

ExPeerience: Support Student-AI Co-Creation in a Learnersourcing Workflow

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Abstract

This demo presents ExPeerience, an AI-assisted learnersourcing system that supports students in co-creating contextualized worked-out examples for database programming. Learnersourcing is a pedagogical approach in which students act as contributors by creating learning materials as part of the learning process. The system addresses two challenges in learnersourcing: (1) the high cognitive burden students face during content creation, and (2) the difficulty of balancing student learning with the production of reusable, high-quality sourced learning materials. ExPeerience structures student-AI collaboration by assigning the AI distinct roles across ideation, content generation, and solution evaluation, while keeping students responsible for decision-making and problem-solving.

CCS Concepts

• **Applied computing** → **Interactive learning environments;**
Computer-assisted instruction; **Collaborative learning;** • **Human-centered computing** → **Human computer interaction (HCI).**

Keywords

Human-AI Collaboration, Database Programming, Learnersourcing, Student-Generated Content, Worked-Out Example

ACM Reference Format:

Yuzhe Zhou, Prithvi Manjunatha Babu, Udayan Pandey, Alejandra J. Magana, and Tianyi Li. 2026. ExPeerience: Support Student-AI Co-Creation in a Learnersourcing Workflow. In *Companion Proceedings of the 31st International Conference on Intelligent User Interfaces (IUI Companion '26)*, March 23–26, 2026, Paphos, Cyprus. ACM, New York, NY, USA, 4 pages. <https://doi.org/10.1145/3742414.3794774>

1 Introduction and Background

Learnersourcing has emerged as a promising approach for engaging students as active contributors to learning materials rather than passive consumers. While this approach can promote student reflection and deeper engagement [4, 10], creating high-quality learning materials places substantial cognitive demands on students, especially when they have just learned the underlying concept. At the same time, learnersourcing involves a tension between supporting students' learning processes and producing structured, consistent learning materials that can be reused by others.

Prior work on learnersourcing has explored engaging students as contributors who generate different types of learning materials, multiple choice questions [3], coding exercises [13], and peer explanations [7]. To better structure and scale learnersourcing activities, prior systems such as PeerWise [2], RiPPLE [9], and AXIS (Adaptive eXplanation Improvement System) [19] support students in creating and evaluating peer-generated learning materials, using feedback mechanisms to surface high-quality content. However, learnersourcing tasks involving complex artifact creation can impose high cognitive load and produce variable-quality outputs, limiting both learning value and re-usability.

To address these challenges, recent advances in AI present a promising opportunity. Prior work in intelligent user interfaces has explored how AI can support tasks that are also central to the learnersourcing process, such as ideation [5, 16], and facilitate human-AI co-creation [6, 8]. In education-focused contexts, AI has also been applied to support ideation [11, 18], content creation [1], and evaluation [15], helping learners generate ideas, produce instructional content, and receive feedback during the learning process. The latest version of RIPPLE [14] also explores the incorporation of generative AI in providing feedback on student-generated materials.

Building on these works, we propose to empower students to not only create exercises around course topics, but also to contextualize those exercises in scenarios related to their personal backgrounds and lived experiences. To achieve this goal, we designed and developed ExPeerience, which embeds AI into a learnersourcing workflow with stage-specific roles that provide timely scaffolding while



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IUI Companion '26, Paphos, Cyprus
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ACM ISBN 979-8-4007-1985-1/26/03
<https://doi.org/10.1145/3742414.3794774>

