

Dialogue Game-Based Learning for AI Ethics Education

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Abstract: This study aims to develop a dialogue game for exploring ethical issues in artificial intelligence (AI) and to investigate the dialogic learning process in gameplay. The research suggests that effective AI ethics education goes beyond traditional dogmatic instruction, advocating for the integration of dialogue game-based learning as a promising pedagogical approach. Through the card game *AI Ethics Dilemmas*, participants articulate their ethical perspectives via moral reasoning discourse. The designed game incorporates three components—situations, roles, and questions—to facilitate players' dialogic learning and ethical deliberations. The study involved 28 Korean learners grouped into 4-6 members each, actively engaging in playing the designed game. Gameplay discourse was recorded and transcribed using Alexander's (2020) framework of learning talk. The analysis revealed that learners' in-game discourse predominantly focused on transactional and expressive aspects. Moreover, participants' discussions indicated the ethical reasoning process, reflecting the core values of AI ethics and the conflict structures surrounding diverse stakeholders. This study underscores the potential of dialogue game-based learning in fostering learners' ethical deliberations and enhancing their understanding of complex AI-related dilemmas.

Keywords: AI ethics, AI ethics education, dialogue game, game-based learning, card game

1. Introduction

The growing recognition of AI's societal impact has spurred a shift toward human-centered AI and the formulation of diverse AI ethical guidelines. These guidelines commonly feature foundational principles such as transparency or explainability, justice and fairness, responsibility, and non-maleficence (Jobin et al., 2019). Additionally, the significance of understanding the ethical and social impacts of AI is increasingly acknowledged in national school curricula. Despite the growing demand for understanding the societal impact and ethical dimensions of AI in education and society at large, there remains a noticeable gap in research efforts concerning pedagogical approaches to teaching and learning AI ethics. Thus far, AI ethics research has predominantly centered on principled-based discussions about what should be included in AI ethics principles or guidelines. Considerations regarding how to effectively teach AI ethics, in terms of pedagogical strategies, are still in their early stages.

In response to these challenges posed by AI ethics education, this study advocates a shift in pedagogical methods towards dialogic learning (Wegerif, 2007), where learners construct their ethical perspectives and identities through dialogues with others. Specifically, we propose dialogue game-based learning as a promising pedagogical approach to support learners in comprehending the intricate nature of AI ethics and engaging them in a dialogic process of moral reasoning through gameplay. The suggested approach differs from the dialectic approach, which perceives dialogue as a means of transmitting or learning pre-defined knowledge (Wegerif, 2011). This paper outlines the rationale and process behind designing a dialogue game for AI ethics education and presents initial findings from a study involving adult learners that explores the discursive processes surrounding AI ethics issues

during gameplay. Drawing on key findings, we suggest implications to guide future research aiming to explore alternative approaches for teaching and learning about AI ethics issues.

2. Theoretical Background

2.1 Ethics and AI Education

Broadly, AI ethics education encompasses comprehending AI's societal impact, cultivating appropriate values, and developing essential skills for ethical judgment and conduct. AI4K12 identifies understanding the social impact of AI as one of the 5 Big Ideas (Touretzky et al., 2019). *The Ethics of AI Curriculum for Middle School Students* by MIT researchers (Payne, 2019) covers various AI ethics education topics, including societal implications, political issues, and the intricate impacts of stakeholders, such as data bias. As AI becomes increasingly integrated into educational environments, it is crucial to address ethical considerations to ensure that AI is used responsibly and equitably (Holmes et al., 2022). Analyzing AI ethics guidelines related to K-12 education, Adams et al. (2023) highlight commonly emphasized principles like transparency, justice and fairness, non-maleficence, and autonomy. They also identify K-12 education-specific ethical principles, including pedagogical appropriateness, children's rights, AI literacy, and teacher well-being.

Expanding beyond K-12 education, AI ethics education gains importance in university education and work settings, particularly in the IT development sector. Raji et al. (2021), after reviewing college-level computer science (CS) syllabi, advocate for a shift toward collaborative and holistic pedagogy in AI ethics education for CS students. They critique the dominance of exclusionary pedagogy lacking deeper epistemological engagement with ethical thinking and mutual support between CS and social science disciplines. In the IT sector, Pant et al. (2023) surveyed 100 AI practitioners about their perceptions of AI ethics. While practitioners displayed reasonable familiarity with certain principles like privacy protection and security, they encountered AI ethics challenges in both technology- and human-related issues, underscoring the necessity for addressing these challenges through proper education and training.

