Children's Rights in Online Environments with Social Robots: The use case study of CORP: A Collaborative Online Robotics Platform

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ABSTRACT

This paper addresses a system's vulnerability, in terms of data protection, privacy, liability, autonomy, etc., of a Google Slides technology that allows the interaction between remote learners, facilitators, and social robots by sharing a google-cloud environment to learn STEM and SEL learning skills. After describing the platform's technical aspects and how the multiple actors operate it, we realized an analysis of the children's correct principles from each participant's role. Then, we expose the ethical and legal challenge that emerges from this context, proposing a compliant process that could enhance the potential applications to address the legal and technical challenges in the human-robot interaction. Finally, we are covering the context of data protection and intellectual property rights involved during the activities' flow. Through a use case study, we generalize the needs to harmonize legislative and ethical frameworks in children/adult-robot interaction in a more general perspective.

KEYWORDS

Children-Robot Interaction, Privacy, Data protection, Ethics, Human Rights, Social Robots

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1 INTRODUCTION

When COVID-19 impacted the world, the use of platforms for distance interaction increased dramatically. Some of the platforms that there were used sporadically in different domains such as education or health, became part of our regular medium of interaction between people.

A disruption of the channels of communication is a reality, and the boundaries about people's rights in this new environment need to be clarified to ensure that there is no physical or emotional harm, that there is no leaks in data protection and privacy, that society is empowered by a fair resources of technology.

The Center for Engineering Education at Outreach at Tufts has developed a Collaborative Online Robotics Platform (CORP), that interconnect students from multiple connections through google cloud services, to combine LEGO Robots-based [1] activities related to science, technology, engineering and mathematics (STEM) skills, with social emotional learning (SEL) skills: self- management (goal setting and following instructions), relationship building (communication and cooperation), social awareness (turn-taking and appreciating diversity), self-awareness (confidence and efficacy), and responsible decision- making (problem-solving).

As we can see in Fig. 1, students interact between them and with the robot using shared Google resources such as Google Slides, Google Meet, etc.

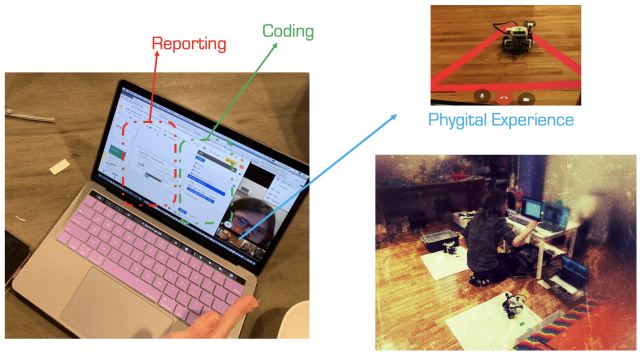

Figure 1: Layout of the CORP Environment

In order to enhance the social engagement, and target other learning contents, we have integrated the QT Robot by LuxAI into the system [2]. So we are moving interacting with a Robotics device as a learning tool, to a Robotic Social Agent that has the two roles: learning tool and social classmate.

In Fig. 2 we can see the environment of interaction between the different social agents.

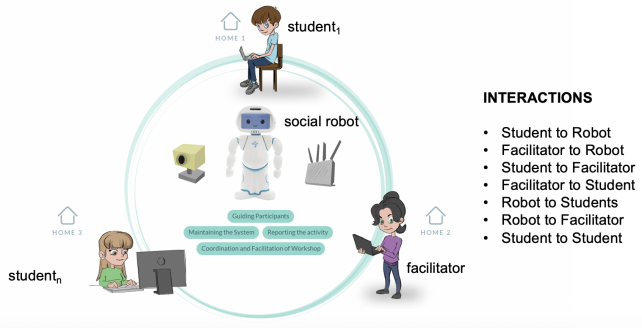

Figure 2: Schematic of Interactions

A significant difference between the previous system based on LEGO robots and the new system with the social robot is that, while the LEGO robot was running instructions and scripts sent by the students or the facilitator, the QTRobot is executing not only those types of scripts but also autonomous pre-programmed prompts to enhance and facilitate the engagement tasks of the facilitator. This creates a blur situation about being autonomous versus being remote controlled.

In this paper we want to bring a first approach to the challenges that this disruptive solution can generate, and what considerations, recommendations, and processes we have to follow in order to preserve user's rights. In particular, we identify four main roles in the human-robot interaction ecosystem: children, included between 7 and 14 years-old students; their parents/caregivers; facilitators/teachers. The system-designer/developers, indeed, shall address the ethical-legal-societal challenges.

2 DESCRIPTION OF THE PLATFORM

The platform is a cloud web-based environment that allows several users to conduct activities remotely at the same time controlling remote robots over the Internet using Google Slides. That context allows to develop two possible scenarios depending on where is located the students and the robot in the space.

