy is high, some suggested the responsibility of schools in addressing the ethical challenges.

For example, Gardelli (2016) doctoral thesis examined ethics in the Swedish educational system, with attention to technology and distinguished between three approaches: descriptive ethics, value transmission, and inquiry ethics. Gardelli (2016) found a complex role of ethics in the curriculum, with the inquiry ethics approach being most prevalent but rarely implemented. The inquiry ethics approach advocates for schools to instruct students in rationalising and critically analysing ethical matters, and encouraging ethical exploration by the students. The Swedish students' moral reasoning on technology choices highlighted conflicts with curriculum values, suggesting that schools should be more explicit and intentional about the ethical issues connected to technology.

Needless to say, there are several ethical challenges and different stakeholders are responsible for addressing their different aspects.

4.3. INCENTIVISING GOOD USE

Overall, there are three key themes that the reviewed literature and reports cluster around:

1. data governance and the ethical issues of fairness;

2. inclusivity, privacy, security, and data protection;

3. algorithms and ethical issues of democracy.

Mishra (2023) conducted a literature review and web scraping of Reddit comments prior to June 10, 2022, to explore ethical concerns within the EdTech industry. The study aimed to support the creation of a responsible EdTech ecosystem through three key initiatives: the development of a website to sustain ethical practices, the creation of an automatic privacy policy analyzer for parents and educators, and an analysis focused on the structure of EdTech products and systems rather than their content. Mishra's (2023) efforts reflect the recurring theme in the literature surrounding the positive use of AI in EdTech.

Figure 2 captures the model of Trustworthy AI: Human agency and oversight, Technical robustness and safety, Privacy and data governance, Transparency, Diversity, non-discrimination and fairness, Societal and environmental wellbeing and Accountability. These requirements stand on the pillars of robustness, lawfulness, and ethics, which, all together, are under the umbrella of Trustworthy AI.

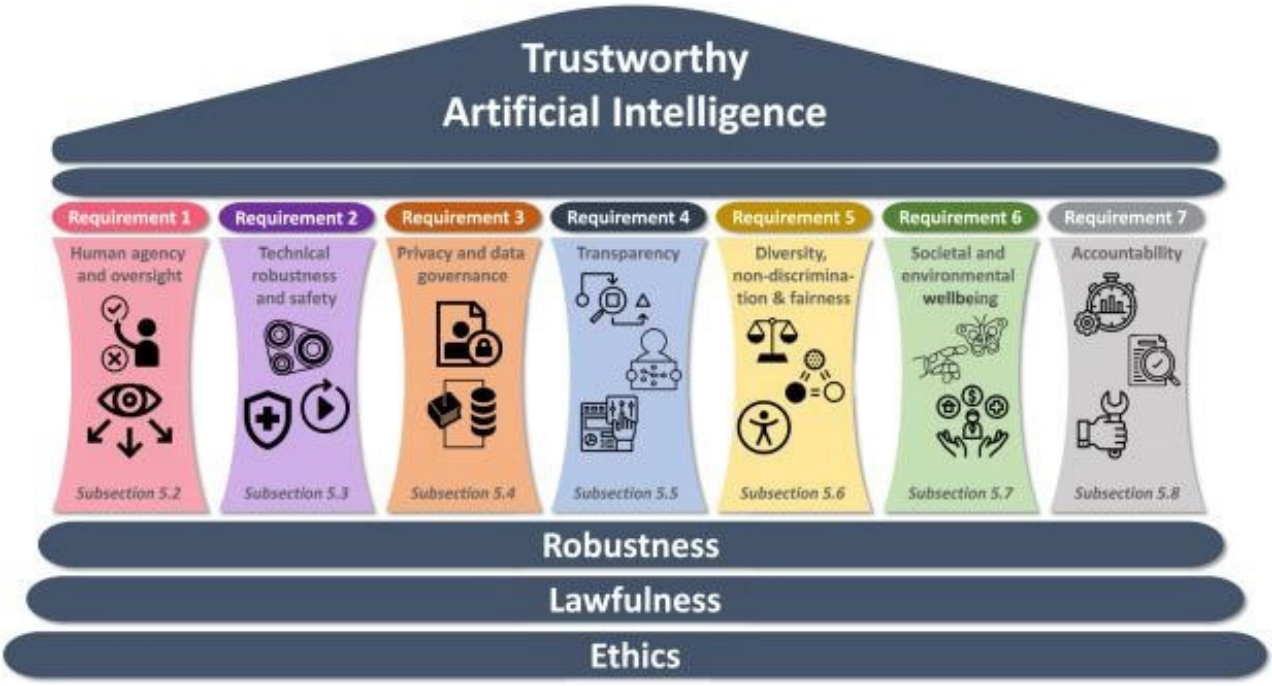

Figure 2. European Commission High-Level Expert Group on AI C. Ethics guidelines for trustworthy AI (reproduced from Cannarsa, 2021).