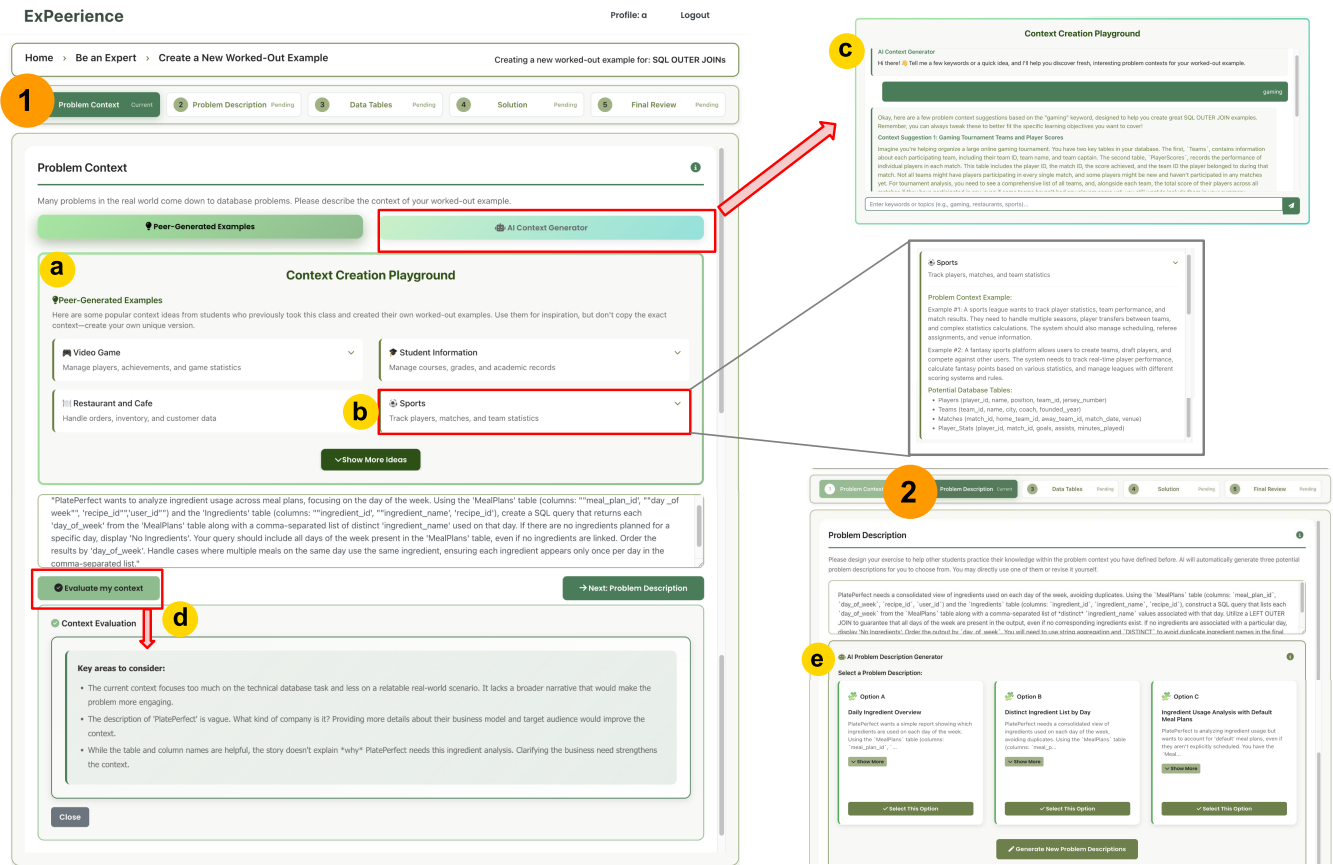


Figure 1: The ExPeerience interfaces for (1) Problem Context and (2) Problem Description creation. Panel (1) shows the Context Creation Playground, which includes the Peer-Generated Examples and AI Context Generator features for ideation, as well as the Evaluate My Context button for receiving AI feedback. Panel (2) displays the AI Problem Description Generator, which presents three candidate problem descriptions of varying complexity based on the student’s defined context.

preserving student agency. In ExPeerience, AI works with students like a just-in-time collaborator rather than a post hoc evaluator. This demo illustrates how such structured student–AI co-creation can extend prior learnersourcing and educational AI systems in practice.

2 System Description

ExPeerience implements a learnersourcing workflow that scaffolds students in creating worked-out examples that connect database concepts with familiar or personally meaningful real-world scenarios [12]. A well-constructed worked-out example typically includes (1) a clear problem statement, (2) a detailed procedure for solving the problem, and (3) auxiliary representations that support understanding of the problem [17]. Corresponding to these three principles, the system contains five ai-assisted components: **a context creation playground** to support students in ideating meaningful and conceptually appropriate problem contexts, **a context evaluator**

to help students refine clarity and appropriateness, **a problem description generator** to help students formulate well-scoped tasks aligned with target database concepts, **a data tables and dummy data generator** to reduce routine schema and data construction effort, and **a code evaluator** to support iterative solution refinement through actionable feedback.

