

Faculty of Cognitive Sciences and Human Development

The Effects of Flipped Classroom on Learning Performance in Management Courses at Vocational and Technical Colleges in China

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The Effects of Flipped Classroom on Learning Performance in Management Courses at Vocational and Technical Colleges in China

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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree

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ABSTRACT

This study examined the effects of the flipped classroom approach on learning performance among first-year management students in five vocational and technical colleges in Anhui Province, China. A mixed-methods quasi-experimental design was employed, integrating both quantitative and qualitative approaches. During a six-week teaching experiment, 50 classes comprising 1,000 students were randomly assigned to experimental and control groups. The experimental group adopted the flipped classroom model, while the control group followed traditional teaching approaches. The primary objective was to assess the flipped classroom's effects in enhancing learning performance, including academic achievement, successful intelligence, and learning attitudes. The research framework identified the independent variables as the flipped classroom and traditional classroom approaches, as well as demographic profiles (such as college and gender). The dependent variable was learning performance, with cognitive style serving as a moderating variable. Control variables included grade level, teaching focus, and teaching materials.

The experimental results showed that the flipped classroom significantly outperformed the traditional classroom. Flipped students had a 41.642-point increase in academic achievement test scores compared to 30.998 points for traditional students. Successful intelligence scores rose by 9.146 points in the flipped group and decreased by 0.07 points in the traditional group. Learning attitudes improved by 33.092 points in the flipped group, compared to a 0.394-point decrease in the traditional group. Findings indicated that the flipped classroom model significantly improved academic achievements, successful intelligence, and fostered a more positive learning attitude compared to traditional teaching

methods. However, cognitive style did not moderate the effects of the flipped classroom approach.

This study provided empirical evidence on the effects of the flipped classroom in China's Vocational and Technical Colleges (VTCs), while explored the moderating role of cognitive styles to deepen the understanding of how different teaching methods impact learning performance. It contributed to the broader discussion on personalized and student-centered learning approaches in China's Vocational and Technical Education (VTE). Future research could expand by diversifying samples, conducting longitudinal studies, incorporating additional variables (e.g., self-efficacy, learning motivation), and exploring cross-disciplinary contexts.

Keywords: Flipped Classroom, Vocational and Technical Colleges, Learning Performance, Cognitive Styles

Kesan Pembelajaran Flip terhadap Prestasi Pembelajaran dalam Kursus Pengurusan di Kolej Vokasional dan Teknikal di China

ABSTRAK

Kajian ini meneliti kesan pendekatan pembelajaran flip terhadap prestasi pembelajaran dalam kalangan pelajar tahun pertama jurusan pengurusan di lima kolej vokasional dan teknikal di Wilayah Anhui, China. Reka bentuk kuasi-eksperimen kaedah campuran telah digunakan, yang menggabungkan pendekatan kuantitatif dan kualitatif. Sepanjang eksperimen pengajaran selama enam minggu, sebanyak 50 kelas yang melibatkan 1,000 orang pelajar telah diagihkan secara rawak kepada kumpulan eksperimen dan kumpulan kawalan. Kumpulan eksperimen menggunakan model pembelajaran flip, manakala kumpulan kawalan mengikuti pendekatan pengajaran tradisional. Objektif utama kajian ini adalah untuk menilai kesan pembelajaran flip dalam meningkatkan prestasi pembelajaran, termasuk pencapaian akademik, kecerdasan berjaya, dan sikap terhadap pembelajaran.Kerangka kajian mengenal pasti pembolehubah bebas sebagai pendekatan pembelajaran flip dan pendekatan tradisional, serta profil demografi (seperti kolej dan jantina). Pembolehubah bersandar ialah prestasi pembelajaran, manakala gaya kognitif berfungsi sebagai pembolehubah moderator. Pembolehubah terkawal termasuk tahap gred, fokus pengajaran, dan bahan pengajaran.

