Introducing AI Without Computers: Hands-On Literacy and Ethical Sense-Making for Young Learners

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Figure 1: Subfigure A and B show the *Introducing AI* activity. Subfigure C shows the *Are You Smarter Than AI?* activity. Subfigure D and E show the *Datasets and Data Brokers* activity. Subfigure F shows the *EthiQuest* activity.

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Abstract

Middle school students encounter AI daily, yet they often lack the tools to critically examine AI's influence on their lives. We seek to address this issue by designing activities where learners engage with AI in personally relevant contexts and "unplugged" interactions foster collaborative ethical reasoning. We present novel designs of four unplugged activities that address learning objectives such as recognizing AI, understanding AI's capabilities, and reasoning about AI ethics. We conducted a secondary analysis of

data collected during a five-day summer workshop with middle school students where our 'unplugged' activities were integrated into an existing curriculum. Teacher feedback suggests that the activities were engaging and fostered conceptual understanding. Student surveys revealed growth in students' comprehension of foundational AI concepts and ethical reasoning; however, abstract concepts were not as well understood. This study contributes a model for designing interactive AI education interventions that emphasize personal relevance and collaborative ethical reasoning.

CCS Concepts

• **Applied computing** → **Collaborative learning**; **Interactive learning environments**; *Game-based learning*; • **Social and professional topics** → **Computing literacy**; **Ethical issues**; *Technology and society*; • **Computing methodologies** → **Artificial intelligence**.

Keywords

AI Literacy, Middle School Education, Collaborative Learning, AI Education, Unplugged, AI Ethics

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1 Introduction

Artificial intelligence (AI) is affecting the lives of middle school age students (10-14 year olds). Algorithms are powered with data collected from young people who may not realize how their personal information is being used [24, 42]; social media algorithms have been linked to negative impacts on teens' mental health [1]; and advances in generative AI are reshaping the labor market young people will be entering [17]. Middle schoolers are in the formative stages of developing their personal identity, building social relationships, and exploring interests that may lead to future career paths [39, 44]. As AI impacts these processes, it is imperative that middle schoolers have opportunities to build their critical awareness surrounding AI and explore how it affects their personal lives and the world around them [12]. In this paper, we refer to *AI literacy* as defined by Long and Magerko (2020): "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" [32].

Recent studies emphasize the importance of interactive, ethics-driven AI education for middle schoolers [5, 10, 13, 15, 27, 29]. However, many AI education initiatives focus on coding and model construction, which can be inaccessible and disengaging for students without prior computer science (CS) experience [48]. While a few projects have engaged middle school students in discussions about AI ethics using low-tech activities (e.g., [13]), there remains a need for additional learning interventions that connect abstract ethical issues like algorithmic bias or data privacy to concrete experiences and emotions that middle school students are familiar with [22]. Our research addresses this challenge through activities that 1) encourage learners to think about AI in *personally relevant, real-world contexts* and 2) leverage "unplugged" (i.e., low or no tech) interactions–such as card games or crafts–to foster *collaborative ethical reasoning*.

By linking AI concepts to personally relevant ethical dilemmas and leveraging unplugged activities to foster collaborative dialogue, our approach aims to help middle schoolers develop both a high-level understanding of how AI works and the ability to critically examine its societal impact.

While prior HCI research has explored tangible computing and digital interactivity in AI learning [25, 34], much of AI education still assumes that effective engagement requires computational tools. Our work challenges this assumption, demonstrating that low-tech, participatory interventions can drive deep ethical reasoning and conceptual understanding just as effectively as high-tech interfaces while also could be effectively paired with high-tech interfaces to support different kinds of learning. By framing unplugged activities not as a limitation but as an intentional design choice, we position discussion-driven, interactive learning as an alternative within HCI's broader efforts to expand AI literacy [15, 37]. At the same time, our unplugged activity designs build on prior HCI and design research on tangible interfaces [6, 25] and low-tech activities (like card sorting) to support collaborative learning about technology [30]. Our approach aligns with ongoing calls to make AI education more accessible to students with varying levels of prior CS knowledge [32, 48] and to foster critical AI literacy through engaging, reflective learning experiences [10, 11, 15]. This study explores two key research questions: *RQ1: How can unplugged activities that center personal relevance and collaborative ethical reasoning empower middle school students to learn about AI?* and *RQ2: How do these activities support students' understanding of foundational AI concepts, including how AI works, its strengths and limitations, and ethical implications?*

