Exploring Decision-Making Skills With the ChatGPT-Enhanced Decision Tree Interactive Learning Model

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Abstract
This study explores the impact of the ChatGPT-enhanced Decision Tree Learning Model on the decision-making skills of Chinese international students. By integrating artificial intelligence with traditional decision tree methods, the model offers an interactive, personalized learning experience to help students navigate complex decision-making scenarios. The study involved 80 students from a university in Thailand, who were randomly assigned to either the experimental group using the ChatGPT model or the control group using traditional teaching methods. A pre-test and post-test design, along with self-assessment tools, were used to evaluate students' decision-making skills. The results showed significant improvements in the experimental group in terms of systematic thinking, autonomous adaptability, and feedback-driven optimization. These findings support the effectiveness of AI-driven models in enhancing key decision-making skills and are consistent with existing research on the role of technology in skill development. The study concludes that the ChatGPT-enhanced model is a valuable tool for developing decision-making abilities in international students, but further research is needed with extended interventions and diverse samples to explore its long-term impact and broader applicability.

Keywords: Decision-Making Skills, ChatGPT, Decision Tree International Students

Introduction

With globalization advancing, international education has become a key pathway for Chinese students to grow and learn. However, in unfamiliar cultural and academic environments, developing decision-making skills poses a significant challenge. These skills are critical for academic success and future career development. Arslan and Kılınç (2019) highlight that sound decisions enhance personal success and contribute to societal progress, while Samancı and Mazlumoğlu (2023) emphasize that past decisions shape our present lives. In education, decision-making skills directly impact academic performance, with Ross (1981) identifying knowledge, emotion, and skills as the foundation of wise, empathetic decisions.

Educational technology, particularly AI tools like ChatGPT, offers new opportunities to strengthen these skills. Through interactive, personalized feedback, AI supports students in tackling complex problems. A study on Chinese international students' demand for the ChatGPT-enhanced Decision Tree Learning Model (Miao et al., 2024) found strong interest in improving cultural sensitivity, adaptability, and confidence while highlighting lesser emphasis on systematic analysis and diverse values. The study recommends integrating AI, cultural training, and confidence-building programs to enhance decision-making in dynamic contexts.

Decision trees provide a visual structure for analyzing multi-factor decisions, improving transparency and reducing information overload (Priyanka & Kumar, 2020). Combining ChatGPT with decision trees enhances accuracy, adaptability, and personalized feedback (Chiesa-Estomba et al., 2024), making it highly effective in education, law, and medicine (Guo & Wang, 2024; Zhou, 2023).

In this context, this study explores whether the ChatGPT-enhanced Decision Tree Learning Model can effectively improve decision-making skills among Chinese international students. By merging the logical clarity of decision trees with ChatGPT's interactive intelligence, this model offers a dynamic, tailored learning experience. Thus, the research question is: Will the ChatGPT-enhanced Decision Tree Learning Model improve the decision-making skills of Chinese international students?

Literature Review

Theoretical Framework

The ChatGPT-enhanced decision tree learning model integrates constructivist learning theory, systematic decision theory, and AI-driven personalized learning to create a dynamic, tailored framework for improving decision-making skills. Grounded in constructivism, the model supports learners in actively constructing knowledge through interactive problem-solving scenarios, with ChatGPT providing personalized cases and real-time feedback to refine decision strategies (Jayasinghe, 2024). Systematic decision theory enhances logical analysis and visualization of outcomes, using decision trees to simplify complex problems, weigh solutions, and promote fairness in diverse learning contexts (Lehto et al., 2021). AI further personalizes learning by dynamically adjusting content, simulating immersive decision scenarios, and using data-driven optimization to refine feedback mechanisms and learning paths (Song et al., 2024). This integrated approach empowers learners to confidently navigate complex decisions, combining active knowledge construction with logical rigor and adaptive

feedback, offering a robust foundation for decision-making skill development in intelligent education systems.

