

AILitHub: Building AI Literacy Infrastructure to Situate Frameworks into Practice

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Abstract

While AI literacy frameworks are becoming more widely adopted, a key gap remains: we still lack practical infrastructure for educators to collect, share, and understand real classroom cases that connect framework ideas to situated teaching practice. Such infrastructure may help strengthen the connection between theory and practice. In this work, we present AILitHub, a multilingual and scalable web system that enables teachers to contribute AI-related educational cases and annotate them with stakeholders and competencies defined in the OECD AI Literacy Framework. We position AILitHub as an early infrastructure for future professional learning and research. It contributes a scalable case-collection mechanism and may provide practice-grounded evidence that can inform future framework refinement and AI education design. In a preliminary deployment within an AI literacy professional training program, we successfully collected 53 complete teacher-contributed cases. Early results suggest that, while teachers showed strength in contributing positive cases demonstrating AI literacy, they may lack the skill or awareness to identify and provide negative examples.

Keywords

AI Literacy, Generative AI, AI in Education, Educational Data Mining, Teacher Education, Educational Dataset

1. Introduction

As AI becomes increasingly embedded in educational contexts, the need for AI literacy education has grown. In response to this growing demand, many AI literacy frameworks have emerged to offer high-level guidance about what learners and teachers should know and be able to do in AI-rich educational contexts [1, 2]. However, there is limited infrastructure to collect real-world, classroom-based AI literacy cases that can connect framework concepts to teachers' daily teaching decisions [3]. Without such infrastructure, opportunities to connect framework concepts with authentic classroom experiences remain limited. We conceptualize this connection as a cycle in which teachers document situated AI-related experiences, interpret them through framework-aligned annotations, and contribute examples that can be compared across contexts and over time.

To address this need, we introduce **AILitHub**, a multilingual and scalable web platform for teachers to document, annotate, discuss, and share authentic AI-related educational cases with a broader community. Each case is annotated by teachers from three aspects: (1) whether a case reflects the presence or absence of AI literacy, (2) the involved educational stakeholders, and (3) the related AI literacy competencies in the OECD Framework [4]. We deployed AILitHub in an AI literacy professional training program for K-12 teachers and collected an initial dataset of 53 complete teacher-contributed cases. From an initial descriptive analysis of stakeholder patterns, competency mappings, and differences between AI-literate and non-AI-literate cases, we found that teachers and students were the most frequently mentioned stakeholders, competency mappings focused on practical judgments, and AI-literate cases were more numerous and richer. These findings provide initial evidence for the feasibility of a teacher-sourced, case-based approach to connecting AI literacy frameworks with educational practice.

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AILitHub builds on long-standing traditions of case-based teacher learning and framework-guided reflection by translating them into reusable infrastructure for AI literacy practice. The platform combines teacher-authored case collection, multilingual submission, stakeholder tagging, and framework-aligned annotation, supporting both professional learning and the construction of structured educational data grounded in authentic practice.

2. Related Work

The Theory-Practice Gap in AI Literacy AI literacy is increasingly framed as more than technical familiarity: it includes understanding, use, evaluation, creation, and ethical judgment around AI systems [5]. Teacher-focused reviews also show that AI literacy in education remains an emerging area, and that teachers' practical knowledge and professional judgment are less developed than technical or conceptual dimensions [1]. Empirical studies of teachers' reactions to generative AI also suggest that concerns, acceptance, and professional-development needs vary across grade bands and teaching contexts, making one-size-fits-all support insufficient [6]. Critical perspectives further argue that educators need support not only to adopt AI tools, but also to question dominant narratives, examine power and ethics, and preserve professional agency in AI-rich settings [2]. Prior literature points to a persistent gap between framework-level descriptions of AI literacy and the situated judgments teachers make in everyday practice [1, 2]. More broadly, educator uptake of AI is shaped by social, psychological, and contextual factors, so progress depends on understanding educators in practice rather than focusing only on technical capability or system performance [7]. Work on context-sensitive design in educational AI similarly argues that educators need tools that function in culturally and socially complex settings, and that trustworthy implementation depends on collaboration among educators, developers, and researchers as systems meet local practice [8, 9]. Although researchers have begun to examine how professional-development training shapes teachers' AI literacy, this line of work still focuses primarily on evaluating PD outcomes rather than on building scalable infrastructure for collecting and analyzing authentic classroom cases [10]. This suggests a need for systems that do more than present competencies: they should also capture how teachers interpret, apply, contest, and annotate AI-related incidents in real educational settings [2, 8].

