

Enhancing Pair Programming with XIPU AI

School of Advanced Technology

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1. Background

Pair programming is a widely used method in software development and education, where a driver writes the code while an observer reviews and provides feedback. Despite its benefits, several challenges arise in real teaching scenarios, including communication gaps, skill differences between partners, role imbalance, and time inefficiency within limited lab sessions. To address these issues, XIPU AI was introduced to support the observer and enhance the overall learning experience.

2. Solutions

In this case, observers were allowed to use XIPU AI during pair programming sessions to enhance collaboration and problem-solving.

The key components include:

1. **Simplified explanations and examples:** AI provides additional explanations and examples to help students better understand difficult concepts.

2. **Generating initial ideas and algorithmic steps:** When students struggle to begin a programming task, AI supports the observer in guiding the driver.
3. **Debugging assistance:** AI identifies potential issues, explains code logic, and suggests improvements to streamline debugging.
4. **Improving code quality:** Students receive refactoring tips to enhance readability, efficiency, and coding best practices.

XIPU AI further strengthens collaboration through real-time assistance, conceptual clarification, and support in resolving role-related conflicts.

3. Outcomes and Benefits

During the six-week study, 183 students completed a questionnaire evaluating their experience with XIPU AI. Results showed significant improvements in several key areas. Based on a five-point Likert scale: Code Quality (3.6), Productivity (4.0), Enjoyment (3.7), and Knowledge (3.8) all reflected strong positive responses. Students reported that AI improved their understanding, reduced debugging time, and increased confidence and engagement. The ability to obtain immediate explanations also helped them learn and apply new programming concepts more effectively.

4. Replicability and Promotion Value

This case is highly replicable and can be applied to various programming courses, project-based learning activities, lab sessions, and corporate

technical training. Since XIPU AI primarily provides support in explanation, debugging, and code optimization without altering core teaching structures, it is easy to adopt across different departments and instructional settings.

5. Next Steps

Future plans include enhancing student engagement while reducing passive reliance on AI, improving AI-generated collaboration prompts, and better supporting interaction between drivers and observers. The approach can also be extended to team project development, code review activities, and other collaboration-based learning environments.