This paper makes two contributions. First, we present the design of four novel unplugged activities—*Introducing AI, Datasets and Data Brokers*, *EthiQuest*, and *Are You Smarter than AI?*—that center *personally relevant* experiences and foster *collaborative ethical reasoning*. Second, we analyze student learning outcomes from a five-day summer workshop that piloted these activities. Our findings indicate that the unplugged activities enhanced middle school students' understanding of foundational AI concepts including recognizing AI, understanding AI's strengths and limitations, and reasoning about AI ethics. Furthermore, teacher feedback indicated that the unplugged activities were easy to integrate into an existing curriculum, use as standalone activities, and pair with higher tech activities, indicating the potential of these activities to flexibly scale in a variety of contexts. Our findings contribute to understanding how personal relevance and collaborative ethical reasoning can be leveraged to support AI learning in the design of interactive AI education tools, human-AI interaction, and AI literacy interventions. By demonstrating how unplugged activities engage students in AI transparency and ethics, we provide actionable design insights for HCI researchers developing accessible, participatory AI education experiences.

2 Related Work

In this section, we review relevant prior work on designing unplugged activities to foster AI literacy, AI ethics education, equity in AI education, and design principles for AI education.

2.1 Unplugged Activities for AI Education

AI education initiatives often emphasize coding, which can be inaccessible or intimidating for younger learners and resource-limited classrooms [45]. In contrast, unplugged, hands-on activities can provide low-barrier entry points to communicate foundational concepts and engage learners in collaborative dialogue. Prior HCI research highlights that tangible and interactive learning environments improve conceptual understanding by encouraging hands-on exploration and active knowledge construction [6, 25]. Our approach extends this work by demonstrating how unplugged, discussion-driven activities create interactive spaces where students engage deeply with AI concepts rather than passively receiving information.

This aligns with the goals of CS Unplugged, which has enabled CS concepts to be taught in short time frames and in contexts where technology is not accessible and engaged students in the 'big ideas' of CS without getting bogged down in details of programming syntax [7]. Recent efforts have sought to design 'AI unplugged' activities (e.g., [3, 13, 31]). However, these approaches often focus on isolated AI concepts rather than engaging students in personally relevant, socially-driven ethical discussions about AI's impact on their daily lives. Our work builds on this prior research by explicitly integrating collaborative ethical reasoning and personal relevance as core pedagogical strategies, ensuring that students not only understand AI but also reflect on its broader implications in their own digital and social worlds.

At the same time, access to AI education is often uneven, with under-resourced schools lacking the technology and expertise required for coding-based curricula [36]. Unplugged activities address this disparity by eliminating the need for specialized equipment or prior technical knowledge, making AI literacy more inclusive. This approach is particularly important during middle school, a formative period when students' interest in STEM can either solidify or wane [21, 37]. By offering physically interactive and socially collaborative learning experiences, these activities can be integrated across curricula, engaging students from diverse backgrounds and fostering equity in STEM participation.

2.2 Ethics in AI Education

Ethical reasoning is a critical component of AI literacy [11, 15, 32]. Without it, students may view AI systems as infallible, overlooking biases and potential harms embedded in algorithmic decisions [38]. Incorporating ethics into AI education allows learners to critically examine AI's societal impact, from the fairness of AI-generated art in competitions to the consequences of biased algorithms in hiring or policing [8, 9]. Research supports the value of participatory, discussion-based learning where students explore ethical dilemmas rooted in familiar, relatable scenarios [18, 19]. Some prior work has explored how to design AI education initiatives that center ethical reasoning [2], including projects that engage students in thinking about stakeholder values in technology design [13], in considering future impacts of AI via crafting design fictions [43], and in storytelling to consider AI ethics scenarios [20]. Our research expands on this work by focusing on centering ethical discussions in personally relevant contexts.