Teachersourcing and Case Knowledge In teacher education, case knowledge has long been valued because it preserves the contextual richness of practice rather than reducing teaching to abstract rules [11]. Cases can function as prototypes, precedents, and parables, helping teachers reason across situations while linking concrete events to broader principles and values [11]. Cases, portfolios, and problem-based inquiries, have been used to support teacher learning in context and to produce more valid forms of professional assessment [12]. More recent work shows that case-based teacher education can prepare teachers for diagnostic judgment in unexpected situations by foregrounding uniqueness, connecting theory to practice, and opening space for multiple interpretations of the same event [13]. Recent studies also show that cases are not only materials teachers read: they are also materials teachers compose [14]. Teacher-authored written and video cases support dissemination, reflection, and knowledge co-production, while yielding richer data about what teachers view as salient in practice [14]. This is especially relevant for AI literacy, where classroom incidents are often highly contextual, value-laden, and distributed across multiple stakeholders.

Structured teacher-composed cases can also be understood as a form of educational dataset. Recent EDM research has increasingly treated complex educational artifacts as analyzable data, including teacher communities as sites of practical knowledge sharing [15], teacher-created teaching and learning activities as records of educators' design decisions [16], and classroom dialog as material for qualitative coding and computational analysis [17]. At the same time, this line of work has also highlighted an ongoing need for high-quality annotated training datasets, especially when researchers aim to study nuanced and context-dependent aspects of educational practice [17]. AILitHub builds on this broader view of educational data by collecting teacher-authored AI literacy cases in a structured format. Unlike general educational resource repositories or teacher-sharing communities, AILitHub is designed specifically to connect situated classroom cases with AI literacy interpretation. Each case preserves teachers' narrative accounts of practice while also requiring structured AI-literate/non-AI-literate

Teacher Profile
Please provide your professional details for statistical analysis.

Example Submission
Describe a scenario, lesson plan, or experience involving AI in your classroom.

AI Literate Example
"A teacher used an AI tool to generate a new elective course syllabus and materials. What previously took 20 hours to design now took only 2 hours. With this time savings, the teacher offered more elective courses, enabling students to learn additional subjects and successfully apply to better universities."

Not AI Literate Example
"A teacher used AI to generate test papers without reviewing the content. The AI-produced questions contained inappropriate material and factual errors. The teacher distributed these tests directly to students, causing confusion and negative educational impact."

Your Example *
Example: [Who] used [AI tool/method] to [action], which resulted in [outcome/consequence].

Classification
Is this example indicative of AI Literacy? *
AI Literate Not AI Literate 3.1 3.2

Multiple choice: Which roles are involved in this example? *
Student Teacher Parent School Administration Government Curriculum Developer EdTech Company
Researcher/Academic Community/Public Others

Which AI Literacy Competencies Are Involved in This Example? 3.3
Select the specific competences from the AI Literacy Framework that your example addresses (or lacks, if not AI literate).