Keputusan eksperimen menunjukkan bahawa pembelajaran flip memberikan prestasi yang jauh lebih baik berbanding pendekatan tradisional. Pelajar dalam kumpulan bilik darjah flip mencatat peningkatan 41.642 mata dalam skor ujian pencapaian akademik, berbanding 30.998 mata bagi kumpulan tradisional. Skor kecerdasan berjaya meningkat sebanyak 9.146 mata dalam kumpulan flip dan menurun sebanyak 0.07 mata dalam

Sikap pembelajaran meningkat sebanyak 33.092 mata dalam kumpulan flip, berbanding penurunan sebanyak 0.394 mata dalam kumpulan tradisional. Penemuan ini menunjukkan bahawa model pembelajaran flip secara signifikan meningkatkan pencapaian akademik, kecerdasan berjaya, dan memupuk sikap pembelajaran yang lebih positif berbanding kaedah pengajaran tradisional. Namun begitu, gaya kognitif tidak mempengaruhi kesan pendekatan pembelajaran flip.

Kajian ini menyediakan bukti empirikal tentang kesan pembelajaran flip di Kolej Vokasional dan Teknikal (VTC) di China, serta meneroka peranan pemoderat gaya kognitif bagi memperdalam pemahaman tentang bagaimana kaedah pengajaran yang berbeza memberi impak kepada prestasi pembelajaran. Ia menyumbang kepada perbincangan yang lebih luas tentang pendekatan pembelajaran yang diperibadikan dan berpusatkan pelajar dalam Pendidikan Vokasional dan Teknikal (VTE) di China. Kajian masa depan boleh diperluas dengan mempelbagaikan sampel, menjalankan kajian longitudinal, memasukkan pembolehubah tambahan (contohnya, kecekapan kendiri, motivasi pembelajaran), dan meneroka konteks merentasi disiplin.

Kata kunci: *Pembelajaran flip, Kolej Vokasional dan Teknikal, Prestasi Pembelajaran, Gaya Kognitif*

TABLE OF CONTENTS

		Page
DECLARATION		i
ACKNOWLEDGEMENT		ii
ABSTRACT		iii
ABSTRAK		v
TABLE OF CONTENTS		vii
LIST OF TABLES		xiii
LIST OF FIGURES		xvii
LIST OF ABBREVIATIONS		xix
CHAPTER 1: OVERVIEW OF STUDY		1
1.1	Introduction	1
1.2	Research Background	2
1.3	Problem Statement	10
1.3.1	Theoretical Gaps	10
1.3.2	Ontological Gaps	11
1.3.3	Epistemological Gaps	11
1.3.4	Practical Gaps	12
1.4	Research Objectives	15
1.5	Research Questions and Hypotheses	17