Google Slides is a free cloud-based presentation application offered by Google. It is integrated on the G Suite platform (office productivity suite, Google Apps) within Google Drive. It provides a web-based environment accessible without any installation of any software previously, only a device with internet connection, a browser and a Google account are required. So, it makes easy and simple to use, as well as its compatibility with different devices as computer or tablet. [3–6]

Google Slides + LEGO MINDSTORMS EV3 or other robots, is a web-based environment which there is not needed to download or configure a code editor or transport development files from/to computers. It has been developed using the editor add-ons, one of the two types to extend Google Applications. Editor add-ons let to bound a script to Google Slides file to build an interface, in this case, an add-on menu created using Apps Script's base Ui service with different items that provide an initial starting point on the front tool bar on Google Slides application.

The system requires to have internet connection, a web browser and a gmail account. In the context of the robot manager role, the internet system needs to forward the port to each robot to be sure that the communication between the users and the robot is feasible. Each user has to personalize gmail account features, according to the given Terms and Conditions and privacy policy.

3 PRINCIPLES RELATED TO CHILDREN'S RIGHTS

In [7], authors already identified that there is a gap between the understanding of principles involving robots. For example, Within the EU legislative initiatives, the White Paper On Artificial Intelligence - A European approach to excellence and trust, published in February 2020,included a Report on the safety and liability implications of Artificial Intelligence, the Internet of Things and robotics, that addresses in terms of soft law regulation the ethical-legal-societal implications of robotics on Fundamental Rights[21]. In July 2020, the High Level Group on AI established by the EU Commission provided a general check-list to assess a given technology, under seven requirements, the so-called Assessment List on Trustworthy Artificial Intelligence (ALTAI) [8]. Although they provided guidelines, aiming at assessing lawfulness, ethics, and robustness of a given technology, there is a missing space related to humans and robots' social interaction [9]. And this gap is magnified if we consider the remote interaction conditions plus the fact that there are minors involved. In fact, children are per se vulnerable groups, but their vulnerabilities might be considered as multi-level ones according to age, education, socio-economics conditions, individual maturity, personal attitudes, etc. In this regard, UNICEF has recently published a Policy Guidance on AI for Children[10] identifying ten requirements of a children-centred AI. In particular, AI-based technologies shall support children's development and well-being, ensuring inclusion of and for children, prioritize fairness

and non-discrimination, protect their data and privacy, as well as their safety. Under the technical viewpoint,therefore, AI-developers shall provide evidence of a transparent, explainable, and accountable approach in order to create an enabling a safe environment. Thus, an ethical-legal compliant approach for the proposed applications shall adopt a child-friendly approach aimed at identifying the technical and technological measures required to achieve the highest level of safety and security for the end-users fundamental rights' protection[20]. In addition, the ecosystem shall be tested and then put in the market providing the organizational measures required to mitigate risks and at the same time promote children's enhancement with the interface. The table below presents possible principles to assess the proposed platform under the Children's rights perspective and under the other requirements developed for AI tools and robotics in order to identify who is responsible to address the given ethical-legal issue. This methodological exercise is useful either to highlight the technical and organizational measures to be implemented for a trustworthy ecosystem where minors interact with social robots in a web-based application or to identify the regulatory challenges to be still identified to promote by design and by default a children-oriented innovation approach.

At Table 1 we present a set of principles and its concreteness based on [7] where roles are: D= developer; P= parents/caregivers PP=policy makers/authorities F=facilitator/teacher. Combining the principles framing the human-robot interaction, with a RAM (responsibility assignment matrix - commonly applied as a risk-management strategy), and the possible stakeholders that shall protect children as final end-users, we identify - in terms of impact assessment of the AI-based ecosystem - who shall be responsible to take decisions in the best interests of the children.

Therefore, on the basis of the experience in the development of the described ecosystem, we consider that Parents/Caregivers could play an essential role to protect children under the ground of their safety (especially if the system is used at home), their autonomy (considering their duties to educate and care), and avoid them to self-isolation attitudes (by supporting children's use of the interface) as well as any following monitoring by adults. In this regard, developers are responsible to design a compliant and trustworthy technology. While teachers and facilitators have the same responsibilities of the parents/caregivers within their specific educational context/role. Finally, it is up to policy makers to encourage a fair and transparent use of these technologies.

