

Supplementary Materials

Making AI in Education Responsible: Classroom-Ready Ethical Guidelines for Teachers and Students

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Part 1. Final AIED Ethical Framework

The figure below presents the final AIED Ethical Framework, illustrating the 11 ethical principles (as equal-weight radial segments) and the six stakeholder groups positioned by proximity to classroom practice. Developers are placed in the outermost ring without color effects to encode their indirect relationship to classroom instruction.

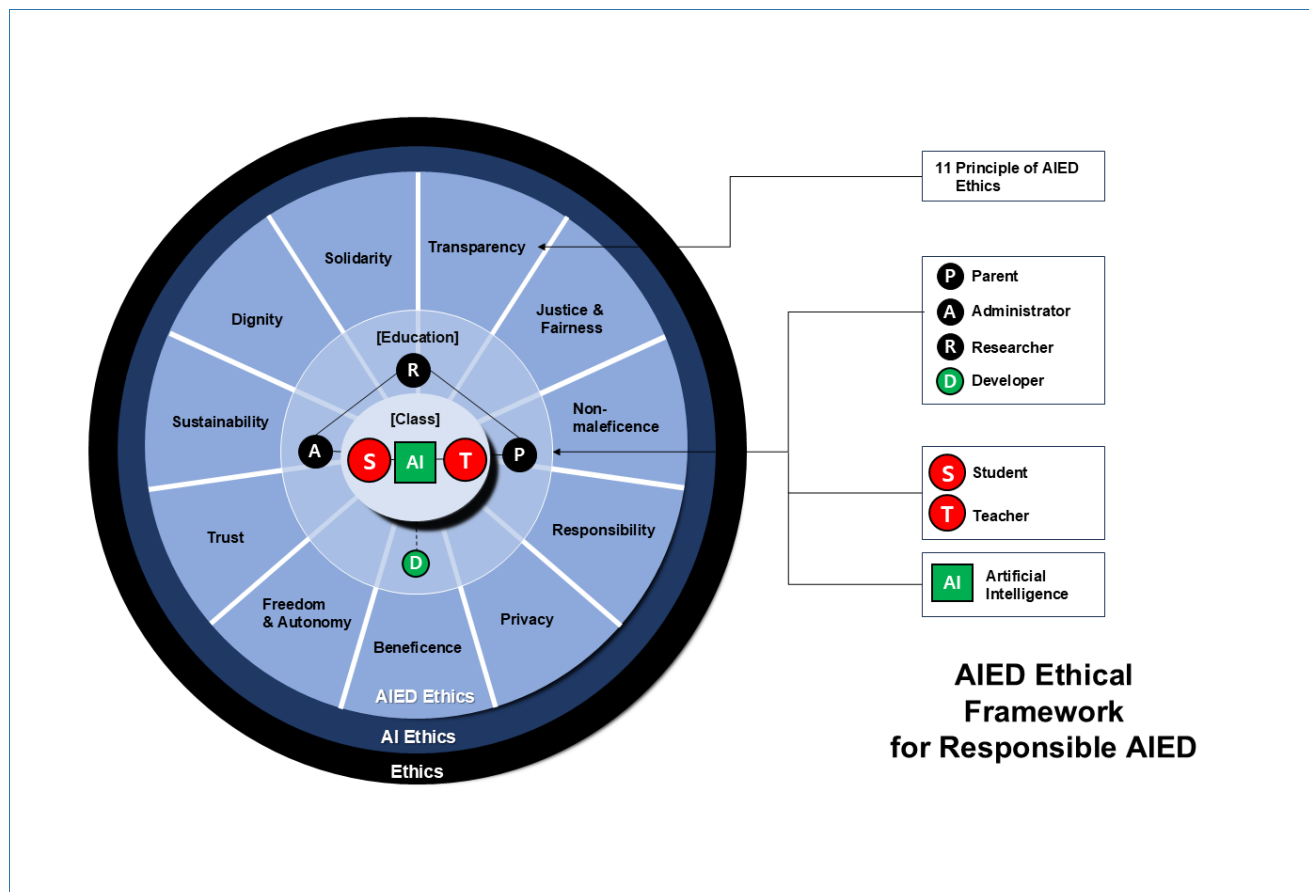


Fig. 2. Final framework: Ethical framework for responsible artificial intelligence in education (AIED). The 11 ethical principles are represented as radial segments of equal angular size, denoting their equal normative weight. Developers are positioned in the outer ring and distinguished by the absence of color effects, visually encoding their indirect relationship to classroom instruction compared to primary actors (teachers and students). The concentric bands move from Ethics (outer) → AI Ethics (middle) → AIED Ethics (inner), encoding domain-specificity hierarchy.

