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GLOBAL AI ETHICS ASSESSMENT KEY SUBINDEXES: AI LITERACY

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"GLOBAL AI ETHICS ASSESSMENT KEY SUBINDEXES: AI LITERACY"

Research paper

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Abstract

Artificial intelligence (AI) ethics become one of the essential elements of soft law in regulating national and international market. December 2021 UNESCO adopted the Recommendation on the ethics of artificial intelligence that provides the approaches for international soft regulation putting ethics in the heart. The Global AI Ethics index framework could be the basis for ethical impact assessment in alliance with the Recommendation and OECD AI Principles and the framework for AI classification. AI Literacy is part of the group of subindexes of the framework that are influencing all the stakeholders along the AI system lifecycle. Being important element of digital literacy, it faces almost the same challenges in terms of development. AI literacy is influenced by digital divide and flexibility to data and AI economics from national educational system.

"Global AI ethics assessment key subindexes: AI Literacy" is the publication in AI FOR DEVELOPMENT research paper collection

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Key words: artificial intelligence, ethics, index, soft law

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List of abbreviations

AI	Artificial intelligence
ICT	Information-communication technology
OECD	Organisation for Economic Co-operation and Development
SDGs	Sustainable Development Goals
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational, Scientific and Cultural Organization

Introduction

This working paper is the next step in the ongoing research of MGIMO Centre for AI on elaboration of Global AI ethics index. In the separate papers all the key subindexes are discussed in details including the key indicators and challenging issues.

Global AI ethics index is a complex approach involving all the key actors along AI life cycle – state, business, civil society, research centres/ think tanks. Moreover, we propose the estimation though three subindexes of the areas that contribute AI sustainable development at all the stages and influence all the groups of actors – AI literacy, R&D investments and ICT infrastructure development.

The General Framework for the Global AI ethics index published in February 2022 (Abramova, Ryzhkova and Tserekh , 2022) covers all the main elements of the index presenting the groups of key indicators. This research paper is focused on detailed coverage of the subindex AI literacy, highlighting the challenging issues in lifelong education, involvement of key actors.

The structure of the research is follows – the first section is introduction, the second is devoted to challenging issues with regard to digital and AI literacy as a part of it. The third one is focused on methodology of Global AI ethics subindex AI literacy and the final one is dedicated to the discussion the problems issues in practical implementation of the subindex keeping in mind the AI lifecycle and digital inequality.

The authors are grateful to the leaders and coordinators of the National Priority 2030 project for making it possible to conduct the research.

Challenging path from digital literacy to AI literacy

Digital literacy key elements include the competences allowing each person to be competitive in the era of digital economy[1]. For ICT proficiency estimations six main digital capabilities are could be considered – information, data and media literacies, digital learning and development, digital communication, participation and collaboration, digital creation, problem solving and innovation[2].

[1] What is digital literacy? https://www.westernsydney.edu.au/studysmart/home/study_skills_guides/digital_literacy/what_is_digital_literacy
[2] Building Digital Capability. https://www.jisc.ac.uk/rd/projects/building-digital-capability

For the purpose of the research the term Digital literacy saw some sectoral elaborations for finance and health. Digital financial literacy was considered as essential for financial decision making (Kumar et al. 2022) covering "knowledge of digital financial products and services, awareness of digital financial risks, knowledge of digital financial risk control, and knowledge of consumer rights and redress procedures." Digital health literacy or "electronic health (eHealth) literacy, focuses on an individual's ability to access, understand, and engage with digital healthcare materials or technology to contribute to quality of life" (Griebel, et al, 2018).

AI literacy is grounded on the frame of digital literacy with focus on AI developments. AI literacy is a subgroup of digital literacy (Yang 2022). According to Long and Magerko (2020), AI literacy is "a set of competencies that enables individuals to critically evaluate AI technologies, communicate and collaborate effectively with AI, and use AI as a tool online, at home, and in the workplace". AI literacy has four main areas know and understand AI, use AI, evaluate, and AI ethical issues (Ng et all 2021). So, AI literacy being less in scope comparison with digital literacy now has the potential to become one of the main essential skill-sets in mid-term with growing AI application in wide range of social and economic fields.