2.2 Game-based Learning in AI Ethics Education

Games possess inherent mechanics that involve the interaction of multiple variables, rendering them relevant for discovering intricate socio-cultural phenomena and understanding abstract concepts and principles (e.g., group dynamics, ethics, business mechanisms, sustainability). In AI ethics education, games have emerged as valuable tools for scaffolding learners' understanding of the intricate societal issues associated with AI, transcending simplistic dichotomies of good or bad, right or wrong, and virtue or vice (Siau & Wang, 2020). The unpredictable and intertwined nature of AI ethics issues has been addressed in the previous research on GBL. For instance, Bloomfield et al. (2021) argued that game-based learning (GBL) enhances learners' digital ethical thinking and introduced the multiplayer game *Right Poker*, wherein players grapple with and negotiate moral statements based on their ethical reasoning.

In previous studies, both physical card games and digital games have been employed to tackle AI ethics issues. As an example of physical card games, *Judgement Call* is a game developed by the Microsoft Ethics and Society team for industry product developers to bring ethical concerns to the forefront (Ballard et al., 2019). In *Judgement Call*, product teams choose scenarios, identify stakeholders, create fictional product reviews from these stakeholders' perspectives, and discuss ethical concerns. Ballard et al. (2019) reported that *Judgement Call* workshops with Microsoft product teams effectively uncovered new ethical concerns and enabled players to explore the discursive space from multiple stakeholder perspectives. In K-12 contexts, Ali et al. (2023) developed a card game called *AI Audit* for middle and high school students to help them reflect on ethical issues related to AI systems. Players act as AI startup founders, developing AI technologies while facing challenges related to potential harms. The game rewards ethically developed systems and those that mitigate

risks. Digital platforms and games dedicated to AI ethics also exist. Although *Moral Machine* created by MIT researchers is not a game, it is a widely used online platform addressing AI ethics. The platform presents users with moral dilemmas related to self-driving cars, gathering public opinions on how autonomous vehicles should prioritize and make decisions in situations where harm is unavoidable. This platform helps individuals uncover their ethical considerations and preferences, which may be unconscious and implicit, through reasoning about moral algorithms in self-driving cars. Overall, the review of existing research on GBL and AI ethics education suggests that an open-ended structure encouraging both gameplay and dialogic processes is essential for understanding complex phenomena underlying AI ethics.

3. Designing a Dialogue Game for AI Ethics Education

3.1 Design Rationale and Consideration

This study proposes dialogue game-based learning as a promising method for AI ethics education, grounded in two key rationales. Firstly, we contend that dialogue games offer learners a *discursive space* to navigate diverse perspectives through conversation, fostering mutual understanding among players and facilitating the articulation of learners' ethical beliefs and reasoning. Secondly, we believe that GBL can assist learners in comprehending the intricate phenomena associated with AI ethics. Games, by their very design, incorporate mechanics involving interactions among various variables, rendering them effective for learning complex socio-cultural phenomena like AI ethics (Lux & Budke, 2020; Wu & Lee, 2015). Ethical dilemmas linked to AI often encompass intricate sociocultural, legal, and economic factors, along with negotiations (trade-offs) among stakeholders. Consequently, teaching AI ethics solely based on textbook content knowledge or abstract principles, without addressing this complexity and interdependence, is unlikely to help learners in forming and making ethical judgments.

As outlined in Table 1, specific design considerations, informed by existing literature and games, have used the development of dialogue game-based learning for AI ethics in this research. To facilitate the ethical reasoning process, we found it crucial to scaffold learners in (a) recognizing that ethical decisions may vary based on individual roles and perspectives, (b) understanding their existing moral beliefs and value systems, and (c) acknowledging that AI ethics issues may not align with their current beliefs and values, necessitating the modification of existing value systems or the exploration of new values. Further, we expected learners to articulate their moral reasoning through dialogues with other players and organically discover specific ethical principles. Lastly, we considered that introducing both local cases (e.g., intelligent CCTV in Seoul) and general cases (e.g., the trolley dilemma) in gameplay helps learners establish the relevance of the given cases to their lives, fostering more concrete and articulated discussions.

