

# AI-Driven Academic Resilience: Enhancing Self-Directed Learning in Repeating EAP Students Through Prompt-Engineered Large Language Models

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## 1. Background

At Xi'an Jiaotong-Liverpool University (XJTLU), English for Academic Purposes (EAP) programmes are critical to academic success. However, repeating students face unique challenges, including cycles of underperformance, low confidence, and underdeveloped self-directed learning skills. Students in the EAP045 module, in particular, require targeted support that extends beyond what standard curricula can offer. These students often struggle with setting learning goals, monitoring their progress, and managing their self-directed learning activities effectively. To address these issues, we designed an embedded AI learning platform to help repeating students cultivate self-directed learning abilities and break negative academic performance cycles.

## 2. Solutions

Based on Ekin' s (2023) framework and the unique needs of EAP045 learners, prompts were designed to guide the agent in providing personalized academic support. The agent' s training followed prompt optimization principles emphasizing clear instructions, explicit constraints, and contextual examples.

**Data Collection:** To comprehensively evaluate agent effectiveness, pre- and post-intervention surveys were administered. The survey comprised 10 items addressing usability, response relevance and usefulness, and impact on self-directed learning capacity. A 5-point Likert scale enabled quantitative satisfaction assessment.

**Core Intervention:** An AI chatbot named "Smart Agent" was embedded in the learning platform. The chatbot helps students summarize or break down materials and assists with goal setting. Surveys revealed all participants (n=6) used the AI chatbot to assess their comprehension of course materials, indicating significantly improved AI literacy.

## 3. Outcomes and Benefits

A case study recruited six EAP045 participants for the AI learning platform intervention.

### **Goal-Setting Behavior Transformation:**

- **Pre-intervention:** Most participants (5) rarely or never set specific learning goals; only 2 occasionally did so.
- **Post-intervention:** The majority (5 students) reported more frequent goal-setting behaviors; only one still occasionally set goals.
- Research demonstrates goal-setting effectively supports students across academic domains (reading, writing, foreign language learning) and enhances self-regulated learning and intrinsic motivation.

### **Metacognitive Strategy Enhancement:**

- **Pre-intervention:** All participants (6) rarely evaluated their topic understanding before advancing.
- **Post-intervention:** Most (4) reported frequent evaluation; one continuous practice; one occasional evaluation.
- Survey data: pre-intervention mean = 1.00 (0.00 SD);  
post-intervention mean = 3.50 (0.836 SD).

### **Substantial Increase in Self-Directed Learning Time:**

- Average autonomous learning duration rose from 4 hours/week baseline to 11 hours/week post-intervention—a 175% increase, demonstrating significantly enhanced commitment.

### Strengthened Willingness to Complete Online Tasks:

- For the statement "I will complete online learning materials and tasks":
  - **Pre-intervention:** Majority (5, 83.3%) selected "disagree" (Mdn = 2, IQR = 0).
  - **Post-intervention:** Four participants (66.7%) selected "agree"; two (33.3%) "strongly agree" (Mdn = 4, IQR = 1).
  - 100% of respondents agreed or strongly agreed post-intervention.
- Survey means: pre-intervention = 1.33 (0.816 SD);  
post-intervention = 4.33 (0.516 SD).

Enhanced AI Literacy: Integrating AI tools into learning processes indicates students became more proficient with such technology and demonstrated methods for leveraging AI in academic self-assessment.

## 4. Replicability and Promotion Value

**Cross-Disciplinary Application Potential:** The AI-driven learning platform clearly benefits self-directed learning behavior development. Given XJTLU' s status as a Sino-foreign cooperative university where many students face academic environment adaptation challenges, these methods can significantly impact student success.

**Promotion Value:**

- Provides a replicable framework for institutions supporting students in transitional academic environments.
- The intervention has potential for all EAP students, particularly repeaters needing academic performance improvement.
- The approach combining prompt engineering with pedagogical principles (retrieval practice, personalized goal-setting) is cross-disciplinarily applicable.

**Future Research Directions:**

- Expand scalability testing.
- Examine long-term behavioral retention.
- Explore cross-disciplinary applications of similar AI tools.