Methodology Global AI ethics subindex AI literacy

Review of possible scenario

Subindex "LITERACY" is a cross-sectional part of whole Global AI ethics framework. The authors propose the same methodology as for stakeholders' levels. This approach helps to contain in one complex framework the most significant parts of AI ethics implementation aspects.

Firstly, the authors reviewed and compared the five most common and proven methods for evaluating complex and dynamic systems, such as:

- brainstorming;
- analysis of weaknesses and strengths;
- method of charting;
- Delphi method;
- expert evaluation.

Each of the overviewed methods has its own characteristics and limitations in application.

For AI literacy level of subindex framework, the authors recommend using Expert valuation method, because it is the valuable compromise between high cost, long-time calculations, and investigation depth.

1) Brainstorming

For AI literacy level of subindex framework this method is not realistic in view of the fact that it's highly hard to gather all the decision makers at one place and one time. One solution would be to set up a unit within the ministries of education, with the subsequent establishment of broader working groups.

As a rule, brainstorming is carried out within the project team with the possibility of involving a third-party expert in the work. An expert may have broad, or vice versa, highly specialized knowledge, which, in the opinion of the project team leader, is important in the implementation of the project.

The algorithm of method is rather simple and contains of several steps:

1. The participants make the most detailed list of parameters, that are relevant for the project
2. The paraments with least realization probability are deleted from long-list by the majority of participants.

Advantages of the method: the speed of obtaining the result, the ease of implementation of the method.

Disadvantages of the method: the quality of the analysis directly depends on the experience and outlook of the persons participating in the brainstorming session.

The possibility of applying the method for evaluating the ethical aspects of AI technologies implementation:

- requires the experience project team involving for implementing similar products,
- a high cost
- the complexity of involving relevant professionals.

2) Analysis of weaknesses and strengths

For AI literacy level of subindex framework this method is not realistic in view on the fact that it's highly hard to gather all the decision makers at one place and one time.

The method is similar to the assumption analysis method, however, the project team compiles a list of potential parameters, identifying and subsequently analyzing their weaknesses / strengths.

Advantages: detailed consideration of the Index parameters.

Disadvantages:

- the long-time realization of the method;
- excessive detail of the method;
- the quality of the analysis directly depends on the experience and outlook of the professionals involved.

The possibility of applying the method for evaluating the ethical aspects of AI technologies implementation: the project team, with insufficient experience, may miss significant parameters and aspects.

3) Charting analysis

For AI literacy level of subindex framework this method is not realistic in view on the fact that it's highly hard to several professionals who can describe the complex situation at the field of AI ethics in life-long education.

The method is carried out within the project team with the possibility of inviting an external expert. The analysis takes place in three stages:

- drawing up cause-and-effect relationships,
- creating a flowchart of the processes being implemented,
- drawing up impact diagrams.

Advantages: qualitative consideration of potential risks of projects.

Disadvantages: the implementation of the charting method requires the skills of the project team to work with this method and significant time costs.

The possibility of applying the method for evaluating the ethical aspects of the use of AI technologies: the application of this skill requires specialized competencies and experience.

4) Delphi method

For AI literacy level of subindex framework this method is not realistic, because it has too long-time realization.

Advantages: high-quality study of AI ethics application for AI literacy improvement.

Disadvantages: the method requires the long-time realization and financial resources for implementation.

The possibility of applying the method for evaluating the ethical aspects of AI technologies implementation: the method requires a lot of time and money.

5) Method of expert assessments

The method of expert assessments is similar to the Delphi method, however, involves an open survey of experts.