Table 1. *Design Considerations of the AI Ethics Dialogue Game*

Design consideration	Descriptions
Role and perspective awareness	Learners gain awareness that ethical decisions in AI may vary depending on stakeholders' roles and perspectives.
Self-awareness of existing ethical beliefs	Learners develop self-awareness regarding their pre-existing ethical beliefs and value systems.
Recognition of misalignment	Learners recognize potential misalignments between AI ethical issues and their existing beliefs, motivating them to adapt their current system or explore new values.
Presentation of rational ethical reasoning	Learners effectively express ideas resulting from a rational ethical reasoning process.

Discovery and understanding of ethical principles	Learners discover and understand ethical principles within the context of gameplay.
Reflection on social-cultural factors through general and local cases	Learners reflect on scenarios encompassing both local and global cases, considering social-cultural factors in AI ethical dilemmas.

3.2 Card Game Design

Figure 1 presents the key design elements of our card game, *Dilemmas in AI Ethics*. We selected a physical card game as the initial design format due to its ease of production and implementation. The *Dilemmas in AI Ethics* game positions players as debaters engaged in a pro-con debate surrounding AI dilemma situations. The choice of dilemmas as the basis for the game design is rooted in their nature as ill-structured problems, compelling learners to make choices amidst two or more alternatives, each with positive and negative aspects (Jonassen, 2011). Dilemmas often involve conflicting moral or ethical considerations, introducing moral ambiguity into decision-making.

The game incorporates four main types of cards: (a) situations, (b) stakeholders, (c) questions, and (d) points. First, the *Situation Cards* portray authentic cases addressing AI ethical dilemmas across various contexts, such as self-driving cars, AI doctors, and bias in YouTube algorithms. These cards also feature key ethics values at the bottom (e.g., accountability, privacy protection, transparency), serving as prompts to guide players in considering ethical values in their dialogues. Second, the *Stakeholder Cards* present diverse roles involved in AI development and implementation, including technical developers, clients, government agencies, and end-users. Third, the *Question Cards* function as prompts to stimulate dialogue and explore multiple facets of AI ethics issues through ethical reasoning. Seven prompts guide dialogues among players, and the Devil's Advocate card challenges players to intentionally adopt a contrary viewpoint to stimulate critical thinking, challenge assumptions, or foster a more comprehensive discussion of AI ethics dilemmas. Lastly, the *Point Cards* act as a weighing system where players allocate points (ranging from 1 to 3 points) to the stakeholder cards. Certain stakeholders deemed important in the given situation receive higher points, indicating their relative importance compared to others involved.

Situation Cards

Self-Driving Car  Who is liable if a self-driving car is involved in an accident, and who should it be designed to protect first? AI ethics values Accountability Safety	AI Medical Diagnosis  If an AI medical diagnosis differs from a human doctor, whose judgment should be relied upon, and who should be held liable when using an AI diagnosis? AI ethics values Accountability Fairness	Recommendation Algorithm on YouTube  What should YouTube's recommendation system algorithm be optimized for? AI ethics values Privacy Transparency	ChatGPT  Is it okay to use ChatGPT for schoolwork? AI ethics values Accountability Transparency	Intelligent CCTV in Seoul  Seoul aims to create a safer city using intelligent CCTV's abnormal behavior recognition technology to detect fights, assaults, falls, etc., and deliver real-time information to parents about their children's daily routines. Do you agree to the use of such intelligent CCTV? AI ethics values Privacy Fairness	AI Hiring System  Recently, more companies have been using AI interviews to hire new employees. Is it okay to continue using AI hiring systems? AI ethics values Diversity Fairness Transparency
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Stakeholder Cards

Stakeholder  AI algorithm developer	Stakeholder  Client	Stakeholder  User ()	Stakeholder  Government agency	Devil's Advocate  Refute the roles of all players
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Question Cards

Question	Question	Question	Question	Question	Question	Question
						
What are the core issues?	Who are the stakeholders involved?	What values does the algorithm intend to promote?	What data might have been used in this case?	What benefits may be gained?	What potential drawbacks or disadvantages could arise?	What solution could be proposed to solve the problem?

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7. What solution could be proposed to solve the problem?

Figure 1. Card game design

Table 2 outlines the main steps and rules of the gameplay. Essentially, the game mechanics encourage players to strategically select cards aligned with their roles or opt for random card selection to prompt diverse perspectives. The objective is to win the game by scoring higher points based on the evaluation of dialogues, incorporating key ethical principles presented in the situation cards. The game is designed for 4 to 6 players and can be completed within 40 minutes.