2.3 Centering Personal Relevance and Collaborative Dialogue in AI Learning

Our activity designs intentionally center two key educational principles: *personal relevance* and *collaborative dialogue*. Research highlights that connecting technical concepts to students' identities and lived experiences significantly enhances engagement and comprehension [4, 9, 19]. By grounding AI concepts in scenarios that resonate with students' everyday lives, learners are more likely to see the value and impact of these technologies, fostering intrinsic motivation to engage critically [23].

Equally important is the role of *collaborative dialogue* in supporting students' understanding of complex ethical and technical concepts. Facilitating open discussions and group-based activities encourages learners to articulate their ideas, challenge assumptions, and collaboratively reason through nuanced ethical dilemmas [32]. Prior research suggests that when learners are actively involved in shaping their own learning experiences, they engage more deeply and take greater ownership of their knowledge construction [16]. This social construction of knowledge not only deepens understanding but also builds essential communication and critical thinking skills [46].

3 Unplugged Activity Designs

We designed four unplugged activities—*Introducing AI*, *Are You Smarter than AI?*, *Datasets and Data Brokers*, and *EthiQuest*—to teach middle school students foundational AI concepts and foster critical thinking about AI's societal impacts. Each activity has an associated lesson plan to facilitate easy instruction. The activities and their learning objectives are described below. See Appendix for a summary list of learning objectives for each activity. All activity materials are included in supplemental materials.

Introducing AI (Figure 1, top left and middle) familiarizes students with recognizing AI and understanding (at a high-level) how AI works while prompting them to reflect on societal implications and their own feelings towards AI. Using the *Introducing AI Worksheet* and themed card decks, students explore AI applications, sensors, datasets, algorithms, outputs, and AI's advantages and disadvantages. The activity aims to spark curiosity about how AI functions, where it appears in daily life, and how people perceive it. This updated design builds on prior work [33] and incorporates discussion questions and a card-sorting activity that connect learners to their emotions and experiences surrounding AI, (*personal relevance*), as well as a creative construction activity that encourages *collaborative ethical reasoning* about the advantages and disadvantages of future AI technologies.

The activity begins with the *Introducing AI Worksheet*, which prompts students to answer foundational questions like "What is artificial intelligence (AI)?" and "Where have you encountered AI?" to activate prior knowledge and assess baseline understanding. Next, students engage with an AI card deck showcasing real-world AI applications. They select familiar AI applications and categorize

them using an emotion chart (e.g., trust, curiosity, worry), encouraging personal reflection on technology. Payne's curriculum [40], describing AI as taking in inputs (sensors/datasets), processing data using algorithms, and delivering outputs. Following this model, students create an "imaginary AI cube" by selecting components from the card decks to design a custom AI system, with each cube face representing inputs, algorithms, outputs, and system pros/cons. Learners are prompted to share their cubes with their peers. This collaborative speculative design [35] activity encourages creativity and critical reflection on AI's societal and ethical impacts.

Are You Smarter than AI? (Figure 1, top right) is an introductory trivia-like activity to familiarize learners with the capabilities of generative AI. The activity provides an interactive introduction to the strengths, limitations, and ethical implications of generative AI systems. Students are encouraged to actively compare human and AI capabilities throughout the activity as they engage with real-world examples of AI successes and failures (*personal relevance*). The trivia-style game with human vs. AI challenges offer meaningful opportunities for *collaborative ethical reasoning*.

The activity features an interactive slide deck that can be presented by teachers or printed for student use. On each slide, learners are presented with a challenge (e.g., write a Taylor Swift song in 20 seconds, draw a picture of a salmon swimming) and then they compare their answers with a real-world example of an AI success or failure. The customizable slide deck enables educators to adapt content and use slides in any sequence.

Datasets and Data Brokers (Figure 1, bottom left and middle) introduces students to data privacy and AI algorithms by exploring how digital platforms collect, aggregate, and sell user data to third parties like advertisers and law enforcement. This activity helps students understand how personal data—such as name, age, preferences, and online activity—is used to create detailed user profiles. It also highlights how AI algorithms personalize content and advertisements, increasing awareness of how online behavior shapes user engagement. The activity uses middle schooler profiles to make the activity *personally relevant* and incorporates role-play and a strategic guessing game to foster *collaborative ethical reasoning*. Students role-play as data brokers, analyzing fictional middle school online profiles (consisting of interests and search history) to select targeted products for marketing. This mirrors how AI clusters users, revealing how data profiling can inform marketing decisions while also exposing risks like stereotyping and privacy invasion. The activity begins with students grouping profiles for targeted ads, prompting collaborative discussions on their strategies. They then choose 1–6 products to market, justifying their choices in group discussions. Each group finalizes their product selections and documents their strategies on a handout for reflection. The activity concludes with an answer key review, revealing which profiles "purchased" products. Profiles are intentionally complex to show how online identities can be incomplete or misleading, encouraging reflection on the ethical challenges of data collection and profiling.

