

Influence of ChatGPT's Feedback on Student Motivation and Learning: The Moderating Role of Trust

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Abstract

This study investigates the influence of ChatGPT's feedback on students' intrinsic motivation, engagement, and learning outcomes in higher education, with a focus on the moderating effect of trust. Drawing from Self-Determination Theory (SDT) and Self-Regulated Learning (SRL) theory, this study examines how AI-generated feedback affects learners' cognitive learning status and academic performance. A survey was conducted among 300 programming students; data analysis results revealed that feedback from ChatGPT enhances intrinsic motivation, which leads to a higher level of affective and behavioural engagement, ultimately boosting learning outcomes. However, contrary to our assumption, trust towards ChatGPT negatively (instead of positively) moderates the relationship between feedback and intrinsic motivation. These findings suggest that integrating AI-driven feedback mechanisms like ChatGPT can greatly enhance educational experiences by promoting intrinsic motivation, active engagement, and academic outcomes.

Keywords: Feedback, ChatGPT, Intrinsic Motivation, Engagement, Learning Outcomes

1. Introduction

Recently, generative AI has been used to provide reliable, personalised feedback to students with less teacher effort and intervention (Cavalcanti et al., 2021). ChatGPT has become a powerful tool to facilitate students' learning and improve educational outcomes. This study employs Self-Determination Theory (SDT) (Ryan & Deci, 2000) to explain how feedback enhances intrinsic motivation and uses Self-Regulated Learning (SRL) theory (Nicol & Macfarlane-Dick, 2006) to clarify how self-regulated learners engage affectively and behaviourally to improve learning outcomes.

Trust has been frequently studied as an antecedent of ChatGPT adoption (Choudhury & Shamszare, 2023); however, its moderating role in the relationship between ChatGPT's feedback and students' intrinsic motivation is yet to be explored. We proposed that trust towards ChatGPT would positively moderate the relationship between feedback and intrinsic motivation; thus, when the perceived trust level is high, students are more likely to view the feedback as helpful and reliable, thereby enhancing their enjoyment and pleasure in learning.

In sum, we examine how feedback shapes motivation, engagement, and learning outcomes, as well as the moderating effect of trust towards ChatGPT. Our research questions are:

1. Will high-quality feedback from ChatGPT influence students' intrinsic motivation? Will this relationship be positively moderated by perceived trust in ChatGPT?
2. Will intrinsic motivation positively influence two forms of engagement (affective and behavioural), and eventually lead to enhanced learning outcomes?

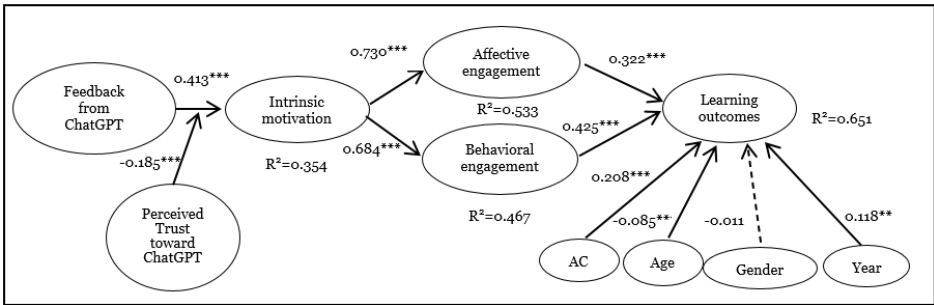
2. Methodology

Measures were adopted from past literature with minor adjustments to the ChatGPT context. Feedback from ChatGPT was measured by timeliness, accuracy, detailedness, and more (Lipnevich & Panadero, 2021). Feedback from ChatGPT is usually structured and standardised in response to programming-related prompts. Intrinsic motivation involves satisfaction, achievement, and confidence; learning outcomes are a direct measure of self-reported course grades.

A cross-sectional survey was conducted at a Hong Kong university. The participants were undergraduate students who had taken programming-related subjects in the past two years. A total of 1,000 questionnaires were sent out, with 410 valid responses, making the response rate 41%. We then excluded those with incomplete responses (20) and those who never used ChatGPT in their schoolwork (90). Finally, 300 data points became the final dataset for analysis. SPSS (v. 29) and SmartPLS (v. 4) were used to analyse the data.

3. Results and Discussion

Figure 1: Structural Model Data Analysis Results



(Note: H2 indicates the hypothesis regarding the moderating role of trust)

- **Hypothesis Testing:** All other main hypotheses were supported except H2.
- **Model Fit:** R-squared values demonstrated good explanatory power for the model.

The data analysis results revealed the following:

1. High-quality feedback from ChatGPT triggers intrinsic motivation, which influences learning outcomes through the mediating effects of affective and behavioural engagement.
2. The findings support SDT and SRL, indicating that effective feedback motivates self-regulated learners to engage emotionally and behaviourally in learning, thereby enhancing their performance.
3. Trust towards ChatGPT was not proven to positively influence the relationship between high-quality feedback and intrinsic motivation. Instead, it negatively moderated the relationship between feedback and intrinsic motivation. This may be because over-reliance on GenAI increases laziness and reduces students' intrinsic motivation to learn (Sarabadani & Akbari Ghatar, 2025).

4. Implications

The most interesting finding is the negative moderating effect of trust in the relationship between feedback from ChatGPT and intrinsic motivation. This result provides practical implications for universities to pay special attention to over-reliance issues regarding the use of ChatGPT. University policymakers should warmly embrace students' normal use of ChatGPT, as feedback from it can greatly motivate students to enjoy studying and further engage emotionally

and behaviourally with learning tasks, ultimately leading to enhanced learning outcomes. However, universities should also guide students to avoid over-reliance on the use of ChatGPT, as it could potentially diminish students' motivation to learn.

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