AI-relevant frameworks specifically developed for EdTech are, to the best of our knowledge, currently in the process of development. The EU is in the process of developing a common evaluation framework that centres human dignity and safe AI practices (https://www.coe.int/en/web/education/-/developing-a-common-european-evaluation-framework-to-assess-educational-technologies). Similarly, there is Australian Framework for Generative Artificial Intelligence (AI) in Schools (https://www.education.gov.au/schooling/resources/australian-framework-generative-artificial-intelligence-ai-schools). From within academic research, Chaudhry, Cukurova and Luckin (2022) proposed the 'Transparency Index Framework for AI in Education' (https://link.springer.com/chapter/10.1007/978-3-031-11647-6_33).

Appendix 2 in the Accountability Report 2.0 by the Internet Commission (https://www.inetco.org/reports-and-data/accountability-report-2) proposes an Evaluation Framework for Digital Responsibility, outlining question concerning organisation, people, and governance, including options covering content moderation, automation, and safety. Although focused on Internet governance rather than EdTech specifically, it suggests criteria that can be embedded into future standards or certifications, including a set of indicators for evaluating current solutions.

5. EMERGING EDTECH ETHICAL STANDARDS

At the EdTech product level, compliance with the regulations and laws in a given country regarding data governance is expected. The key indicators include compliance with national legally binding regulations, such as GDPR if the product is to be used by EU residents, or COPPA if the product gathers personal information from children under 13 residing in the US. In the UK specifically, the voluntary ICO 'Age Appropriate Design' Code of practice for online services is aimed at all online services that children use, or may potentially use. As ICO explains "For all the benefits the digital economy can offer children, we are not currently creating a safe space for them to learn, explore and play. This statutory code of practice looks to change that, not by seeking to protect children from the digital world, but by protecting them within it." (https://ico.org.uk/for-organisations/uk-gdpr-guidance-and-resources/childrens-information/childrens-code-guidance-and-resources/age-appropriate-design-a-code-of-practice-for-online-services/). In the EU context, Council of Europe, the Committee of Ministers, have issued a set of recommendations 'Guidelines to respect, protect and fulfil the rights of the child in the digital Environment' (CM/Rec(2018)).

In addition to these legally enforceable instruments, a number of frameworks provide more specific guidance, evaluation and monitoring. The 'Ranking Digital Rights' framework (https://rankingdigitalrights.org/) "advances corporate accountability for human rights in the digital age" and they monitor and evaluate large corporate organisations based on numerous criteria that are organised thematically around governance, freedom of expression, and privacy. The adherence to these frameworks and other recommendations can be, to some extent, verified by established certifications awarded to EdTech, including 1EdTech Data Privacy (https://www.1edtech.org/standards/data-privacy),

iKeepSAFE COPPA Safe Harbor (https://ikeepsafe.org/certification/coppa/), FERPA certification (certified by iKeepSafe) and Common Sense Media Privacy certification (https://privacy.commonsense.org/). Another notable example of an emerging framework is 'IEEE Standard for an Age Appropriate Digital Services Framework' based on the 5Rights Principles for Children (IEEE, 2021) (https://standards.ieee.org/ieee/2089/7633/).

These above examples serve as compliance checks in our nomenclature to set the minimal standards that need to be in place to avoid harm. Beyond these, at the desirable level, design-related requirements centre on interoperability and access in EdTech. Corresponding certifications include 1EdTech interoperability standards (https://www.1edtech.org/specifications), Project Unicorn Interoperability certification (https://www.projectunicorn.org/interoperability-certification), CAST Universal Design for Learning certification, or Ed-Fi Alliance interoperability resources (https://www.ed-fi.org/data-interoperability-research-and-resources/).