ExPeerience integrates AI support in the following way: (1) Ideation: the AI helps students brainstorm and refine their ideas; (2) Generation: the AI assists with generating necessary components for producing complete, high-quality learning materials; (3) Evaluation: the AI provides targeted feedback to support iterative revision and reflection. The AI assistance is implemented with the Gemini 2.0 Flash model¹. Detailed prompt designs are reported in our full paper [20].

Context Creation Playground (see Figure 1, a & c). To lower the barrier of identifying problem contexts that are both personally meaningful and appropriate for database concepts, ExPeerience

¹<https://cloud.google.com/vertex-ai/generative-ai/docs/learn/models>

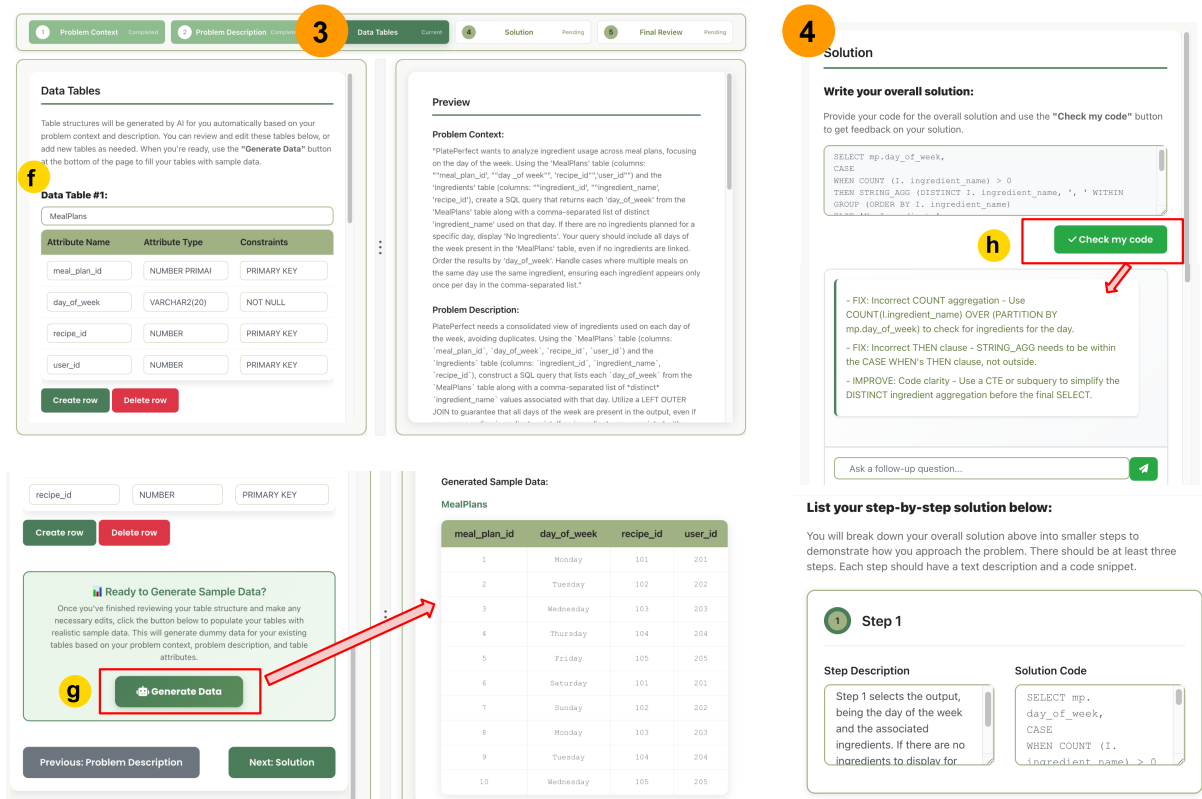


Figure 2: The ExPeerience interfaces for (3) Data Table and Dummy Data and (4) Solution and Subgoals. Panel (3) introduces both table design and data generation, which automatically creates relational tables and dummy data aligned with the student’s problem description. Panel (4) supports solution authoring through the Overall Solution input, followed by an Check my code button for correctness checking, and a Step-by-Step Breakdown editor for defining subgoals and final SQL queries.