Table 1: Concrete legal principles

Principles	Concreteness	Roles
Principle of Safety	Safety	D,P,PP
Principle of User Protection	Consumer Protection	PP,D
	Environmental Regulation	D,PP
Principle of Liability	Compliance	D,PP,F
	Insurance	D,F
	General Liability	D,PP
	Prospective Liability	D,F,PP
Principle of User Rights Safeguard	Privacy	D,PP
	Data Protection	D,PP,P,F
	Intellectual Property	D,PP,P
	Non-Discrimination	D,F,P
Principle of Autonomy	Final Say	D,F,P
	Enabling Capabilities	D,F
	Acceptance	F,P
	Persuasion	F,P
Principle of non-isolation	Humans Non Replacement	F,P
	Feelings Non Replacement	F,P
	Auto-exclusion Context	F,P
	Dignity or Purity	D,F,PP,P
Principle of autonomous agent's minimization	Limit open scenarios	D,F,
	with non-mission tasks	D,F
	No post-monitoring	P,D,F,PP
	ethical agents	PP
Principle of Justice	Equality	D,PP
	Cost Access	D
	Opportunity Access	PP,F

4 RECOMMENDATIONS TO ADDRESS THE ETHICAL-LEGAL CHALLENGES

In the previous paragraphs, we illustrated the component of the proposed disruptive system and the applicable principles emerging from the fragmented ethical-legal framework. In this paragraph, we will try to highlight how the compliance process could enhance the potential applications of the robot, providing interesting challenges in terms of human-robot interaction both from a technical and legal perspective.

According to the risk-based approach on new technologies and robotics towards society, the highest technical standards shall be addressed from the developer to the maintainer of the platform in all the life-cycle of the development and use of the system[11]. In this regard, the human-robot interaction is safe, whether external threats are mitigated by a secure channel. Personal and non-personal data shall be processed in encrypted environments whose access shall be limited to authorized users.

As far as the engagement of human beings in the interaction with the web-based system and robot, it shall be based on a prior informed consent of all involved end-users. Therefore, legal representative of children (i.e. caregivers/parents) shall be aware and consent on the participatory activity of the children, while the latter shall be aware and - according to their age - express their own opinion and consent to the activity.

In addition, a kind of self-regulation system shall be agreed between children, caregivers, and facilitators in order to avoid the misuse of the human-robot interaction. This profile may stimulate and be the opportunity in times of social-distancing to promote and educate children to inclusiveness, non-discrimination, and fairness by developing new technological skills (like programming in python). At the same time, the interaction with the robot shall be moderated by the teacher/facilitator in order to avoid possible physical as well as psychological harms emerging from unsupervised activities and/or possible incidents. In this context, the facilitator shall

develop specific skills and competence to remotely provide countermeasures to avoid possible harms (e.g. how to timely recognize if a child gives the robot the instruction to beat someone/something).

From a policy-making perspective, the introduction of social robots in workplaces shall be preceded by training and awareness sessions aiming at developing a higher level of acceptability of the robot, in order to avoid the reluctance effect due to possible fear of job replacement. Other educational potentialities of the system are referred to the team-skills development enabled also by remote that can be embedded in the daily didactic activities.

These benefits that may go along with children's instruction and education shall be balanced in an attentive impact assessment that involves several scenarios. The first one is the back-end one. Here, standards of security, connection, and encryption shall be identified case-by-case in order to provide the proper balance between privacy-preserving requirements, accessibility by children's houses, and required performance to achieve the educational goals, as done, for instance, in [22]. In addition, we shall consider that human-robot interaction may affect children's behaviour beyond the given application. Therefore, parents and caregivers shall be trained to monitor possible positive and negative effects on the cognitive and emotional ground that they may notice in their children. At the same time, facilitators/teachers shall assess the robots-students interaction under the pedagogical and educational perspectives. These "organizational activities" shall be adopted by design and tailored to the age of the children. Developers shall create synergies both with institutions and policy-makers in order to identify general objectives and strategies to improve education through innovation. At the same time, each pilot and context shall identify specific channels of implementation in order to address tailored objectives aiming at promoting the given children considering the given socio-economical-family-educational conditions of the class (children, families and facilitators).

Therefore, a general impact assessment based on providing how the system could be compliant with the applicable legal ethical and security frameworks and standards shall be provided by the developer, while a more specific evaluation tailored to the pilot shall be performed by the facilitators and caregivers in the best interests of the engaged children. All these remarks can be summarized considering the opportunity to receive an ethical committee approval/competent authority approval/authorization including a kind of instructions/terms and conditions to guarantee a trustworthy use of the application. In addition, the described scenario arises further legal issues related either to the need to protect personal data and intellectual property rights within the human-robot interaction (both in unsupervised or supervised tasks) or to ensure the compliance with the applicable legal framework that is dramatically fragmented.

5 DATA PROTECTION, INTELLECTUAL PROPERTY RIGHTS, AND PARENT RESPONSIBILITIES

In the above-illustrated scenario (see Fig.2), a relevant role is played by the issues emerging from the collection and processing of personal and non-personal information.