The ChatGPT-Enhanced Decision Tree Learning Model

The ChatGPT-enhanced decision tree learning model integrates NLP and decision tree analysis to develop learners' decision-making and logical thinking skills through cultural sensitivity, personalized learning, and data-driven optimization. The learning process consists of the following five stages: Step 1: Needs Analysis and Scenario Design: Through an initial assessment, ChatGPT identifies the learner's decision-making abilities and cultural background, then designs customized learning scenarios and tasks based on the needs analysis. Step 2: Scenario Task Guidance: ChatGPT guides the learner through case scenarios, such as cross-cultural team collaboration or complex business problems, using the structured pathways of decision trees to analyze issues step-by-step and select optimal solutions. Step 3: Real-Time Interaction and Feedback: At each decision point, the learner receives real-time feedback from ChatGPT, including analyses of the strengths and weaknesses of their choices and suggestions for improvement, enhancing the learning process. Step 4: Reflection and Optimization: After completing the decision pathway, the system summarizes the learner's performance, analyzes errors, and provides supplementary learning materials to help the learner continuously refine their decision-making skills through repeated practice. Step 5: Evaluation: The system generates a comprehensive evaluation report covering the quality of the learner's decision pathways, cultural adaptability, and improvements in problem-solving abilities.

Decision-Making Skills

Decision-making skills refer to an individual's ability to effectively analyze information, balance multiple demands, solve problems, and make rational choices in complex academic, social, and cultural environments. Their assessment can be structured around three core dimensions: Systematic Thinking, which involves comprehensively analyzing information and developing logical, feasible solutions (Kahneman & Tversky, 2013); Autonomous Adaptability, which refers to the ability to flexibly respond to challenges and adjust decisions in dynamic and uncertain environments (de Bruin et al., 2007); and Feedback-Driven Optimization, which emphasizes reflecting on and utilizing feedback to continuously improve decision quality. These dimensions comprehensively encompass pre-decision information analysis, in-decision adjustments, and post-decision optimization, aligning with the dynamic and holistic nature of the decision-making process (Kealey & Protheroe, 1996; Kolb, 2014). The theoretical foundation includes Prospect Theory, Self-Efficacy Theory, and Experiential Learning Theory. Methods such as situational simulations, dynamic case analyses, and action-reflection journals can scientifically evaluate international students' decision-making skills, providing practical guidance for cross-cultural adaptation and academic success.

Method

Experiment Design

This study employed a pretest-posttest randomized experimental design, also known as a pretest-posttest control group design. A total of 80 students were randomly assigned to either the experimental group or the control group, with the experiment lasting six weeks. The experimental group learned using the ChatGPT-Decision-Making Tree Model, while the

control group followed traditional teaching methods. All participants completed a pretest before the intervention and a posttest afterward to evaluate the impact of the ChatGPT-Decision-Making Tree Model on students' decision-making skills.

