

# Zhilin Fan

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Beijing, China

## Profile

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AI in Education (AIED) researcher with a **B.E. in Computer Science and Technology** and an **M.Sc. in Educational Technology**, previously supervised by **Prof. Yu Lu** at Beijing Normal University.

I am currently an **incoming PhD student at Monash University**, joining the **Centre for Learning Analytics at Monash (CoLAM)**, supervised by **Dr. Mladen Rakovic** and co-supervised by **Dr. Guanliang Chen** and **Dr. Yi-Shan Tsai**.

I have hands-on experience in **LLM fine-tuning, RAG, multi-agent workflows, explainable AI, knowledge tracing, and cognitive diagnosis**.

## Education

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### Beijing Normal University

M.Sc. IN EDUCATIONAL TECHNOLOGY

*Beijing, China*

*Sep. 2023 – Jun. 2026*

- GPA: 3.7/4.0 (Avg: 87.35/100)
- **Supervisors:** Prof. Yu Lu<sup>\*</sup> (advisor); Prof. Penghe Chen<sup>†</sup> (co-advisor)
- **Master's Thesis:** Developing and evaluating an explainable LLM-powered chatbot to support the diagnosis of students' problem behavior.

### Nanjing University of Information Science and Technology

B.E. IN COMPUTER SCIENCE AND TECHNOLOGY (TEACHER EDUCATION)

*Nanjing, China*

*Sep. 2019 – Jun. 2023*

- GPA: 4.1/5.0 (Avg: 90.93/100); **Rank:** 1/47

## Research & Technical Skills

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- **Research Methods:** Literature review, survey research, experimental research, user studies, quantitative analysis, qualitative thematic analysis
- **Data Analysis:** Python (Pandas, NumPy, Scikit-learn, Matplotlib), SPSS
- **LLM & AI Engineering:** LLM fine-tuning (PEFT), RAG (LangChain), LLM-based multi-agent systems (LangGraph)
- **Software Development:** JavaScript, Python (Flask, Django), Java (SSM), RESTful APIs, MySQL/SQLite/Neo4j, Docker, Git
- **English Proficiency:** IELTS 6.5; PTE 62

## Research Experience

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### NSFC General Program (Participant)

*2023 – 2024*

EDUCATIONAL DIALOGUE SYSTEMS FOR STUDENT PROBLEM BEHAVIOR DIAGNOSIS

- **Conducted research on AI-supported student problem-behavior diagnosis** and teacher decision support, contributing to studies on educational dialogue systems, LLM-based recommendation, and explainable AI.
- **Developed an end-to-end LLM-based dialogue system** for student problem-behavior diagnosis and strategy recommendation, including dialogue corpus construction, **PEFT-based fine-tuning**, a **RAG pipeline**, and evidence-grounded explanations.
- **Conducted technical evaluation and user studies**, including research design, data collection, quantitative analysis, and manuscript preparation, contributing to publications in **IEEE TLT** and **AIED**.
- **Supported the development and maintenance of the "AI Moral Teacher" system**, including JavaScript frontend, Java SSM backend, RESTful APIs, OAuth 2.0 authentication, Docker deployment, and Git-based version management.

### Student Research Grant (Participant), Faculty of Education, BNU

*2023 – 2024*

PEDAGOGICAL AGENT FOR MATHEMATICAL PROBLEM POSING

- **Developed a conversational pedagogical agent** powered by **gpt-3.5-turbo** using ChatGPT Plugins to scaffold students in generating high-quality mathematical questions.
- **Conducted an empirical experiment** to evaluate the agent's effectiveness in supporting students' mathematical problem-posing fluency and flexibility, including experimental implementation and research data analysis.

## MathsTale Research Project

AI-GENERATED INTERACTIVE STORIES FOR PRIMARY-SCHOOL MATHEMATICAL PROBLEM SOLVING

- Contributed to a **design-based research (DBR)** project investigating how AI-generated interactive stories can support primary-school students' mathematical problem solving.
- Supported **user-study design and data collection**, and conducted **qualitative thematic analysis** of interview data, contributing to a manuscript submitted to **ACM CHI 2027**.

## LLM Multi-Agent Research Project

AIED 2026

MULTIDISCIPLINARY LLM MULTI-AGENT SYSTEM FOR STUDENT PROBLEM BEHAVIOR DIAGNOSIS

- **Implemented a LangGraph-based multi-agent workflow** for multidisciplinary student problem-behavior diagnosis, enabling structured **inter-agent communication and consensus building**.
- Contributed to system evaluation and manuscript preparation for the resulting **AIED 2026** publication.

## Selected Publications

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\* corresponding author    † co-supervisor

[J.01] Penghe Chen<sup>†</sup>, Zhilin Fan, Yu Lu<sup>\*</sup>. **KnowSTU: Diagnosing Students' Problem Behavior Using Fine-Tuned LLM and RAG.** *IEEE Transactions on Learning Technologies*, 2025. **SCI/SSCI, JCR Q1, IF 7.4** [\[Link\]](#)

**Contribution:** Fine-tuned the LLM and implemented the RAG pipeline; conducted technical evaluation and a user study; analyzed the resulting data; and drafted the manuscript.