EthiQuest (Figure 1, top right) is a generative AI and ethics-focused card game designed to engage middle school students with real-world, age-appropriate ethical dilemmas involving AI. The game emphasizes the *personal relevance* of AI ethics by exploring creative, social, and academic contexts familiar to middle school students. Its design employs a card-game activity to foster *collaborative ethical reasoning*.

Inspired by the card game *Cards Against Humanity*, *EthiQuest* fosters active participation and discussion, allowing students to explore AI's ethical gray areas. Unlike AI ethics topics that are commonly referenced in educational settings–such as cybersecurity or biases in criminal justice [28]–each *EthiQuest* card presents a scenario that is relatable to middle school students, like using AI-generated art in school projects or enhancing social media profiles. *EthiQuest* includes three thematic card decks, each addressing a key ethical theme in AI: 1) *Creativity (Orange Deck):* Explores AI's role in creative tasks, prompting discussions on ownership and fairness in using AI-generated content, such as in art competitions or creative projects; 2) *Authenticity (Yellow Deck):* Examines how AI shapes personal identity and social interactions, questioning the ethics of AI-enhanced social media profiles and self-representation; and 3) *Responsibility (Blue Deck):* Focuses on accountability in AI-driven decisions, highlighting issues like misinformation and algorithmic bias. Learners are prompted to engage in discussion surrounding each card. Instructors have the ability to customize which cards are discussed, giving the activity flexibility for variable contexts and time constraints.

4 Methodology

4.1 Data Collection

The activities were implemented during a five-day summer AI workshop at North Carolina State University (NCSU). The workshop blended unplugged activities created by our team (*Introducing AI*, Day 1; *Ethiquest*, Day 1-4; *Are You Smarter Than AI?*, Day 4; *Datasets and Data Brokers*, Day 5) with plugged activities from the hosts.

Data were collected by researchers at NCSU with approval from their IRB. Our team (at Northwestern University) conducted a secondary analysis of anonymized pre- and post-surveys and daily exit ticket surveys (see Appendix for the instruments) and gathered informal feedback from instructors. Pre-surveys (Day 1) assessed baseline AI knowledge, prior computer science experience, and demographics, while post-surveys (Day 5) measured changes in AI understanding and ethical attitudes. Daily exit tickets (Days 1–4) with questions designed by our team evaluated learning outcomes from our unplugged activities. The NCSU team did not ask exit ticket questions for the Ethiquest activity, but teacher feedback provided valuable insights into its performance. Exit tickets were brief (2–4 questions, under 15 minutes) and questions were open-ended (see Appendix).

4.2 Data Analysis

To evaluate students' learning outcomes, we developed specific rubrics for each question, with each rubric carefully designed to align with the learning objectives of the corresponding question. These rubrics followed the same general structure to score exit ticket responses (see Appendix for full rubrics). Responses were categorized into four levels: Inadequate (0 points) for irrelevant or incorrect answers, Partial (1 point) for superficial or slightly inaccurate responses, Adequate (2 points) for correct and sufficiently detailed answers, and Excellent (3 points) for responses

demonstrating deep understanding and insightful analysis. Two authors independently qualitatively coded all responses using the rubrics, ensuring consistency and minimizing bias. After initial coding, they met to compare results, resolve discrepancies through discussion, and refine the rubric as needed to improve clarity and alignment with activity goals. Although the workshop involved other activities, our analysis focused exclusively on data related to our unplugged activities.