Engaging with AI
Engaging with AI in daily life involves using AI as a tool to access new content, information, or recommendations.
☐ Recognize AI's role and influence in different contexts.
☐ Evaluate whether AI

Creating with AI
Creating with AI consists of collaborating with AI in a creative or problem-solving process.
☐ Use AI systems to explore new perspectives and approaches that build upon original ideas.
☐ Visualize, prototype, and

Managing AI
Managing AI requires intentionally choosing how AI can support and enhance human work.
☐ Decide whether to use AI systems based on the nature of the task.
☐ Decompose a problem based on the capabilities

Designing AI
Designing AI empowers learners to shape AI through hands-on exploration of the data used by AI models and engagement with AI design decisions.
☐ Describe how AI systems can be designed to support a solution to a

Figure 1: In AILitHub, a teacher completes one case in three steps: (1) *Introduce*: provide basic teacher profile information; (2) *Document*: read an example case and submit their own AI-related educational case; (3) *Annotate*: classify the case as *AI Literate* or *Not AI Literate* (3.1), select the relevant stakeholders (3.2), and choose the AI literacy competencies that best correspond to their case (3.3). In the initial deployment, teachers used the Traditional Chinese version, which has the same layout and content.

classification, stakeholder tagging, and competency annotation aligned with the OECD AI Literacy Framework. This design makes cases searchable, comparable, and analyzable across submissions while retaining contextual richness. In this sense, AILitHub is not only a platform for sharing examples, but also an early infrastructure for building a practice-grounded educational dataset that can support future EDM analysis of how AI literacy is recognized, interpreted, and enacted in educational contexts.

3. Methods

3.1. AILitHub System Design

We developed the AILitHub, a web-based case collection and annotation tool designed to gather teachers' submissions of AI-related cases from educational practice. The system was built as a multilingual online application with support for English, Spanish, Simplified Chinese, and Traditional Chinese, so that teachers from different linguistic and cultural contexts could contribute cases in their preferred language (Figure 1). Participants first provided background information including email, country/region, gender, age group, institution type, teaching setting, education level, whether they identify as an IT teacher, and whether they had prior AI-related professional development (PD) training. Before submitting their own narrative case, participants could review example cases for inspiration. For each case, participants were asked to classify the case as *AI Literate* or *Not AI Literate*, identify the stakeholders (options include student, teacher, parent, school administrator, government, curriculum developer, edtech company, researcher, community, and others) involved, and map the case to one or more competencies from the OECD AI Literacy Framework [4]. We chose this framework because it was developed specifically for primary and secondary education and is intended to support teachers, education leaders, policymakers, and learning designers in developing learning materials, standards, school-wide initiatives, and responsible AI policies. Its four-domain structure: engaging with AI, creating with AI, managing AI, and designing AI, also provided a concrete and practice-oriented annotation scheme for connecting teacher-authored cases to AI literacy competencies. Cursor was used to assist with debugging and implementing portions of the AILitHub website. All AI-assisted code suggestions were reviewed, tested, and edited by the authors. We deployed the website on Vercel.

3.2. Initial Deployment and Participants

We deployed the AILitHub in an online, livestream PD program on AI literacy in education in an East Asian educational context. The program enrolled over 200 in-service teachers, and participation in the workshop counted toward required annual PD hours. During the workshop, participants spent approximately 10 minutes in the system to contribute one AI-related educational case from their own practice after receiving instructions on the OECD AI Literacy Framework [4]. Because one goal of AILitHub is to understand how teachers themselves interpret AI literacy frameworks, we treat the resulting labels as teacher-perceived mappings rather than validated expert codes. These annotations should therefore be interpreted as evidence of teacher recognition and perception rather than ground-truth competency assignments. A total of 69 submissions were received. After excluding invalid responses (e.g., duplicated submission), the resulting dataset comprised 53 complete submissions from

53 unique teachers. 75% of participants were female, and 62% taught in public schools. The majority ($N=51$) taught disciplines outside of information technology (IT), and only 13% ($N=7$) reported prior AI-related training. Participation was voluntary, and the study was approved by the authors' institutional IRB. Given the exploratory nature of this first deployment, we present the resulting analyses as a dataset snapshot and feasibility demonstration rather than as evidence of teacher learning outcomes or validated competency distributions.