Furthermore, although not with a certification, the ISO 42001 standard outlines requirements for an Artificial Intelligence Management System (AIMS), promoting responsible development and use of AI, emphasising ethics, transparency, and continuous learning. It is tailored for organisations offering AI-based technologies or using AI sub-processors, guiding them in establishing, implementing, maintaining, and enhancing an AIMS (https://www.iso.org/standard/81230.html).

Academic research suggests that EdTech companies are aware of their ethical obligations and challenges (Kousa & Niemi, 2023) and the industry should be informed and adopt widely held standards to, at the very least, show their awareness and understanding of why ethics matter to their practice and modus operandi.

5.1 ASPIRATIONAL ETHICAL BENCHMARKS

As highlighted in the literature, a myriad of standards, propositions, recommendations, and ethical principles exist for EdTech providers to choose from, each with its own stance, philosophical approach, and focus. Direct comparison or enumeration of these standards proves challenging due to their inherent diversity.

To synthesise these diverse perspectives into cohesive benchmarks, we distinguish between **technical standards** that can be addressed through EdTech design and guidance that pertains to the **ethical use** of EdTech, necessitating adherence from users such as teachers, parents, and learners.

Crucially, we delineate between **minimum quality standards** mandated by law, which are non-negotiable prerequisites, and **desirable ethical benchmarks**, which can be categorised into levels of desirability, goodness, and exceptional quality. Notably, achieving the desirable level presupposes compliance with these foundational minimum standards.

Questions for providers to ask focus on the identified three key themes of (1) data governance and the ethical issues of fairness, including data ownership, (2) inclusivity, privacy, security, and data protection, and (3) algorithms and the ethical issues of democracy. These questions are deliberately phrased as **aspirational**. They should be only considered after the EdTech providers have demonstrated how they meet the minimal ethical standards, as required by international and national law and regulation (e.g. GDPR, avoidance of misuse of data or commercial use of data).

To illustrate the difference between the minimal standards (quality assurance) and the desirable aspects (our Level 1-Level 3 questions), please see Figure 3.

Figure 3. Reproduced from: www.edtechimpactproject.no

The Figure shows that minimal quality criteria, in the form of standards for technology companies, and guidance, for EdTech users, need to be met before considering

We outline the EdTech ethical benchmarks at three levels and in the form of questions to the EdTech industry. These questions should be asked by decision-makers, procurement teams, practitioners and other stakeholders responsible for EdTech access and adoption. We ranked the questions at three levels of good, desirable and exceptional: good practices can generate desirable results that can become exceptional over time, see Table 2.

Table 2. Criteria and indicators of good (Level 1), desirable (Level 2) and exceptional (Level 3) practices

	Level 1 (good)	**Level 2 (desirable)**	**Level 3 (exceptional)**
Data governance and fairness	Is student data collected and stored securely in compliance with national and relevant international data protection regulations? What policies do you have in place in relation to the ownership of the collected data?	Have you considered how your data handling may affect end-users (both benefits and risks associated with data handling)? What specific steps have you taken to ensure robust data security measures that align with international data protection standards to safeguard student data from unauthorised access and misuse?	Can you provide a detailed overview of your data governance framework, including how you address fair stakeholder engagement in the continuous evaluation and improvement of your EdTech product? Can you provide an overview on how end-users are informed about their data rights and whether they are given meaningful control over how you handle their data?

	Do you have a publicly accessible statement in “plain language” that explains your data governance practices to your end users (including children)?	How do you clarify and uphold ownership rights over collected data for schools and parents, to ensure that your EdTech product/ approach mitigates bias that could unfairly disadvantage any group of students?	
Accessibility and interoperability	Does your EdTech solution ensure accessibility for students with special needs in K-12 settings and interoperability with at least one EdTech solution used in the same classroom/ educational environment of the target user?	How does your EdTech solution ensure interoperability with existing educational technologies and systems commonly used in K-12 environments in your context?	Can you describe the specific accessibility features and standards adhered to in the design of your EdTech solution for K-12 education? Additionally, how does your solution address interoperabili-ty challenges to facilitate smooth integration with existing educational infrastructure?