5 Results

5.1 Demographic Data

Participants included 24 middle school students from a summer AI education camp in the southern United States. Demographic data was collected for 22 participants. Ages ranged from 11 to 13 (average: 12). The grade distribution included 2 sixth graders, 11 seventh graders, and 9 eighth graders. Regarding gender, 50% identified as male, 40.9% as female, and 9.1% as other. Ethnic backgrounds were 27.3% White, 36.4% South Asian/Indian, 18.2% Black/African American, 4.5% Middle Eastern, 4.5% American Indian/Native Alaskan, and 9.1% Other or not listed. Participants' prior computer science experience varied: 2 had no experience, 3 had rarely participated in CS learning experiences, 10 engaged occasionally, 4 participated frequently, and 3 reported daily involvement.

5.2 Exit Ticket Surveys

The rubric analysis of exit ticket questions showed varying understanding across activities: 23 students answered *Introducing AI*, 24 answered *Are You Smarter than AI?*, and 23 answered *Datasets and Data Brokers*.

5.2.1 Introducing AI. Student responses showed that students recognized AI in their daily lives, citing examples like "virtual assistants" and "recommendation systems" (Q1, M = 2.52). They also demonstrated an adequate understanding of the data types AI uses as inputs, correctly identifying examples like "pictures" and "text." (Q2, M = 1.52). While many students understood the basics of how AI processes input data, they struggled to explain data processing or mention "algorithms," indicating the need to emphasize these concepts more in future activities (Q3, M = 1.39). Overall, the *Introducing AI* activity showed students could recognize AI but struggled more with understanding AI data processing.

5.2.2 Are You Smarter than AI?. Most students (n=14) demonstrated an adequate understanding of tasks where AI excels by citing examples such as "creating texts" (Q1, M = 1.38). Responses on AI's weaknesses scored slightly higher (Q2, M = 1.58), with students mentioning examples like math or riddles (introduced during the activity). On AI "hallucinations," most learners understood that AI can make mistakes, yet few could not remember the the term "hallucinations" (Q3, M = 1.54). Overall, in the *Are You Smarter than AI?* activity, students demonstrated a growing awareness of AI's capabilities and its constraints, fostering critical thinking about how AI can be applied in real-world contexts.

5.2.3 Datasets and Data Brokers. When asked for examples of data collected by online platforms (Q1, M = 2.04), most students cited things like "search history" or "preferences," with some going beyond simple identification to explain why such data is collected. Similarly, students identified "Netflix recommendations" and "Instagram ads" as examples of personalized content (Q2, M = 2.04), demonstrating awareness of AI's role in shaping online experiences and related ethical concerns. Overall, the *Datasets and Data Brokers* activity demonstrated students' understanding of data privacy and AI-driven personalization, prompting critical thinking about the ethical implications of data collection.

5.3 Teacher Feedback

Teacher feedback highlighted the effectiveness of unplugged, hands-on activities in fostering deeper student engagement and understanding. One teacher noted, *"The kids really enjoyed all the hands-on activities that involved teamwork and planning, like card games,"* while another shared, *"Computer activities engaged the kids, but physical, hands-on activities built stronger understandings and experiences."* Furthermore, one teacher provided specific insights on the Ethiquest activity, stating, *"I was able to gauge the students' knowledge most effectively during [this] activity... it allowed me to understand... what they think about the ethical and unethical aspects of AI."* These insights underscore the value of collaborative, unplugged learning in enhancing comprehension [47].

6 Discussion

In this paper, we sought to answer two research questions. In response to **RQ1**, we present the design of four novel activities that utilize personally relevant contexts and unplugged interactions to foster collaborative ethical reasoning. In response to **RQ2**, we present a preliminary evaluation of student learning outcomes and teacher feedback from an implementation of the activities in a five day summer workshop.

The exit ticket surveys suggest that unplugged activities effectively support middle school students' understanding of foundational AI concepts such as recognizing AI in daily life (*Introducing AI*) and identifying strengths and weaknesses of AI (*Are You Smarter Than AI?).* Teacher feedback indicated that students engaged in collaborative ethical reasoning with *EthiQuest*. This suggests that *personally relevant contexts* and the use of unplugged interactions to foster *collaborative ethical reasoning* may be productive design principles for interactive AI learning experiences, as suggested by prior work [10, 22]. However, future research is needed to substantiate that these principles specifically led to learning. The *Datasets and Data Brokers* activity was especially effective in teaching both technical and ethical aspects of AI. Students who role-played as data brokers scored especially well on questions about how data influences personalized content online, suggesting that real-world simulations may help clarify how AI systems collect and use data. This aligns with prior research that leverages participatory simulations [41] and role-play [26] to teach about complex concepts. However, students did not score as well on questions about explaining abstract concepts, like how an algorithm processes data (*Introducing AI*). They also struggled to move beyond recognition to explain underlying causes of topics like AI strengths and weaknesses (*Are You Smarter than AI?*). The seamless integration of these