4. Dataset Snapshot and Early Findings

To illustrate participant contributions to this system, we present a representative case (Figure 2).

Example ID: 89

Participant Background: Public school, In-person, Not IT teacher, Did not receive previous AI-training

Description: "In a natural science class for upper elementary students, I found that students had a limited understanding of the textbook concept of "ecosystems," especially when it came to the cause-and-effect relationships involved in food chains and environmental change, which felt abstract to them. Because there was a wide range of ability levels in the class, I wanted to prepare differentiated materials, but writing multiple versions myself would have been extremely time-consuming, so I tried using AI as a support tool for instructional material design."

Stakeholders: Teacher, Student

AI-Literate: True

OECD AI Literacy Competencies (4): **CRE-2:** Visualize, prototype, and combine ideas using different types of AI systems; **DES-1:** Describe how AI systems can be designed to support a solution to a community problem; **ENG-2:** Evaluate whether AI outputs should be accepted, revised, or rejected; **MAN-3:** Direct generative AI systems by providing specific instructions, appropriate context, and evaluation criteria

Figure 2: A submitted teacher example of AI use for differentiated teaching.

Pattern 1: Teachers and Students Were the Most Frequently Mentioned Stakeholders Teachers ($N=47$) were the most frequently appearing stakeholder across the examples, followed by students ($N=41$). The most prevalent stakeholder pairing was teacher and student, observed in 26 cases (49%), with teacher-only examples as the second most frequent ($N=8$, 15%). Several examples also incorporated broader stakeholder groups, typically in combination with teachers and students, including parents ($N=9$), community members ($N=6$), curriculum developers ($N=4$), school administrators ($N=3$), edtech companies ($N=1$), researchers ($N=1$), government ($N=1$), and others ($N=2$). Only two cases did not directly involve teachers or students.

Pattern 2: Teacher-Selected Competency Mappings Focused on Practical Judgments There is an imbalance in the frequency with which competencies were associated with cases. Participants treated cases as multidimensional, with every case linked to at least two competencies (mean = 7.52, median = 6, mode = 4). The most frequently selected were Evaluate whether AI outputs should be accepted, revised, or rejected (ENG-2, $N=38$); Describe how AI systems can be designed to support a solution to a community problem (DES-1, $N=31$); Collaborate with generative AI systems to elicit feedback, refine results, and reflect on thought processes (CRE-3, $N=29$); Decide whether to use AI systems based on the nature of the task (MAN-1, $N=28$); and Recognize AI's role and influence in different contexts (ENG-1, $N=26$). By contrast, several competencies appeared infrequently, including Explain how AI could be used to amplify societal biases (ENG-4, $N=5$); Analyze how well the use of an AI system aligns with ethical principles and human values (ENG-6, $N=6$); Describe how AI systems consume energy and natural resources (ENG-5, $N=9$); and Collect and curate data that could be used to train an AI model by considering relevance, representation, and potential impact (DES-3, $N=9$).

Pattern 3: AI-Literate Cases Were More Numerous and Often More Detailed There is an imbalance in both the quantity and depth of AI-literate and non-AI-literate submissions. The majority ($N=43$) of cases were annotated as AI-literate, with substantially fewer ($N=10$) identified as non-AI-literate. AI-literate cases tended to be more original and detailed, offering greater thematic diversity and richer situational detail. While the tool's example emphasized teacher efficiency and positive academic outcomes, participants extended beyond that framing to describe AI-supported parent communication, SEL-oriented counseling, simulated practice for student intervention and empathetic communication, and creative multimodal learning activities. Only one submission was similar to the example provided. On the other hand, among the ten non-AI-literate cases, half closely echoed the pattern of the example in the tool: a person generates materials with AI without reviewing the content, and the product contains

inappropriate material and factual errors.