Part 2. Ethical Guidelines for AI Use in Education (66 Items)

The following table presents the complete set of 66 ethical guidelines developed for teachers and students across 11 AIED ethical principles. Each principle is operationalized into three temporal phases of instruction (before, during, and after AI use), yielding three role-specific guidelines per role per principle. Guidelines are structured as explicit action rules. Teachers' guidelines specify professional responsibilities for designing, conducting, and reviewing AI-integrated instruction. Students' guidelines specify behavioral expectations for active, critical, and ethical engagement with AI tools.

Ethical Principle	Guidelines for Teachers (3 per principle)	Guidelines for Students (3 per principle)
Transparency	1) The teacher should clearly explain the purpose and procedure of using AI in class to students in a way they can understand. They should also be prepared to answer any questions the students may have. 2) The teacher should actively document potential issues related to the use of AI and provide a means for students and parents to review them. 3) The teacher should openly communicate the policies regarding data collection, storage, disposal, and accessibility concerning the AI system and be prepared to provide thorough answers to any related questions.	1) Students should actively ask questions and try understanding the purpose and process of using AI in class. 2) Students should seek information about AI technology and the purpose of AI utilization on their own or find someone to help them understand it. 3) Students should clearly understand how AI works, safety measures, and how to use it in class through ongoing communication with the teacher.
Justice and Fairness	1) The teacher should regularly monitor AI algorithms and data for any biases and clearly communicate them to students and parents. 2) The teacher must show respect and understanding of students' diverse backgrounds and offer proactive support to prevent any student from feeling excluded when using AI. 3) The teacher should ensure equal educational opportunities for all students taking into account the different types and levels of AI.	1) Students will work with teachers and peers to respect, understand and appreciate the diverse backgrounds of their peers and ensure that no peer is marginalized in the use of AI. 2) Students will identify whether there are elements of inequality in AI and communicate with teachers to address them. 3) Students will critically examine the information provided by AI for elements of bias and discrimination and collaborate with their teachers to ensure that it is not.
Non-maleficence	1) The teacher should assess whether collecting and using student data affects their self-esteem. 2) The teacher should consider the vulnerability of students when measuring and utilizing AI's emotions and behaviors. 3) The teacher should consistently monitor the safety of AI and implement safety measures to protect students from potential threats and cybercrimes.	1) Students should continually assess whether the use of AI poses a threat to their physical or mental safety. 2) Students should be fully informed about the safeguard functions and how to utilize them in case of abnormal behavior or unexpected AI errors. 3) Students should immediately stop using AI and report to their teachers if AI hurts their physical and emotional well-being.
Responsibility	1) The teacher should regularly assess the	1) Students should have a clear