Question	Inadequate (0)	Partial (1)	Adequate (2)	Excellent (3)	Avg. Score
Q1 (N = 23)	0	4	3	16	2.52
Q2 (N = 23)	3	5	15	0	1.52
Q3 (N = 23)	6	2	15	0	1.39

Table 1: Distribution of student responses across scoring categories for the *Introducing AI* questions: Q1: What are a few examples of AI technologies that you use in everyday life?; Q2: What is an example of data that can be input to AI?; Q3: What does AI use to make sense of its input data?

Question	Inadequate (0)	Partial (1)	Adequate (2)	Excellent (3)	Avg. Score
Q1 (N = 24)	5	5	14	0	1.38
Q2 (N = 24)	4	7	8	5	1.58
Q3 (N = 24)	6	0	17	1	1.54

Table 2: Distribution of student responses across scoring categories for *Are You Smarter than AI?* questions: Q1: What is an example of a task that AI is good at?; Q2: What type of tasks is AI bad at?; Q3: What is it called when AI makes up information?

Question	Inadequate (0)	Partial (1)	Adequate (2)	Excellent (3)	Avg. Score
Q1 (N = 23)	3	0	13	7	2.04
Q2 (N = 23)	1	1	17	4	2.04

Table 3: Distribution of student responses across scoring categories for *Datasets and Data Brokers* questions: Q1: Give an example of data that is collected about you when you use online platforms.; Q2:Give an example of where you see personalized content in your daily life.

activities into a curriculum with plugged activities and the flexibility of certain activities (*Are You Smarter than AI?*, *EthiQuest*) to be slotted throughout the workshop indicates the value of designing flexible AI education interventions with easy-to-follow lesson plans, as called for in prior work [14]. Our findings provide empirical evidence that developmentally-appropriate activities can effectively integrate technical and ethical learning about AI [20, 43].

This paper presents a preliminary evaluation that we plan to build on in future work. This study's sample limits generalizability across cultural and educational contexts. The absence of topic-specific pre-assessments restricts our ability to directly attribute learning gains to the activities. While we can speculate on elements of the designs that led to learning, future research is needed to substantiate a causal effect. Integration with other AI lessons may also have influenced results. Relying solely on written responses and teacher feedback limited insights into student engagement and peer collaboration. Finally, we did not assess long-term retention or the transfer of learning to new contexts. We hope to further explore how these activities foster student learning in future work.

7 Conclusion

This study demonstrates the efficacy of unplugged activities in fostering AI literacy among middle school students by combining personally relevant learning with collaborative ethical reasoning. Role-play, hands-on tasks, and real-world scenarios helped students grasp foundational AI concepts, particularly those related to data privacy and AI-driven personalization. However, students struggled to articulate underlying mechanisms and explain abstract concepts, underscoring the need for future work on concretizing these ideas and fostering deeper reflection. Teacher feedback confirmed that unplugged activities enhance engagement and fit easily into both digital and non-digital curricula, making them an accessible AI education approach.

Our work contributes to the CHI community by advancing discussions on interactive learning environments, human-AI interaction, and AI transparency in AI literacy interventions. Specifically, we provide design insights into how unplugged, discussion-driven activities can foster critical engagement with AI systems. Moving forward, CHI researchers can explore how similar unplugged and personally relevant, collaborative approaches might be adapted for other AI literacy challenges—such as fairness in algorithmic decision-making or explainability in human-AI collaboration—broadening the scope of interactive AI education beyond coding-based curricula. Additionally, our findings highlight the need for more empirical studies within HCI that examine how different pedagogical structures impact engagement and learning outcomes in AI ethics education. Our findings contribute to the design of AI education by emphasizing personally relevant contexts and collaborative ethical reasoning, fostering engagement, accessibility, and critical thinking about AI's societal role.