5. Discussion

AI literacy frameworks are valuable for defining the knowledge and skills needed in AI-rich contexts, but their abstract nature can make them hard to apply in everyday classroom practice. At the same time, framework developers themselves lack a steady supply of timely, real-world cases spanning the full spectrum of classroom situations needed to interpret and iteratively refine these frameworks. AILitHub takes an initial step toward addressing this two-sided gap by enabling teachers to document concrete cases and annotate them with stakeholder roles and OECD framework competencies. As the repository grows, AILitHub could evolve into shared infrastructure for a wider ecosystem of stakeholders, including policymakers, framework developers, researchers, and AI education product designers. These stakeholders otherwise have limited access to practice-grounded evidence.

Drawing on data from our initial deployment, the practical-competency bias (Pattern 2 in Section 4) and positive-case bias (Pattern 3 in Section 4) we identified carry distinct implications for each group of stakeholders. **For professional development facilitators**, the patterns suggest that teachers are already relatively comfortable recognizing and describing AI literacy in forms that are immediate, practical, and pedagogically actionable, which is an important strength to build on. The relative absence of cases tied to societal, ethical, and technical competencies, however, points to a need for PD that goes beyond tool adoption and efficiency-oriented use cases, and more explicitly cultivates critical reflection on bias, values, environmental cost, and data practices. **For framework developers**, the uneven distribution of competency mappings provides preliminary signals about which OECD competencies are most readily anchored in classroom practice (e.g., ENG-2, DES-1, CRE-3) and which remain abstract or invisible to teachers (e.g., ENG-4 on societal bias, ENG-5 on environmental cost, ENG-6 on ethical alignment) in this deployment. These signals can inform iterative refinement, including clearer descriptors, better exemplars, or finer-grained sub-competencies for the under-represented dimensions. **For AI education product designers and edtech entrepreneurs**, the case repository surfaces what teachers actually do with AI tools and where they struggle: differentiated material design, parent communication, SEL-oriented counseling, simulated practice, and creative multimodal activities, which offer practice-grounded signals to align product roadmaps with authentic classroom needs rather than assumed ones.

6. Limitations and Future Work

This work has several limitations that motivate corresponding next steps. Because the initial sample is small ($N=53$) and drawn from a single professional-development context, future work should expand and diversify contributions across cultures, school types, and educator populations to test whether these patterns hold in broader settings. Because the dataset relies on self-annotation, we cannot yet determine how reliably participants applied AI-literate labels or selected OECD competencies, making deeper analysis of annotation quality, inter-rater agreement, and alignment with independent coding an important next step. In addition, the non-AI-literate submissions that closely mirror the provided example suggest that some responses may have been shaped by the tool's scaffolds rather than participants' own situated judgments. Future iterations should therefore revise prompts, provide better examples, and incorporate validity checks to elicit richer, less template-like narratives, especially for non-AI-literate cases.

Looking further ahead, as AILitHub grows into a larger and more diverse corpus, its paired case narratives and structured annotations could serve as a valuable resource for data mining and machine learning research at the intersection of AI literacy and educational data science. Promising directions include unsupervised discovery of case typologies, mining stakeholder-competency co-occurrence networks, modeling regional or contextual variation in AI literacy enactment, and training models that can assist teachers in annotating, retrieving, and reasoning over situated cases. We see AILitHub not only as a tool for teacher reflection, but also as an evolving educational dataset that can support data mining, learner and teacher modeling, and critical AI literacy research within the broader KDD and AIED community.

Declaration on Generative AI

During the preparation of this work, the authors used GPT-5 and Grammarly in order to: grammar and spelling check, paraphrase and reword. The authors also used Cursor with Claude Sonnet 4.6 to assist with code development for the ALLitHub system. After using these tools, the authors reviewed and edited the content and code as needed and take full responsibility for the publication's content.