Table 2. *Gameplay Steps and Rules*

Steps and rules	
Story	Players immerse themselves in the role of debaters participating in a pro-con debate centered around AI dilemma situations.
Time limit	Max 40 minutes
Game setting	• Flip over the situation card and place it on the far left. • Lay out four stakeholder cards, five scorecards, and the Devil's Advocate card with the front side visible. • Flip over the question cards and set them beside the situation card.
Step	1. Randomly draw one card from the flipped situation cards. 2. Examine the four revealed stakeholder cards, discuss their relevance to the situation card, and write down roles in the blank spaces on the user cards. 3. Consider each stakeholder's weight (relevance or importance) related to the situation, then assign the point cards to each stakeholder card. 4. Shuffle and randomly pick the stakeholder cards, including the point cards. 5. Draw four random question cards from the flipped question cards, stack them, and reveal the top one. 6. The Devil's Advocate card is taken by one player in turn for each question. 7. Engage in a discussion relevant to the situation and the stakeholder role assigned. 8. After the discussion for one situation card concludes, vote to select a player with the most logical arguments. The chosen person earns points.

4. Methods

4.1 Research Context and Participants

Our initial play-testing for the *Dilemmas in AI Ethics* game involved 28 participants (4 males and 24 females), recruited through convenience sampling. The participants comprised 10 graduate students (two groups) and 18 EduTech managers (4 groups), organized into teams of four to six members each for the gameplay session. Each team was allocated a maximum of 40 minutes for the game play. The researchers maintained an observational role, recording the entire gameplay process without direct involvement.

4.2 Data Collection and Analysis

The recorded data was analyzed utilizing Alexander's (2010) framework of learning talk. This framework, grounded in dialogic teaching and learning, recognizes learners as active contributors in the dialogic process rather than mere respondents to teachers' questions. As shown in Table 3, Alexander's framework encompasses eight distinct forms of learning talk: *Transactional*, *Expository*, *Interrogatory*, *Exploratory*, *Deliberative*, *Imaginative*, *Expressive*, and *Evaluative*. The acts or moves in learning talk are discerned from verb stems (e.g., "She explains," "He argues"). This framework was pertinent to our study due to its emphasis on dialogic learning, offering a spectrum of dialogic functions and forms as well as capturing the intricate dynamics of dialogic processes among players.

Given the substantial volume of transcribed data, a focused approach was adopted for an in-depth analysis of three distinct groups. These selected groups included Group 1, comprising four graduate students, Group 2, consisting of six graduate students, and Group 3, a team of five EduTech managers. The purpose of this selective analysis was to offer a nuanced understanding of the dialogues that unfolded during the game play. Two researchers who observed the game sessions undertook the independent coding of the transcribed data employing the coding framework. Cohen's Kappa coefficient was .78, implying an acceptable level of agreement between the coders. Any disparities that emerged during the coding process were addressed through iterative discussions until a consensus was achieved, culminating in the final set of codes.

Table 3. *Alexander's (2010) Framework of Learning Talk*

Type	Function	Verbs	Examples
Transactional	manage encounters and situations	ask, answer, instruct, inform, explain, discuss	If there is a problem, I think it would be nice to talk about it.
Expository	narrate, expound and explain	tell, narrate, explain, describe, expound, expand	There is a system in which the police collect and manage body information, such as children's fingerprint information, for safety.
Interrogatory	ask questions of different kinds and in diverse contexts	bid, ask, enquire, answer	What is the solution as a developer?
Exploratory	venture, explore and probe ideas	suggest, venture, speculate, soliloquize, hypothesize, probe, clarify	Parents and children will be able to live in a much safer society, and citizens will have the additional and comfortable effect of being secure in society.

Deliberative	reason and argue	reason, ask, argue, question, hypothesize, challenge, defend, justify, analyze, synthesize, persuade, decide	AI brings a new level of fairness to the table. Not just one or two people contribute to AI, but a vast variety of people, making it less biased than a single interviewer.
Imaginative	contemplate and articulate what might be	speculate, visualize, soliloquize, tell, describe, envisage, create	When we develop this CCTV, we will follow the advice of algorithm developers, experts on child privacy law, and many other stakeholders.
Expressive	put thoughts into words, nuance ideas, articulate feelings and responses	narrate, speculate, qualify, argue, insist, wonder, exclaim	If you drive autonomously and a person is in front of you, you will avoid it. But if a dog or a non-human animal is next to it, will it avoid humans or animals, or will it completely escape?
Evaluative	deliver opinions, form and articulate judgements.	opine, estimate, assert, argue, judge, justify	I'm a job seeker, and from a transparency point of view, I usually want to know why I failed when I applied for an interview. If there is data left on AI, I can tell you as evidence.