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A Appendix

A.1 Learning Objectives

The learning objectives for each activity are summarized in Table 4.

A.2 Exit Ticket Questions

A.2.1 Introducing AI.

- What are a few examples of AI technologies that you use in everyday life?
- What is an example of data that can be input to AI?
- What does AI use to make sense of its input data?

A.2.2 Datasets and Data Brokers.

- Give an example of data that is collected about you when you use online platforms.
- Give an example of where you see personalized content in your daily life.

A.2.3 EthiQuest.

- Imagine you're entering a drawing contest. What is an advantage of using generative AI to generate your image?
- What is a disadvantage of using generative AI for the drawing contest?

A.2.4 Are you smarter than AI?.

- What is an example of a task that AI is good at?
- What type of tasks is AI bad at?
- What is it called when AI makes up information?

A.3 Rubrics for Exit Ticket Questions

A.3.1 High-level Rubric.

- **0 - Inadequate answer** = Participant did not answer or answered with irrelevant, incomplete, or incorrect information.
- **1 - Partial answer** = Participant answered part of the question correctly or demonstrated some understanding related to the learning goal, but did not fully demonstrate that they achieved or reached the learning goal.
- **2 - Adequate answer** = Participant answered the question competently and completely, demonstrating that they have reached the learning goal.
- **3 - Excellent answer** = Participant demonstrated that they thoroughly understood the learning goal and expended passed by going above and beyond in their response to the question.

A.3.2 Analyst Notes.

- An adequate answer demonstrates that the participant has understood the learning goal. An Excellent answer is like bonus points. If all/most of the participants answered at a Level 2, the exhibit would be doing a good job at communicating its learning outcome(s).
- Some questions do not have possible partial answers. For these questions, the rubric line for partial answer is marked N/A and you will have to choose between Level 0, 2, and 3.

A.3.3 Detailed Rubrics. The detailed rubrics, specific to each activity, are included in the tables below: *Introducing AI* (Tables 5 - 7), *Are you smarter than AI?* (Tables 8-10), and *Datasets and Data Brokers* (Tables 11 - 12).

Activity	Learning Objectives
Introducing AI Activity	• Many everyday technologies use AI. • AI uses data like pictures, numbers, or words as input to learn from. • AI uses algorithms to make sense of the input data and produce an output. • Data can come from sensors and many other sources. • All AI has both advantages and disadvantages.
Datasets and Data Brokers	• Everyday platforms collect data such as users' personal information, preferences, and online activity. • AI algorithms analyze user data to generate and customize personalized content and advertisements in order to engage users. • To generate personalized recommendations, AI makes assumptions about your interests and who you are similar to. These assumptions may not always be correct and can replicate biases or stereotypes. • Data brokers sell users' profiles to companies, so personalized content comes at the expense of data privacy.
EthiQuest	• AI can be used in creative, social, and academic contexts. • Basic ethical concerns related to AI, such as fairness and bias, in familiar scenarios (e.g., AI-generated art or social media filters). • Generative AI can influence perceptions of authenticity and responsibility, providing examples of both advantages and disadvantages. • There are ethical dilemmas surrounding generative AI, particularly concerning fairness, bias, accountability, agency, and responsibility.
Are You Smarter than AI?	• AI does not always generate accurate results. • Tasks involving logic and reasoning may be difficult for generative AI. • Generative AI sometimes generates hallucinations, or false information that may appear plausible. • Generative AI is good at tasks that involve identifying patterns and replicating data.

Table 4: Learning outcomes for each unplugged AI activity.

Criteria	Inadequate answer (0 point)	Partial answer (1 point)	Adequate answer (2 points)	Excellent answer (3 points)
Understanding and Relevance of Examples	Provides no relevant examples of AI technologies or demonstrates a misunderstanding of AI.	Mentions one AI technology OR mentions a few AI technologies but responses have inaccuracies or mix correct and incorrect examples.	Provides 2 relevant examples of AI technologies.	Provides 3 or more relevant examples of AI technologies, OR provides 2 relevant examples with clear descriptions of each OR under- standing their role in daily life.

Table 5: Rubric for Introducing AI Activity Exit Ticket – Question 1, What are a few examples of AI technologies that you use in everyday life?