Advantages: a qualitative study of the identification of potential risks.

Disadvantages: it is required creation of a base of experts who are ready to participate in a large sur.

The possibility of applying the method for evaluating the ethical aspects of AI technologies implementation: the method requires a lot of time.

Calculation formula

The authors based the assessment of groups of indicators on the significance index, which is calculated by the formula:

$$r_{ij}^{k} = \alpha_{ij}\beta_{ij}^{k}, \quad (1)$$

where

r_{ij}^{k} - the significance of the i-indicator , assessed by the j-th respondent, in terms of the impact on the k- factor,

$i = (1...N)$, where N is the number of parameters considered in the study,

$j = (1...n)$, where n is the number of responses received,

$k = (1...5)$, where 1…5 are the numbers of influence groups, respectively (respectively, cost, execution time of IT project, product quality, environment, security),

α_{ij} - the weight of the significance of the indicator i, estimated by the j-th respondent,

β_{ij}^{k} - the value of the "effect" of the influence of the indicator on the considered stakeholder and/or the goals pursued by him.

To assess the average value of indicators, the Index of Significance of the indicator is calculated by the formula:

$$R_{i}^{k} = \frac{\sum_{j=1}^{n} r_{ij}^{k}}{n} = \frac{1}{n}\sum_{j=1}^{n} \alpha_{ij}\beta_{ij}^{k} \quad (2)$$

Proposed parameters for calculation

BUSINESS INVOLVEMENT

- volume of investments in AI literacy relevant projects
- assessment of the level of development of AI literacy of employees
- dynamics of AI literacy development of employees

STATE INVOLVEMENT

- number of programs on AI literacy
- average number of participants in government programs. level: local, national
- compliance with the ethical requirements of UNESCO
- volume of state investments in AI literacy related projects

EDUCATIONAL SYSTEM PART:

- number of youth education projects
    - schools (K, K+1 level)
    - universities
- number of projects to educate the older generation
- number of programs
    - private
    - state
    - state - private
- average number of participants of the programs. level: local, national
- compliance with the ethical requirements of UNESCO
- volume of investments in relevant projects

Conclusions

AI literacy is a new fast growing in importance sublevel of digital literacy as sectors of AI application is increasing in number. AI literacy is grounded on general literacy and basic skills in digital literacy.

The problems with basic literacy are still not solved and it constrains the achievement the targets for digital literacy, indicated in the list of SDGs. It means, that the threat of enlarging the gap in development between the regions persist and it is challenging global social and economic stability.

So, depending on the level of competences at the level of general digital literacy AI skills will vary from use of AI with little understanding of its opportunities and challenges including the ethical ones to creating of AI applications for personal and professional needs. In The Global AI Ethics index framework we introduce AI literacy as a subindex having influence for all the actors along the life cycle of AI systems. Besides, the indicators of the subindex are arranged in accordance with lifelong approach for education, covering all the main levels and possible contributors and participants.

Of course, there are some common general factors that influence quality of assessment of the level of developments in AI literacy – national statistics methodology and ability to collect and measure the relevant data, ICTs development, national education systems flexibility and openness to new digital technologies adoption.

Digital divide is one of the most challenging issues for development in education system. It's also reflected in the Subindex on ICT connectivity and R&D investments. This approach makes it possible to cover development needs from short-term to long-term perspectives.

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MGIMO Centre for AI was established to enhance international cooperation and support collaboration with all the actors of digital economy both at national and international levels. Our multidisciplinary research is focused on international cooperation agenda, national policies for AI and business opportunities. International trade and trade policy (prioritising digital trade), sustainable development, AI ethics are the key areas of our activities.

On the basis of MGIMO-University we promote an international AI expert platform with regular conferences and round tables, peer-revied articles and research papers. Our enlarging network of strategic partneships makes it possible to provide AI consulting and policy solutions both for business and goverment agencies.

The Centre was founded in October, 2021

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