5.1 Data Protection

In particular, personal data flows shall be protected under the applicable legal framework, considering the strict and at the same time wide scope of application of the EU Reg. 2016/679 General Data Protection Regulation and how it affected other legislative initiatives on the topic. Therefore the GDPR compliance could be considered as a standard to address the personal data processing issues in order to identify roles and responsibilities to be translated into a governance of data flows. Its legal bases to process data can be adopted to enable/disable access and transfer of data beyond the educational activities as well as to force their pseudonymization/anonymization for further use. A general map of granular access to the back-end and to the results of the human-robot interaction shall be pre-determined and regulated by the involved parties.

5.2 Intellectual Property

A further issue to be addressed is related to the contents developed by children and the protection of intellectual property rights. The algorithm is daily trained by the inputs provided by the children, who also have the opportunity to use the platform and remote robots for their creative process. With regard to products of this process, their protection as intellectual property as such and, even more importantly, their attribution to the children [12] or the developer can be discussed. This question relates to the underlying question of how to reward investments in advanced technology and "artificial intelligence" in the current intellectual property rights systems [17].

5.3 Parent Responsibilities

Children's actions may violate the rights of others, including personality rights or even physical integrity. Parents (or other legal guardians) can be obliged to prevent children from unlawful behaviour as part of their parental responsibility. In situations where the parent has been negligent in the control of the child, such negligence being the proximate cause of the damage, parents are held liable for damages caused by their children. The exchange of copyrighted works without the copyright holder's consent constitutes violations of that law. Parents have been held liable for such violations due to their failure to provide adequate instructions and failure to adequately monitor the child's behaviour on social platforms [16]. However, children's fundamental rights as enshrined in the UN Convention on the rights of the child and many other instruments, prevent parents from exercising unlimited control over children [18], [19]. Instead, the guiding principle of the best interests of the child (Art. 3 UN Convention) and national family laws specifically foresee age-appropriate space for the child to develop [18]. See for the importance of children's privacy Lack [15] . Limits to the monitoring of children's digital media usage and communications are not clear cut and may vary from applicable legal order to the other. It is challenging for parents to fulfil their obligations to instruct the child according to his age and maturity in cases where they themselves struggle to grasp the meaning and scope of, e.g. , the interaction with social robots and possible implications for intellectual property rights.

5.4 The role of the developer and suggestions

From a legal point of view, it is therefore advisable for the developer to contemplate informative communication with parents as well as with the children in addition to offering support by taking on responsibility for information tailored to children of the targeted age groups. Preceding the application, risks should be identified by the developer and specific guidelines for parents should be established for children of different ages. Specific internal policy including rights and duties of parents and caregivers could include the prohibition to share data/videos and other information developed in the session. In the given application, for example, the pilot has received the IRB office approval for research purposes. In cooperation with children, policies can be developed and agreed upon as part of a 'contract of usage' between responsible authorities, such as parents, and children [13]. Parental informed consent is ensured and information are provided in a simplier language to children (see Art. 12 GDPR). The facilitator can collect and store only slides produced by the robot, while the developer - acting as system maintainer as well - collects pseudonymous information related to given inputs and provided outputs. All users are invited to properly select the highest standards of privacy and security with their gmail accounts. In the future, other service providers are also to be explored.

6 SOME CONCLUSIVE REMARKS

This analysis aims at identifying possible rooms of interdisciplinary discussions on practical and innovative systems based on AI-robots whose potentialities in terms of skills development and education purposes are disruptive in all parts of the world.

The public authorities should complement the industry's self-regulation and the effort of parents to make these applications safe environments for the children. In this sense, it will be appropriate to implement various regulatory and control measures, among which we can mention authorizations or approvals and periodic inspections. Along with this, and from a promotional point of view, public authorities should promote digital literacy and support industry efforts to develop safer tools for the rights of the weakest groups.

We also can conclude that in terms of legislation, there are three law domains to be considered:

- Aspects of Private International Law: due to the possibilities of global and transnational application, different set of rules may apply, e.g. in the US the COPPA, the GDPR in the EU with regard to data protection and so on; the same goes for family laws and IP laws. As a consequence, a patchwork of rules and differing requirements can find application; legal uncertainty attached to these aspects could also influence the incentive to include/ exclude certain countries
- Family Law: question of participation of children, who do not decide for themselves. This is particularly true for more mature children. From this perspective, parental responsibilities shall be addressed to explain, develop awareness, listen to their children etc.
- Unlawful Acts: children could also use the robot to conduct unlawful behaviour, such as defamation, bullying, under the cover of the robot voice ó instruments for prevention.

The need to harmonize legislative and ethical frameworks in the RI sector is everyday more urgent in order to allow, especially in case of children, end-users oriented ecosystems able to be adapted in all legal systems like it happens for technical standards (like ISO norms). In this regard, policy-making initiatives aiming at identifying the highest standards in light of the principle of accountability could really make the difference in decreasing the gaps between the technological progress and the corresponding legislative procedures and obligations to protect rights in the information society.

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