scaffolds students in two ways. First, students can browse peer-generated topic cards collected and summarized from prior studies (see Figure 1, a) to see how others have grounded database problems in familiar domains. In parallel, students can interact with an embedded AI Context Generator (see Figure 1, c) to explore and refine potential contexts based on keywords, interests, or initial ideas they might have.

Context Evaluator (see Figure 1, d). After drafting a problem context, students can click on the “Evaluate My Context” button to receive AI-generated feedback on clarity, appropriateness, and completeness. This panel is designed to support iterative refinement and help students identify missing background details or ambiguities that could hinder later problem solving, while leaving final revision decisions to the student.

Problem Description Generator (see Figure 1, e). Once a context is finalized, students proceed to the *Problem Description* tab (Figure 1, #2). Our prior studies show that student-written problem descriptions contain some common issues, such as vague descriptions or poor alignment with the target database concept, that can make the worked-out example unworkable. To address this, the **problem description generator** automatically suggests

three AI-generated candidate problem descriptions aligned with the student-selected context and target database concept. This design shifts students’ effort from writing from scratch to evaluation and revision, encouraging critical judgment on AI-generated contents while preserving students’ cognitive resources for the later problem-solving stage.

Data Tables and Dummy Data Generator (see Figure 2, #3) In the *Data Tables* tab, students are presented with an initial relational schema automatically generated based on their problem description, and can directly edit tables and attributes. Based on the finalized schema, the **Dummy Data Generator** produces representative sample data, displayed in a preview panel. This design offloads routine procedural work while keeping students responsible for validating alignment between context, schema, and data.

Code Evaluator (see Figure 2, #4) Then students will develop *step-by-step solution* using the dummy data. They first compose their overall solution using a code editor. The **Check My Code** button opens an embedded chat interface to list AI-generated feedback on correctness, logic, and structure, grounded in the previously defined context, problem description, and data. Feedback is organized into actionable categories to support revision rather than giving a

direct answer. Students can also ask follow-up questions, enabling clarification and reflection while maintaining control. Through this design, ExPeerience supports iterative solution refinement and helps students identify and correct issues before decomposing their solutions into step-by-step explanations.

Usability Enhancements. To support navigation across tabs, ExPeerience includes a progress bar that visualizes the creation process and highlights completion status. A resizable preview panel appears during data table and solution creation, allowing students to balance authoring and reviewing without back-and-forth switching. These interface features are designed to reduce extraneous cognitive load and help students manage complex, multi-step learnersourcing tasks within a single workspace.

3 Evaluation

ExPeerience was evaluated with students through a comparative study using a general-purpose chatbot as a baseline. The evaluation results, presented in our full paper accepted at this year's IUI conference [20], show that ExPeerience led to higher-quality student-generated learning materials and more active student engagement during the creation process.

Acknowledgments

This work is supported by the National Science Foundation (NSF) under grant numbers 2315683 and 2434429. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

GenAI Usage Disclosure

In accordance with the ACM Policy on Authorship and Generative AI, we disclose the limited use of generative AI tools during the preparation of this work. Generative AI systems were not used to generate or contribute to the core ideas, design rationale, data analysis, or argumentation presented in this paper.

During the refinement of the final ExPeerience interface design, we used Cursor, an AI-assisted code editor, to accelerate interface implementation and debugging. The underlying interface concepts, interaction logic, and system architecture were entirely designed and developed by the authors. The AI tool was used only as a programming aid to improve layout efficiency and syntax accuracy.

Additionally, ChatGPT (OpenAI, GPT-5.2, 2025) was used only for minor grammar and readability revisions to improve clarity and conciseness without altering the intended meaning. All creative, conceptual, and analytical contributions were made by the listed authors.

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