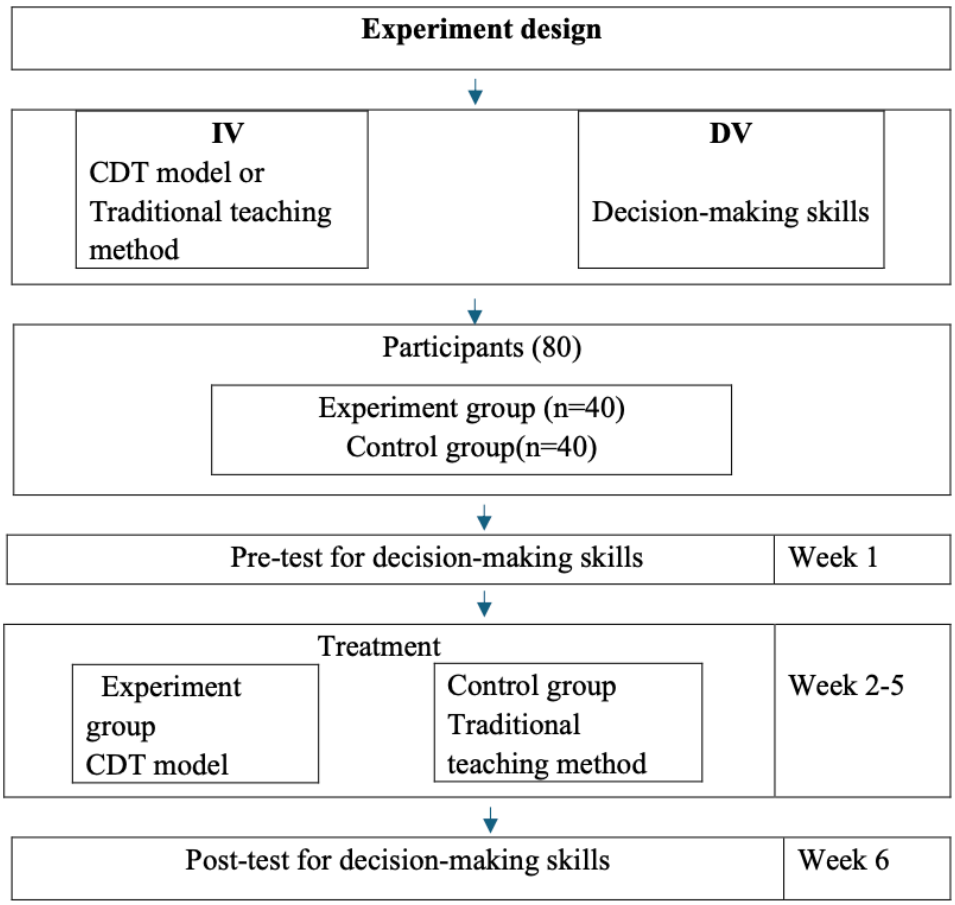

Figure 1: Experiment Design

Participants

This study randomly selected a sample of 80 Chinese international students from King Mongkut's Institute of Technology Ladkrabang (KMITL) in Thailand. Participants were divided into two groups: 40 in the experimental group and 40 in the control group. The sample included students from various academic disciplines, such as Educational Technology, Educational Management, Business Administration, and Interior Design, ensuring representativeness across different decision-making contexts.

Table 1: Participant Information

Demographic Aspects	Number		Percentage	
	Experiment	Control	Experiment	Control
Gender				
Male	23	24	28.7	30.0
Female	17	16	21.2	20.0
Age				
18-25	1	0	1.25	0
26-30	22	24	27.5	30
31& above	17	16	21.2	20
Academic level				
Undergraduate	1	0	1.25	0
Master	22	24	27.5	30
PhD	17	16	21.2	20
Familiarity with AI tools				
Familiar	29	28	36.2	70.0
Unfamiliar	11	12	13.7	15.0

Instruments

This decision-making skills assessment tool uses a quantitative questionnaire to evaluate students' performance across three core dimensions: systematic thinking, autonomous adaptability, and feedback-driven optimization. Each dimension consists of 5 statement items, totaling 15 items. Participants rate themselves on a 5-point Likert scale (ranging from Strongly Disagree to Strongly Agree), with higher scores indicating stronger skills in that dimension. The tool was reviewed by three educational technology experts and two psychology experts for Item-Objective Congruence (IOC), with all items achieving an IOC index range of 0.8–1.0, indicating strong content validity. It is deemed suitable for assessing decision-making skills in this study.

Result

Table 2: Group Statistics

	Group	N	Mean	SD	Error
Pretest	Control	40	52.95	4.58	0.72
	Experiment	40	52.18	4.98	0.79
posttest	Control	40	55.20	5.22	0.82
	Experiment	40	58.53	5.34	0.85

Table 2 shows that the pre-test mean scores of the control group (52.95) and the experimental group (52.18) were similar, indicating no significant initial differences. However, in the post-test phase, the experimental group's mean score (58.53) was notably higher than the control group's (55.20), suggesting that the intervention positively impacted the experimental group's learning outcomes.

Table 3: Independent Sample Test

		Levene's test		t-test for equality of mean						95%	
pretest	Equal variances assumed	F	Sig	t	df	one-tailed	two-tailed	Mean Difference	Error	Lower	Upper
	Equal variances not assumed	1.08	0.30	0.73	78	0.24	0.47	0.78	1.07	-1.35	2.90
posttest	Equal variances assumed		0.86	0.73	77.4	0.24	0.47	0.78	1.07	-1.35	2.90
	Equal variances not assumed	0.32	0.86	-2,82	78	0.00	0.00	-3.33	1.18	-5.68	-0.97

Table 3 presents the results of the independent samples t-test comparing the control and experimental groups during the pre-test and post-test phases. In the pre-test, Levene's test confirmed the equality of variances assumption ($F=1.08$, $p=0.30$). The t-test showed no significant difference in mean scores between the groups ($t=0.73$, $df=78$, $p=0.47$), with a mean difference of 0.78 (95% CI: -1.35 to 2.90). In the post-test, the equal variances assumption was also satisfied ($F=0.32$, $p=0.86$). However, the t-test revealed that the experimental group's mean score was significantly higher than the control group's ($t=-2.82$, $df=78$, $p < 0.01$). The mean difference was -3.33, with a 95% confidence interval of [-5.68, -0.97]. These findings demonstrate the significant positive impact of the intervention on the experimental group.