References

- [1] K. Sperling, C.-J. Stenberg, C. McGrath, A. Åkerfeldt, F. Heintz, L. Stenliden, In search of artificial intelligence (ai) literacy in teacher education: A scoping review, *Computers and Education Open* 6 (2024) 100169.
- [2] E. Aleman, R. Martínez, M. Dilek, E. Baran, Directions for navigating critical ai literacy in teacher education, *Journal of Computing in Higher Education* 37 (2025) 1460–1488.
- [3] R. Xiao, Q. Xiao, X. Hou, P. P. Moletsane, H. Jane Li, H. Shen, J. Stamper, Do teachers dream of genai widening educational (in) equality? envisioning the future of k-12 genai education from global teachers' perspectives, in: *Proceedings of the 2026 CHI Conference on Human Factors in Computing Systems*, 2026, pp. 1–21.
- [4] OECD, *Empowering Learners for the Age of AI: An AI Literacy Framework for Primary and Secondary Education*, OECD, Paris, 2025. Review draft.
- [5] D. T. K. Ng, J. K. L. Leung, S. K. W. Chu, M. S. Qiao, Conceptualizing ai literacy: An exploratory review, *Computers and Education: Artificial Intelligence* 2 (2021) 100041.
- [6] R. Chen, V. R. Lee, M. G Lee, A cross-sectional look at teacher reactions, worries, and professional development needs related to generative ai in an urban school district, *Education and Information Technologies* 30 (2025) 16045–16082.
- [7] R. F. Kizilcec, To advance ai use in education, focus on understanding educators, *International Journal of Artificial Intelligence in Education* 34 (2024) 12–19.
- [8] A. Bhimdiwala, R. C. Neri, L. M. Gomez, Advancing the design and implementation of artificial intelligence in education through continuous improvement, *International Journal of Artificial Intelligence in Education* 32 (2022) 756–782.
- [9] J. Wang, R. Xiao, X. Hou, H. Li, Y. J. Tseng, J. Stamper, K. Koedinger, Llms to support k–12 teachers in culturally relevant pedagogy: An ai literacy example, in: *International Conference on Artificial Intelligence in Education*, Springer, 2025, pp. 152–160.
- [10] Y. Nagae, L. Zhang, L. Farias Herrera, The effects of professional development training on teachers' ai literacy, in: *International Conference on Artificial Intelligence in Education*, Springer, 2025, pp. 368–380.
- [11] L. S. Shulman, Those who understand: Knowledge growth in teaching, *Educational researcher* 15 (1986) 4–14.
- [12] L. Darling-Hammond, J. Snyder, Authentic assessment of teaching in context, *Teaching and teacher education* 16 (2000) 523–545.
- [13] I. Helleve, L. Eide, M. Ulvik, Case-based teacher education preparing for diagnostic judgement, *European Journal of Teacher Education* 46 (2023) 50–66.
- [14] B. Cowie, S. Trask, F. Edwards, Teacher-composed cases of practice as and for dissemination, reflection and data, *British educational research journal* 50 (2024) 1246–1262.
- [15] H. Xinyi, Accelerating Practical Knowledge Sharing in Teachers' Communities with Human-aware Artificial Intelligence, in: *Proceedings of the 18th International Conference on Educational Data Mining*, 2025, pp. 646–649. doi:10.5281/zenodo.15870133.
- [16] J. Albuquerque, B. Rienties, B. Divjak, Decoding Learning Design Decisions: A Cluster Analysis of 12,749 Teaching and Learning Activities, in: *Proceedings of the 15th International Learning Analytics and Knowledge Conference*, ACM, Dublin Ireland, 2025, pp. 407–417. doi:10.1145/3706468.3706520.
- [17] A. Ganesh, C. Chandler, S. D'Mello, M. Palmer, K. Kann, Prompting as Panacea? A Case Study of In-Context Learning Performance for Qualitative Coding of Classroom Dialog, in: *Proceedings of the 17th International Conference on Educational Data Mining*, 2024, pp. 835–843.