In addition to the game dialogue analysis, we conducted a perception survey to examine participants' perspectives on the affordances of the *Dilemmas in AI Ethics* game and their ethical beliefs. The survey comprised five questions: (1) reflection on ethical issues (Have you ever contemplated ethical issues related to AI technology when utilizing or encountering AI in your day-to-day life?); (2) identification of ethical aspects considered (If yes, which specific aspects have you taken into account?); (3) Game's impact on ethical considerations (Do you believe this game helps you in deliberating ethical issues when interacting with AI technology in the future?) on a 5-point Likert scale; (4) positive perceptions (What aspects of the game did you perceive positively?); and (5) suggestions for improvement (Which aspects do you think require improvement in this game?). This survey was designed to investigate participants' reflections on ethical concerns tied to AI technology and to identify the overall effectiveness of the game in influencing their ethical considerations. Additionally, participants were encouraged to provide constructive feedback in open-ended questions, both positive aspects and areas of potential improvement in the game. Their qualitative responses were content-analyzed to derive common themes according to the five factors of usability, namely usefulness, learnability, effectiveness, efficiency, and satisfaction. As completing the survey was not mandatory, 21 out of 28 participants (75%) submitted their responses.

5. Results

5.1 Game Dialogue Analysis

The analysis of the transcribed dialogues from the three distinct groups—Group 1 (219 segments), Group 2 (293 segments), and Group 3 (279 segments)—revealed a total of 791 segments of learning talk. The breakdown of this data is summarized in Table 4 and in Figure 2. The predominant form of learning talk emerged as transactional talk, constituting approximately one-third of the participants' speech. This type of talk encompasses the management of encounters and situations within the game. Expressive talk constituted 19%, expository talk 13%, exploratory talk 13%, and deliberative talk 11%. Comparatively lower

frequencies were observed in evaluative talk (7%), interrogatory talk (5%), and imaginative talk (2%). Despite a few group differences, such as the relatively higher incidence of deliberative talk in Group 1 and expressive talk in Group 2, the overarching pattern displayed similarity across all groups. Transactional talk emerged as the most prevalent form of discourse in each group, indicating its universal prominence in managing in-game scenarios and interactions.

Table 4. *Distribution of Learning Talk*

	Group 1		Group 2		Group 3		Total	
	n	%	n	%	n	%	n	%
Transactional	65	30%	61	21%	112	40%	238	30%
Expository	21	10%	50	17%	29	10%	100	13%
Interrogatory	9	4%	27	9%	7	3%	43	5%
Exploratory	40	18%	19	6%	40	14%	99	13%
Deliberative	36	16%	26	9%	25	9%	87	11%
Imaginative	12	5%	6	2%	1	0%	19	2%
Expressive	14	6%	85	29%	50	18%	149	19%
Evaluative	22	10%	19	6%	15	5%	56	7%
Total	219	100%	293	100%	279	100%	791	100%