Ethical Principle	Guidelines for Teachers (3 per principle)	Guidelines for Students (3 per principle)
Privacy	suitability of using AI in classrooms for students and take appropriate actions. 2) The teacher should make every effort to protect the students and address any issues or damages resulting from technical flaws or limitations of AI. 3) The teacher should provide clear explanations and guidance to students and parents about the decision-making process and compensation measures associated with the use of AI.	understanding of their responsibility to verify the accuracy of data and determine the extent of data disclosure when utilizing AI. Additionally, they should discuss these responsibilities with their teachers. 2) Students should clearly indicate sources and avoid using unauthorized materials when performing AI-enabled tasks. 3) Students should responsibly protect their own and their peers' personal information and prevent leaks during AI interactions.
	1) The teacher must implement security measures, such as data anonymization, to prevent unauthorized disclosure of student data and personal information. 2) The teacher should clearly explain and obtain prior consent for the use of student data and personal information. 3) The teacher should create and communicate a privacy policy regarding the use of AI to students and parents.	1) Students should protect their own data by being sensitive to privacy and avoiding unnecessary information sharing. 2) Students should protect the data of others by not leaking peers' data and personal information acquired in class without their consent. 3) Students should understand the privacy policy and fully discuss it with the teacher before providing personal information.
Beneficence	1) The teacher should consider social well-being and communal values when incorporating AI into classroom instruction. 2) The teacher must structure and conduct AI classes in a manner that fosters public interest and educational development. 3) The teacher should share AI classes' effectiveness and success stories with the educational community to promote awareness and adoption.	1) Students will discuss and understand with their teachers how AI can benefit their learning. 2) Students will discuss and understand with their teachers how AI can benefit not only themselves, their peers, and the school community. 3) Students will discuss and understand with their teachers the social implications of the use of AI.
Freedom and Autonomy	1) The teacher should consider the age and level of the students when allowing them to use AI and should obtain their consent. 2) The teacher should provide students with an appropriate level of autonomy in data collection, considering their age and level, and obtain their consent. 3) The teacher should encourage students to actively use AI during classes, considering their age and level.	1) As an active participant in the class, students should feel free to express their opinions about AI adoption to the teacher and collaborate with the teacher. 2) As an active participant in the class, students are free to express their opinions about data collection to the teacher and collaborate with the teacher. 3) As an active participant in the classroom, students will be self-directed in using AI and take ownership of their own learning in AI-enhanced lessons.
Trust	1) The teacher should consistently evaluate and assess the effectiveness, suitability, and safety of AI classes to establish a reliable learning environment. 2) The teacher should clearly explain and communicate the principles, effectiveness,	1) Students will listen carefully to the teacher's explanations of the effectiveness, appropriateness, and safety of AI lessons to ensure the credibility of AI lessons. 2) Students will collaborate with peers to advance the community's understanding of

Ethical Principle	Guidelines for Teachers (3 per principle)	Guidelines for Students (3 per principle)
	suitability, and safety of AI to students and parents. 3) The teacher should maintain an open communication channel for students to freely express their questions and opinions on the use of AI in the classroom.	the effectiveness, appropriateness, and safety of AI. 3) Students will actively discuss with teachers any barriers to trust in the use of AI and will work together to find solutions.
Sustainability	1) The teacher should be aware of the environmental impact caused by using AI and take steps to minimize pollution in AI classes. 2) The teacher should be aware of the social impact of AI and ensure that AI classes do not impede social development. 3) The teacher should be aware of the economic impact of using AI and consider the sustainability of resources in AI classes.	1) Students understand the environmental impact of AI and utilize AI's digital resources in an environmentally friendly manner. 2) Students understand the social impact of AI and use AI to realize social value and develop society. 3) Students understand the economic impact of AI and efficiently utilize AI's digital resources in the classroom.
Dignity	1) The teacher should design AI classes to respect and reflect the values and opinions of the students. 2) The teacher should consistently show respect for and consider the values and opinions of the students during class instruction. 3) The teacher should highlight the distinctions between AI and humans in students and take steps to protect the values and dignity of humans in the use of AI.	1) Recognize that students should have their human rights and dignity protected in AI-enhanced instruction. 2) Students should continually review how their human rights and dignity are protected in AI-enhanced lessons. 3) Students should identify how their values are reflected in AI-enhanced instruction and work with teachers to make improvements if necessary.
Solidarity	1) The teacher must encourage collaboration among all students in the classroom and incorporate their opinions into the lessons. 2) The teacher should communicate the results of AI classes to parents and administrators to foster a sense of unity within the educational community. 3) The teacher should communicate and collaborate with other teachers, educators, parents, and the educational community to share the process and results of AI classes. This includes providing and receiving assistance.	1) Students work with teachers to actively communicate their opinions and collaborate in class. 2) Students actively cooperate with their classmates by sharing the process and results of AI lessons with their peers and exchanging opinions. 3) Students apply the results of AI classes to real life through cooperation with the local community and contribute to social development.

Note. Guidelines were finalized through three rounds of expert validation (Content Validity Index = 1.00; Inter-Rater Agreement ≥ 0.80 across all dimensions) and field-based focus group interviews (FGIs) with practicing teachers and students. The three-item structure per role reflects the temporal phases of instruction: (1) before AI use, (2) during AI use, and (3) after AI use.