Table 4: Independent Sample Effect Sizes

		Standardizer	Point Estimate	95% confidence interval	
				lower	upper
pretest	Cohen's d	4.77	0.16	-0.28	0.60
	Hedges' g	4.82	0.16	-0.28	0.60
	Glass's delta	4.98	0.17	-0.28	0.59
posttest	Cohen's d	5.28	-0.63	-1.08	-0.18
	Hedges' g	5.33	-0.62	-1.07	-0.18
	Glass's delta	5.34	-0.62	-1.08	-0.16

Table 4 summarizes the effect sizes for the independent samples' comparison between the experimental and control groups in the pre-test and post-test phases, using three standardized metrics: Cohen's d, Hedges' g, and Glass's delta. In the pre-test, all effect sizes were small (Cohen's $d=0.16$, Hedges' $g=0.16$, Glass's $delta=0.17$) with 95% confidence intervals ranging from approximately -0.28 to 0.60, indicating negligible differences between the groups. In the post-test, the effect sizes increased to medium levels (Cohen's $d=-0.63$, Hedges' $g=-0.62$, Glass's $delta=-0.62$), with 95% confidence intervals from approximately -1.08 to -0.16, suggesting a significant positive impact of the intervention on the experimental group. The consistency across metrics reinforces the validity of the observed improvements.

Discussion

The results of this study indicate that the ChatGPT-enhanced Decision Tree Learning Model significantly improved the decision-making skills of Chinese international students. This was evidenced by the significant differences between the experimental and control groups in the post-test phase and a moderate effect size. These findings align with existing research, which highlights the role of advanced technological tools in facilitating key skill development (Ellikkal & Rajamohan, 2024).

In this study, the significant impact of the intervention on systematic thinking supports the efficacy of AI learning models in assisting students in analyzing complex problems and formulating structured solutions. Kahneman and Tversky (2013) emphasize the importance of systematic thinking in decision-making. The ChatGPT model's ability to simulate various scenarios and provide structured feedback likely contributed to the improvement in systematic thinking among the experimental group. This finding is consistent with Djunaidi, who found that structured problem-solving tools enhance students' analytical capabilities (Djunaidi, 2022).

Autonomous adaptability was another key area of improvement. The experimental group demonstrated a better ability to adjust their decision-making in changing environments, suggesting that interactive AI systems can foster greater adaptability. Individuals with higher adaptability are more likely to succeed in dynamic environments (Endres, 2018). The ChatGPT-enhanced model offered a safe environment for students to practice adaptive strategies, highlighting adaptability's role in international students' success (Miah et al., 2024).

The post-test results also highlighted the importance of feedback-driven optimization in decision-making. The experimental group exhibited an ability to effectively utilize feedback to refine their decisions, a critical skill in cross-cultural adaptation (Liu et al., 2024). Kolb's (2014) experiential learning theory supports this view, emphasizing that feedback and reflection are key to skill development. The interactive feedback loop provided by ChatGPT likely contributed to this improvement, which is in line with Xi's (2020) findings that reflective feedback processes significantly enhance decision-making quality (Donovan et al., 2015).

Conclusion

The ChatGPT-enhanced Decision Tree Learning Model is a powerful tool for improving the decision-making skills of Chinese international students. By addressing critical dimensions such as systematic thinking, autonomous adaptability, and feedback-driven optimization, the model offers a comprehensive approach to fostering skills essential for academic and social success in global contexts. These findings underscore the potential of AI-driven educational interventions to transform skill development in diverse student populations.

Limitations and Future Research Directions

While the results are promising, the study has limitations. The six-week intervention may not fully capture the long-term impact of the ChatGPT-enhanced model. Future studies could explore extended interventions and incorporate larger, more diverse samples to enhance generalizability. Additionally, qualitative methods, such as interviews or focus groups, could

provide deeper insights into how students perceive and apply the decision-making skills learned through the model.

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