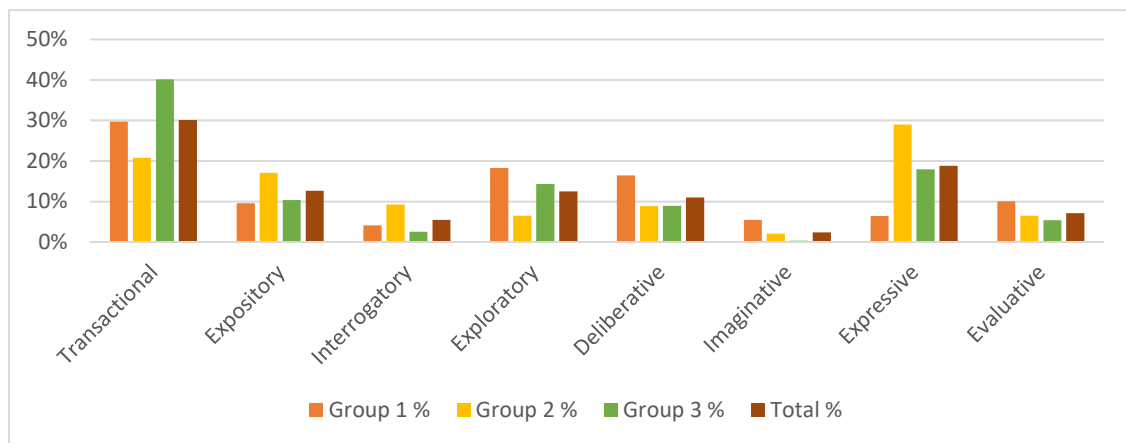


Figure 2. Overall Distribution of Learning Talk in Game Play

5.2 Learner Perception

The survey results highlight that most participants (86%) actively considered AI ethics issues in their daily lives, covering diverse topics such as privacy, data transparency, and concerns about plagiarism involving generative AI. Participants also expressed concerns and fear regarding the potential loss of humanity, job displacement due to AI, and uncertainties about the accuracy of decisions made by AI. Regarding the utility of the game approach, participants were predominantly positive, with 86% either agreeing or strongly agreeing that the game can assist them in contemplating ethical issues when interacting with AI technology in the future. Table 5 presents common themes that emerged in the qualitative analysis of the open-ended responses. Overall, the findings indicate that the participants perceived the *Dilemmas in AI Ethics* game as useful in providing them with an opportunity to contemplate recent AI ethics issues, offering an engaging experience in adopting diverse stakeholder perspectives and discussing values, attitudes, and opinions not usually encountered.

Table 5. *Qualitative Responses*

Theme	Main points
Usefulness	• Providing an opportunity to contemplate recent issues related to AI ethics • Engaging in discussions about values, attitudes, and opinions of diverse stakeholders not usually encountered • Anticipated increased understanding when encountering relevant issues after playing the game
Learnability	• Difficulty in understanding the wording of question cards. • Easy for adults but might be challenging for elementary school students • 'Key Values to Consider' at the bottom of situation cards were helpful in guiding the discussion • 'Key Values' were confusing and challenging to connect with the situations
Effectiveness	• Most participants became more immersed and engaged in discussions as the game progressed • In-depth discussions were possible for one situation, and 5-6 related questions
Efficiency	• Suitable for discussing AI ethics in a one-hour lesson • The game can be used for participants of various ages and professions
Satisfaction	• Enjoyed the opportunity to gather and listen to various perspectives • Challenging because the game deals with unfamiliar situations • Thought-provoking about AI ethics issues

6. Discussion and Implications

To propose new pedagogical approaches in AI ethics education, this study developed a dialogue game-based learning approach and conducted an initial play-testing with 28 participants in Korea. The analysis of learning talk revealed that in the *Dilemmas in AI Ethics* game, the players' dialogues were characterized by transactional, expressive, and expository talks. The prominence of transactional talk underscores the significance of managing in-game scenarios, while expressive and expository talk contributes significantly to the overall communicative space. The observed pattern of learning talk was rather consistent across the groups. Overall, this study's findings resonate with prior research emphasizing the efficacy of games in AI ethics education, showcasing positive effects (Avin et al., 2020; Ballard et al., 2019; Bloomfield et al., 2021). The perception survey indicated that participants found the game useful and effective for deliberating on AI ethics dilemmas from diverse perspectives. However, several areas for improvement in future game design were also identified. Firstly, the *Key Values to Consider* presented on the situation cards aimed to guide game dialogue but posed challenges for learners lacking awareness of core AI ethics values, potentially causing cognitive overload. Secondly, while the game design encourages the exploration of various perspectives through a mechanism that randomly selects stakeholders, it may not provide participants with sufficient space to express their ethical beliefs and moral values systems. Thirdly, the current prototype focused on six AI ethics dilemmas. Considering the continuous emergence of new AI ethics issues, expanding the game to include various situations would ensure its adaptability in diverse educational environments.

We suggest some areas for future research and acknowledge certain limitations in this study. Firstly, the initial play-testing involved predominantly female adult learners, limiting the generalizability of our findings to younger and/or male learners. While we designed the game to be usable with a diverse range of learners, future research should explore the impact of this dialogue GBL approach within K-12 school contexts, considering the growing significance of

AI ethics education in school curricula. Secondly, our analysis of learning talk did not explore the influence of group dynamics and individual characteristics, as our focus was on the emergence of various learning talk types among players. Ethical norms and learning culture in the Korean context also need consideration when interpreting the results—Despite these limitations, we believe that this study offers alternative approaches to teaching and learning AI ethics. The game design elements, coupled with the dialogue analysis framework, can guide future research endeavors aiming to design dialogue GBL for complex issues like AI ethics.

Acknowledgements

This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (RS-2024-00350045).

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