

ARTIFICIAL INTELLIGENCE IN THE EVERYDAY LIFE OF YOUNGER SCHOOL-AGE CHILDREN

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Abstract

The integration of artificial intelligence (AI) into everyday life is rapidly increasing and affects all age groups, including younger school-age children. This paper reports findings from the first, quantitative phase of a broader multi-phase mixed-methods study focused on how children at the end of middle childhood understand AI and what experiences shape their attitudes toward it. The quantitative phase was conducted in the Czech Republic in May 2024 with $N = 2,209$ fifth-grade primary school pupils. The questionnaire examined pupils' awareness of AI, sources of information, associations and mental models, ideas about current uses of AI, perceptions of error-proneness, and risk perceptions. The results show a high level of self-reported awareness of AI (88.8%) and identify the online environment as the main source of information (internet/web: 62.9%), while school appears more often as a secondary source (39.5%). AI is also widely perceived as a potentially risky technology (76.3%), although pupils' justifications are often vague (35.6%). Although 55.7% of pupils reported that they "have an idea of how AI works," open-ended responses revealed many indeterminate answers lacking any mechanism (40.1%) and a predominance of functional or artifact-based conceptions, such as "I give a task $\rightarrow$ AI responds" or AI as a robot/machine. The findings highlight the need for instruction that distinguishes everyday experience with AI tools from understanding their underlying principles and builds on children's lived digital experiences.

Keywords: *Artificial Intelligence, younger school-age children, educational technology, cognitive development, AI ethics in education.*

1. Introduction

The literature indicates that children's understanding of AI at the age of 9–12 is shaped mainly through everyday experience with digital technologies. They encounter AI elements through voice assistants, recommender systems, and "smart" applications, and often derive their ideas from visible system outputs and behavior. Research also shows that children tend to interpret AI anthropomorphically, as an entity with intentions, knowledge, or emotions (Epley, Waytz and Cacioppo, 2007), and may overestimate its capabilities and autonomy (Andries and Robertson, 2023). AI is therefore often understood as a "robot", a "smart computer", or "something that knows everything". Children's explanations are usually grounded in prior experience but often remain simplified. In younger children, AI is frequently anchored in concrete artefacts and media representations, such as a "robot", a "smart application", or "ChatGPT", and interpreted through the functional logic of "I give a task $\rightarrow$ AI responds". This is often accompanied by anthropomorphic formulations such as "AI knows" or "AI understands" (Mertala and Fagerlund, 2024).

From an educational perspective, it is therefore important to examine not only whether children know the term AI, but also what mental models they develop, how they perceive its reliability and risks, and which sources and experiences shape their ideas. These aspects are the focus of our research.

2. Methodology

The research is designed as a multi-phase mixed-methods study, with this article focusing primarily on the quantitative phase. The mixed-methods design combines a quantitative approach, capturing the scope of the phenomenon and differences between groups, with a subsequent qualitative phase aimed at deeper interpretation of meanings, experiences, and reasons underlying attitudes. This article therefore presents mainly the questionnaire findings; the qualitative phase builds on them to further examine concerns about AI, sources of information, misconceptions, and the role of school and family.

The quantitative phase targeted fifth-grade pupils at primary schools in the Czech Republic in the 2023/2024 school year. The main data collection took place online in May 2024 during informatics lessons in one third of Czech regions, in municipalities and schools of varying size. The sample consisted of 2,209

pupils. Prior to the main data collection, six focus groups with 47 pupils were conducted to verify the relevance of the topics and wording of the questions, followed by an online pilot study with 100 respondents. The sample was gender-balanced: 50.2% boys and 49.8% girls. Eleven-year-old pupils predominated (48.8%), followed by ten-year-olds (32.3%) and twelve-year-olds (15.2%). Data were analysed using descriptive statistics and systematic coding of open-ended responses. Textual responses were cleaned, normalised, and coded into thematic categories according to recurring patterns of meaning; multiple coding was applied to more content-rich responses. In this phase, understanding of AI was operationalised through declarative items, particularly awareness and self-assessed understanding, and content indicators from open-ended responses, especially associations, definitions, and descriptions of how AI works. A subsequent qualitative phase is currently underway.

3. Results

The most frequent source of information about AI was the internet (62.9%), followed by school (39.5%) and television or radio (32.3%). Approximately one fifth of pupils reported family (21.0%) or peers (20.9%) as sources, while 11.2% did not indicate any source (Lazarová and Zikl, 2024). According to the responses, children's first contact with AI thus occurs predominantly outside school; school enters the process rather secondarily, although with the potential to pedagogically anchor pupils' spontaneous ideas. Boys more often than girls declared that they had already encountered the term AI (90.8% vs. 86.7%).

Associations with AI were predominantly artifact-based and included mainly robots, computers, the internet, or ChatGPT. Underlying principles of operation, such as data, algorithms, or learning, were mentioned by only a smaller proportion of pupils. In total, 88.5% of pupils stated that AI is already being used; however, when asked to specify areas of use, indeterminate responses (56.4%) or missing answers (11.7%) predominated. Among the more specific areas, pupils most frequently mentioned online content (9.4%) and mobile phones or applications (6.1%), followed by school (3.3%), industry/robotization and creative production (both 3.0%), and healthcare (2.6%).

