

Intent-Based vs. LLM-Based Chatbots in MOOCs: Do Diverse Students Experience Them Differently?

Songhee Han

Educational Psychology & Learning Technologies, Anne's College

Introduction

- Chatbots are increasingly used in MOOCs.
- Prior work focuses on general effectiveness, not on how demographics shape experiences.
- This study investigates how age, gender, socioeconomic region, and native language influence students' experiences with two chatbot types.

Research Question

- How do demographic factors influence students' learning experience domains when using an intent-based chatbot versus an LLM-based chatbot in MOOCs?

Relevant Literature

- Intent-Based Chatbots: Predefined rules, predictable responses.
- LLM-Based Chatbots: Open-ended, dynamic, use large datasets for generative responses.
- Demographics (age, SES, language) influence technology trust and educational outcomes in MOOCs.

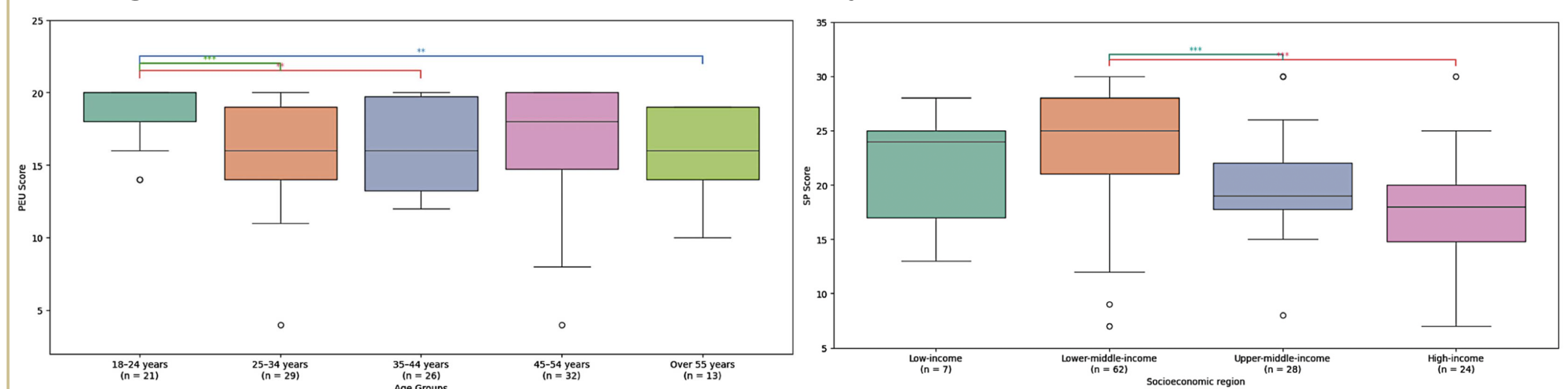
Method

- Context: Two MOOCs (Election Reporting, Intent-based; Digital Content Creation, LLM-based)
- Participants:
 - Intent-based: $n = 340$
 - LLM-based: $n = 121$
- Survey Domains ($n = 5$):
 - Social presence, teaching and cognitive presence, self-regulation, perceived ease of use, behavioral intention to use
- Survey & Analysis:
 - Scale: 5-point Likert, 22 items
 - Tests: Shapiro-Wilk $\rightarrow$ non-normal $\rightarrow$ Kruskal-Wallis & Post-hoc
- Table: Socioeconomic Distribution

Socioeconomic region	Intent-based chatbot users				LLM-based chatbot users			
	low	Lower-middle	Upper-middle	high	low	Lower-middle	Upper-middle	high
Student count	52	233	28	27	7	62	28	24
Total count	340				121			

Results

- Age Effects (LLM-based):
 - Younger students (18–24) reported higher social presence, ease of use, and behavioral intention to use the chatbot.
 - No significant age effects for the intent-based chatbot.
- SES Effects (Both Chatbots):
 - Lower-middle-income region students showed stronger social/teaching and cognitive presence.
 - High-income students reported weaker learning experiences.
- Figure: Box Plots of Post-hoc Analysis (Excerpt, *** $p < .001$ and ** $p < .01$)



Implications and Next Steps

- Age Effects: LLM-based chatbots are more engaging for younger students but may present usability barriers to older students.
- Region Effects: Lower-middle-income students benefit more across both types, possibly due to fewer alternative supports.
- Next Step: Test tailored for older and under-resourced regions