Inclusivity, privacy, security and data protection	How does your company ensure that your EdTech solution promotes inclusivity for diverse learners, including those from marginalised communities, while adhering to privacy regulations? Could you provide an example of how this is implemented?	Can you provide specific examples of the measures your company has implemented to ensure that user data collected by your EdTech solution complies with relevant privacy regulations? Do you only handle people's data in ways they would reasonably expect? Do you ensure that you don't deceive or mislead people when you collect their personal data?	In regions with differing regulatory environments and cultural norms, how does your company navigate the intersectiona-lity of privacy, security, and inclusivity concerns in your EdTech solution? Please provide examples of how you have addressed these challenges while complying with regulations.
Algorithmic justice - for EdTech companies that include the use of AI (referred here as AI solutions)	How does your company ensure that the algorithms used in your AI solutions uphold democratic values and principles while complying with regulations such as the EU AI Act and/ or other relevant legislation? Could you provide an example of how this is implemented?	Can you outline the steps your company takes to address the ethical implications of algorithms' use on democratic processes, particularly in light of generative AI regulations such as those outlined in the EU AI Act?	How does your company ensure that the algorithms used in your AI solutions uphold democratic values and mitigate potential risks to democratic processes, as outlined in regulations

		Please provide an example of how these steps are integrated into your AI development and deployment practices.	such as the EU AI Act? Could you provide detailed insights into your algorithm development and deployment processes, including mechanisms for fairness, transparency, accountability, and stakeholder engagement in ensuring ethical AI use?

5.2 IMPLICATIONS FOR THE INDUSTRY, RESEARCHERS AND POLICY-MAKERS

Implications for the EdTech industry

- Ensuring **robust data protection and security** measures that meet international standards is crucial to address concerns about unfair data processing, unauthorised access and misuse of student data, including addressing unfair data practices such as using data in ways students' would not expect or against their best interests.
- Clarifying **ownership** rights and implementing transparent **consent processes** are essential steps to mitigate ethical issues surrounding data ownership and control within EdTech platforms.
- Engaging actively with end users, especially children, through **co-design** is important to enhance transparency and accountability in data governance practices and represents an opportunity to build trust and drive ethical ambitions in the EdTech sector.

Implications for researchers in EdTech and ethics

- There is currently a lack of empirical studies that explore students' views, opinions, and practices about the use of EdTech in educational institutions, not to mention ethical aspects of EdTech. Future studies should thus aim to capture students' voices, so that the overall discourse would not be dominated by adults.
- Researchers could take the leading role in offering evidence-based objective ethical guidelines (in comparison to industry-led guidelines) for the EdTech companies, as well as guidelines that educational institutions could rely upon in their daily work.

Implications for policy-makers

- There is a need for policy responses to help to open up the "black box": a request for the algorithms to be available for inspection by independent third party reviewers who help to assess the validity and utility of the EdTech products and technologies prior to their uptake.
- To advance the ethical understanding and practice in EdTech, governments should invest in developing public knowledge, general AI and data literacies as well as ethics literacy of teachers, parents, students, i.e. the general public.

6. CONCLUSION

This report represents a pioneering effort in proposing **aspirational ethical benchmarks for EdTech** aimed at enhancing children's learning in an ethical manner. These benchmarks are intended as principles for national policy-makers, international agencies, and certification bodies to consider as they consider the development of national certification schemes and quality assurance mechanisms for EdTech used in schools. They are also intended to open the space for dialogue for all involved stakeholders. The benchmarks have been derived from extensive research, encompassing academic and grey literature, as well as synthesis of legal and regulatory frameworks. Discussions among us, researchers, have also played a crucial role in shaping these principles.

Moving forward, we advocate for the direct implementation of these principles and collaboration with industry stakeholders to refine them further. In particular, specific examples from successful EdTech solutions that meet these criteria will be instrumental in demonstrating practical applications. This iterative process might then establish the benchmarks as desirable aspirational standards within the EdTech field.

In conclusion, we advocate for a **more intentional ethical approach to EdTech**, including standards for auditing AI systems and robust ethical codes with rigorous oversight and accountability mechanisms (Campolo et al., 2017). Transparency regarding responsibility issues is crucial; users must clearly understand the responsibilities of both tech vendors and themselves. Continuous risk analysis and the development of ethical checklists are necessary to proactively mitigate potential harms associated with EdTech implementations.

In navigating these challenges, fostering collaboration between stakeholders will be pivotal in shaping the aspirational principles that re-envision EdTech as an industry that never does harm, prioritise students' best interests in data and design practices and always prioritises ethics.

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