[C.05] Zhilin Fan, Penghe Chen<sup>†</sup>, Yu Lu<sup>\*</sup>. **Tell Me Why: Designing an Explainable LLM-based Dialogue System for Student Problem Behavior Diagnosis.** *International Conference on Artificial Intelligence in Education (AIED)*, 2026. **Poster Paper** [\[Link\]](#)

**Contribution:** Led the project; developed an explainability method for the LLM-based dialogue system; conducted technical evaluation and a user study examining teachers' trust in the system; analyzed the data; and drafted the manuscript.

[C.04] Shuyuan Liu, Yu Lu<sup>\*</sup>, Penghe Chen<sup>†</sup>, Zhilin Fan. **Multidisciplinary Theory Empowered LLM Multi-agent System for Student Problem Behavior Diagnosis.** *International Conference on Artificial Intelligence in Education (AIED)*, 2026. **Poster Paper** [\[Link\]](#)

**Contribution:** Implemented a LangGraph-based workflow for inter-agent communication and consensus building; reviewed the manuscript.

[C.03] Zhilin Fan, Penghe Chen<sup>†</sup>, Yu Lu<sup>\*</sup>. **Why Did the AI Suggest That? Designing an Explainable Educational Counseling System.** *International Conference on Artificial Intelligence in Education (AIED)*, 2025. **Full Paper** [\[Link\]](#)

**Contribution:** Led the project; integrated an explainability method into a RAG-enhanced LLM question-answering system; conducted technical evaluation and a user study with pre-service teachers; analyzed the data; and drafted the manuscript.

[C.02] Penghe Chen<sup>†</sup>, Zhilin Fan, Yu Lu<sup>\*</sup>, Qi Xu. **PBChat: Enhance Student's Problem Behavior Diagnosis with Large Language Model.** *International Conference on Artificial Intelligence in Education (AIED)*, 2024. **Full Paper** [\[Link\]](#)

**Contribution:** Designed the LLM-based dialogue system; constructed the dialogue datasets; fine-tuned the model; conducted system evaluation and data analysis; and drafted the manuscript.

## Selected Work in Progress

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[W.01] Yu Lu<sup>\*</sup>, Zhilin Fan, Deliang Wang, Penghe Chen<sup>†</sup>. **From Black Box to Teacher Trusted Tool: Enhancing Educational Question Answering with Explainable AI.** **Revise and Resubmit at IEEE TLT**

**Contribution:** Implemented the educational question-answering system architecture; conducted system evaluation and a user study; analyzed the resulting data; and drafted the initial manuscript.

[W.02] Kejia Zhang, Yunhao Yuan, Yuqi Niu, Zhilin Fan, Huixin Wang, Mona Alqassim, Charaka Palansuriya, Aurora Constantin. **Exploring AI-Generated Interactive Stories to Support Primary School Students' Mathematical Problem Solving.** **Submitted to ACM CHI 2027**

**Contribution:** Contributed to the design-based research process; supported user-study design and data collection; and performed qualitative thematic analysis of interview data.

## Awards, Fellowships, & Honors

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|------------|---------------------------------------------------------------------------------------------------------------------|
| 2026       | <b>Monash University–China Scholarship Council (CSC) Joint Scholarship</b>                                          |
| 2025       | <b>AIED 2025 Conference Scholarship</b>                                                                             |
| 2025       | <b>Teacher Qualification Certificate (Senior High School Information Technology)</b> , Ministry of Education, China |
| 2024, 2025 | <b>Second Class Postgraduate Scholarship (2×)</b> , Beijing Normal University                                       |
| 2023       | <b>Second Prize, Jiangsu Teaching Skills Competition for Normal Students</b>                                        |
| 2023       | <b>National Scholarship (Top 2%)</b> , Ministry of Education, China                                                 |
| 2022       | <b>President's Scholarship (Top 0.3%)</b> , Nanjing University of Information Science and Technology                |
| 2022       | <b>Jiangsu Province Puxin Elite Scholarship</b> , Jiangsu Province, China                                           |
| 2022       | <b>Jiangsu Provincial Games (Athletics)</b> — 1st in 4×400 m Relay; 2nd in 4×100 m Relay; 5th in 400 m              |
| 2021, 2022 | <b>National Encouragement Scholarship (2×)</b> , Ministry of Education, China                                       |

## Additional Teaching Experience ---

### **Forefront Research of Education**

TEACHING ASSISTANT, SCHOOL OF EDUCATIONAL TECHNOLOGY, BNU

*Fall 2024  
Graduate Level*

Answered academic questions, addressed technical problems, and reviewed student assignments.

### **Frontiers in Educational Technology**

TEACHING ASSISTANT, SCHOOL OF EDUCATIONAL TECHNOLOGY, BNU

*Spring 2024  
Undergraduate Level*

Managed class activities, facilitated group discussions, and assessed project submissions.

### **Information Technology**

STUDENT TEACHER, NANJING PUKOU NO. 3 MIDDLE SCHOOL

*Fall 2022  
Junior High Level*

Designed and delivered lessons on Python programming and digital literacy; managed computer lab dynamics.

### **Information Technology**

STUDENT TEACHER, JIANGSU XINHAI SENIOR HIGH SCHOOL

*Spring 2022  
Senior High Level*

Instructed students on fundamental computer science concepts based on the national curriculum standards.