Criteria	Inadequate answer (0 point)	Partial answer (1 point)	Adequate answer (2 points)	Excellent answer (3 points)
Understanding Types of Data that Could Serve as Input for AI	Lacks understanding of what input data is OR provides an irrelevant or unclear example, OR fails to provide a valid example of data that could serve as input for AI.	Shows an understanding of what input data is BUT fails to provide an example of a data type that could serve as input for AI.	Provides 1-2 relevant examples of data types that could serve as AI inputs (e.g., text, images).	Provides 3 or more relevant examples of input data, OR provides 1-2 relevant examples with mentioning their application in AI systems.

Table 6: Rubric for Introducing AI Activity Exit Ticket – Question 2, What is an example of data that can be input to AI?

Criteria	Inadequate answer (0 point)	Partial answer (1 point)	Adequate answer (2 points)	Excellent answer (3 points)
Understanding that AI Uses Algorithms to Make Sense of Input Data	Fails to mention the term 'algorithms' OR provides incorrect or irrelevant information.	Provides a general explanation of algorithms BUT fails to mention the term 'algorithms'.	Mentions that AI uses 'algorithms' to process input data.	Mentions that AI uses 'algorithms' to process input data by providing examples (e.g., neural networks, decision trees)

Table 7: Rubric for Introducing AI Activity Exit Ticket – Question 3, What does AI use to make sense of its input data?

Criteria	Inadequate answer (0 point)	Partial answer (1 point)	Adequate answer (2 points)	Excellent answer (3 points)
Relevant Example Provided	Fails to provide a relevant example, OR the example does not relate to generative AI's capabilities.	Provides an example, but it is somewhat vague or only loosely related to generative AI's capabilities.	Provides one relevant example of a task that generative AI is good at.	Provides more than one relevant examples OR provides one relevant example by clarifying why AI is good at the task.

Table 8: Rubric for Are You Smarter than AI? Exit Ticket – Question 1, What is an example of a task that AI is good at?

Criteria	Inadequate answer (0 point)	Partial answer (1 point)	Adequate answer (2 points)	Excellent answer (3 points)
Relevant Example Provided	Fails to provide a relevant example, OR the example does not relate to generative AI's limitations.	Provides an example, but it is somewhat vague or only loosely related to generative AI's limitations.	Provides one relevant example of a task AI is bad at.	Provides more than one relevant examples OR provides one relevant example by clarifying why AI is bad at the task.

Table 9: Rubric for Are You Smarter than AI? Exit Ticket – Question 2, What type of tasks is AI bad at?

Criteria	Inadequate answer (0 point)	Partial answer (1 point)	Adequate answer (2 points)	Excellent answer (3 points)
Understanding of Hallucinations	Fails to identify AI 'hallucinations' OR provides an inaccurate explanation without understanding the concept.	N/A.	Mentions the term 'hallucination' without any inaccurate explanation.	Mentions the term 'hallucination' and defines it with a general explanation.

Table 10: Rubric for Are You Smarter than AI? Exit Ticket – Question 3, What is it called when AI makes up information?

Criteria	Inadequate answer (0 point)	Partial answer (1 point)	Adequate answer (2 points)	Excellent answer (3 points)
Relevant Example Provided	Fails to provide a relevant example OR provides inaccurate examples.	Provides an example, it can lack relevance to collected data in online platforms.	Identifies 1-2 relevant examples of personal data that is collected in online platforms.	Identifies more than two relevant examples OR identifies one relevant example by clarifying why the data is being collected in online platforms.

Table 11: Rubric for Datasets and Data Brokers Exit Ticket – Question 1, Give an example of data that is collected about you when you use online platforms.

Criteria	Inadequate answer (0 point)	Partial answer (1 point)	Adequate answer (2 points)	Excellent answer (3 points)
Relevant Example Provided	Fails to provide a relevant example OR provides inaccurate examples.	Provides an example, but it is vague or lacks direct relevance to personalized content.	Identifies 1-2 relevant examples of personalized content.	Identifies more than two relevant examples OR identifies one relevant example by clarifying how the content is personalized.

Table 12: Rubric for Datasets and Data Brokers Exit Ticket – Question 2, Give an example of where you see personalized content in your daily life.