Differences also emerged according to gender and age. Girls more often mentioned online content and applications, whereas boys more frequently referred to industry, robotization, transport, and assistants such as ChatGPT. With increasing age, the proportion of indeterminate responses decreased slightly. In response to the question "Do you have an idea of how artificial intelligence (AI) works?", 55.7% of pupils answered yes ($n = 1,230$), while 44.3% answered no ($n = 979$). This result should be interpreted as subjective self-assessment rather than as evidence of factual knowledge. The findings therefore primarily indicate pupils' level of confidence in their own orientation within the topic of AI.

Table 1. Pupils' conceptions of how AI works by thematic categories.

Theme	Functional interaction (I enter/type something → AI responds/generates)	Internet search (web/Google)	Usefulness / automation (helps, does things instead of people)	Technical explanation (programming/code/algorithms/data/learning)	Recognition (photo/voice/camera/sensors)	Autonomous decision-making / recommendation	Robot / machine / hardware	Anthropomorphism (thinks/imitates humans)	Vague / unclassifiable
Total	160 (14.3%)	145 (12.9%)	122 (10.9%)	136 (12.1%)	51 (4.5%)	32 (2.9%)	182 (16.2%)	102 (9.1%)	449 (40.1%)
Girls	79 (15.4%)	69 (13.5%)	64 (12.5%)	53 (10.4%)	23 (4.5%)	14 (2.7%)	86 (16.8%)	51 (10.0%)	201 (39.3%)
Boys	81 (13.3%)	76 (12.5%)	58 (9.5%)	83 (13.6%)	28 (4.6%)	18 (3.0%)	96 (15.8%)	51 (8.4%)	248 (40.7%)

Note: Topics were coded as multi-label categories; therefore, row percentages do not sum to 100%.

A self-assessed "idea of how AI works" was reported by 55.7% of pupils. Of the 1,121 open-ended responses, approximately 40% were indeterminate and lacked any description of a mechanism. In more specific responses, the prevailing schema was "I give a task → AI responds", together with conceptions of AI as a robot, computer, the internet, or a chatbot, such as ChatGPT. Internal mechanisms, such as programming, algorithms, data, or learning, were mentioned less frequently. AI is thus often understood more as an agent or object than as a process involving data processing and learning from data. For instruction, this indicates the importance of shifting from user-oriented and functional descriptions toward simple, age-appropriate explanations of underlying principles: where AI "runs", what data it uses, and why it may produce errors. An overview of response types is provided in the table above. Boys more often than girls declared that they "had an idea", which may reflect higher self-confidence rather than factual knowledge; declared understanding increased only slightly with age.

The possibility that AI can make errors was acknowledged by 63.1% of pupils, while 21.6% answered "I don't know". AI was perceived as potentially dangerous by 76.3% of pupils. The justifications were

often vague (35.6%); other responses referred to misuse by humans (15.1%), loss of control (12.8%), and privacy or surveillance (11.9%). The type of concern differed by gender: boys more frequently mentioned loss of control, misuse, or war, whereas girls more often referred to privacy and generally formulated concerns.

4. Discussion

The results reveal a typical paradox of the “AI era”: children show a high level of awareness of AI and often express confidence that they know how it works, yet their open-ended descriptions are predominantly functional, artifact-based, and anthropomorphic (Epley et al., 2007). This discrepancy can be explained through the framework of conceptual change: new concepts introduced in school are often merely incorporated into existing naïve conceptions without transforming the underlying mental model of the mechanism. Definitions alone therefore tend to have only a limited effect (Kreinsen, Rabe, Grospietsch and Schulz, 2024). The strong perception of AI as dangerous (76.3%) is accompanied mainly by vague justifications. Alongside realistic concerns, such as human misuse or threats to privacy, narratives close to fiction also appear, especially the loss of control. From a pedagogical perspective, this represents an opportunity to connect AI instruction with safety, verification of outputs, and understanding the limitations of models.

For AI literacy, these findings imply the need to work with “anomalies” in children’s digital experience, such as a confident but incorrect output, failure on an atypical example, or biased recommendation. Such situations may disrupt naïve conceptions of AI and open space for a simple mechanistic explanation: AI learns from examples and uses them to estimate outputs (Touretzky et al., 2023). This model can then be used as a basis for addressing issues of data, fairness, privacy, information verification, and responsibility (Long and Magerko, 2020). The interpretation should be grounded in multiple perspectives: developmental-cognitive approaches, theory of mind and anthropomorphism, conceptual change, media and algorithmic literacy, and computational thinking. In addition, a sociocultural perspective is important, as it emphasizes the role of family, school, and media in shaping children’s ideas about AI.

5. Conclusions

The study shows that artificial intelligence is a familiar concept for Grade 5 pupils, and half declare that they have an idea of how it works. This understanding, however, is often grounded in everyday experience with digital tools rather than in principles such as data-based learning, algorithmic processing, or modelling. The findings support instruction that distinguishes use of AI tools from understanding their principles and helps children move from anthropomorphic and user-oriented conceptions toward a simple mechanistic model. This model should cover the data–model–learning relationship, the probabilistic nature of outputs, and the distinction between searching and generating. Vague responses should not be seen as lack of knowledge, but also as limited conceptual resources for describing abstract processes. Further research should add direct tests of understanding to self-assessment, examine generalizability across schools, and strengthen open-response analysis through independent coding by multiple raters.

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