1.5.1 Research Questions 17

1.5.2 Research Hypotheses 18

1.5.3 Previous Studies on the Relationship Among Variables and Hypothesis Development 19

1.6 Research Significance 24

1.6.1 Stakeholder Relevance 25

1.6.2 Practical Implications of the Study 25

1.6.3 Theoretical Contributions 26

1.6.4 Relevance to the Chinese Vocational Technical Education System 26

1.7 Research Scope 27

1.8 Chapter Summary 27

CHAPTER 2: LITERATURE REVIEW 29

2.1 Introduction 29

2.2 Theoretical Framework 29

2.3 Flipped Classroom 31

2.3.1 Origin of the Flipped Classroom 31

2.3.2 The Essence of the Flipped Classroom 34

2.3.3 Critical Review of Flipped Classroom 49

2.4 Learning Performance 53

2.4.1 Definition of Learning Performance 54

2.4.2 Aspects and Factors of Learning Performance 56

2.4.3 Assessment of Learning Performance 57

2.4.4 Learning Attitudes 64

2.4.5 Critical Review of Learning Performance 67

2.5 The Impact of Demographic Profiles on Learning Performance 73

2.6 Chapter Summary 77

CHAPTER 3: RESEARCH METHODOLOGY 78

3.1 Introduction 78

3.2 Research Variables 79

3.2.1 Independent Variables 79

3.2.2 Dependent Variables 79

3.2.3 Moderating Variables 80

3.2.4 Control Variables 81

3.3 Research Participants 81

3.4 Research Design 84

3.4.1 Quasi-Experimental Research Design 84

3.4.2 Teaching Design Explanation 87

3.5 Research Instruments 96

3.5.1 Academic Achievement Test Paper 97

3.5.2 Successful Intelligence Scale 97

3.5.3 Learning Attitude Scale 100

3.5.4 Cognitive Style SOP (Style of Processing) Scale 102

3.5.5 Qualitative Instruments 103

3.6 Pilot Study 104

3.7 Research Implementation Procedure 105

3.7.1 Preparation Stage 105

3.7.2 Development of Teaching Design and Experimental Research for Flipped Classroom Model 106

3.7.3 Pilot Study Results 107

3.7.4 Data Collection 110

3.8 Data Analysis 110

3.8.1 Quantitative Data Analysis 110

3.8.2 Qualitative Data Analysis 112

3.9 Research Ethics 113

3.10 Chapter Summary 114

CHAPTER 4: FINDINGS 115

4.1 Introduction 115

4.2 Quantitative Findings 117

4.2.1 Descriptive Statistics 117

4.2.3 Differences in Learning Performance Based on Flipped Classroom Model 121

4.2.4 Comparative Analysis of Traditional and Flipped Classroom Model 124

4.2.5 Moderating Role of Cognitive Style 128

4.3 Qualitative Finding 156

4.3.1 Theoretical Anchoring and Methodological Rigor 156

4.3.2 Engagement Dynamics and Cognitive Skill Development 157

4.3.3 Pedagogical Adaptation and Cognitive Style Nuances 158

4.3.4 Collaborative Learning and Community Building 158

4.4 Chapter Summary 159

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS 161

5.1 Introduction 161

5.2 Discussions on the Findings 161

5.2.1 Validation of Pre-Post Improvements in the Flipped Classroom 163

5.2.2 Comparative Efficacy of Flipped vs. Traditional Classrooms 164

5.2.3 Moderating Role of Cognitive Style 165

5.2.4 Qualitative Insights 165

5.2.5 Methodological Reflections and Future Directions 167

5.2.6 Theoretical and Practical Synthesis 169

5.3 Contributions of the Study 169

5.4 Implications of the Study 170

5.5 Recommendations 175

5.6 Chapter Summary 178

REFERENCES 181

APPENDICES 219

Appendix A Management academic achievement test 219

Appendix B Successful Intelligence Scale 225

Appendix C Learning Attitude Scale 255

Appendix D Cognitive Style SOP (Style of Processing) Scale 259

Appendix E Teacher's Teaching Records 263

Appendix F Teaching Activity Worksheet 264

Appendix G Student's Reflection Report 266

Appendix H Teaching Activity Design 267

LIST OF TABLES

Page

Table 2.1	Summary of Empirical Research Literature	45
Table 2.2	Summary of Learning Performance Definitions	54
Table 2.3	Summary of Learning Attitude Definitions	65
Table 3.1	Participants Distribution by Gender	83
Table 3.2	Quasi-Experimental Research Design	86
Table 3.3	Summary of Cognitive Style Definitions	90
Table 3.4	Unit Teaching Time, Content, and Progress Schedule	94
Table 3.5	Example of Teaching Activity Design for Experimental Group in Management Course Unit 1-1	94
Table 3.6	Example of Teaching Activity Design for Experimental Group in Management Course Unit 1-2	94
Table 3.7	Example of Teaching Activity Design for Control Group in Management Course Unit 1-1	95
Table 3.8	Example of Teaching Activity Design for Control Group in Management Course Unit 1-2	95
Table 3.9	Questionnaire Collection Statistics from the Pilot Study	107
Table 3.10	Reliability statistics of the Academic Achievement Test	109
Table 3.11	Reliability statistics of the Successful Intelligence Scale	109

Table 4.1 Academic Achievement Test Scores 120

Table 4.2 Successful Intelligence Scores 120

Table 4.3 Learning Attitude Scores 121

Table 4.4 Paired T-Test Results of Academic Achievement Test Scores for Experimental Group 122

Table 4.5 Paired T-Test Results of Successful Intelligence Scores for Experimental Group 123

Table 4.6 Paired T-Test Results of Learning Attitude Scores for Experimental Group 124

Table 4.7 Two Independent Sample T-Test Results of Academic Achievement Test Scores 124

Table 4.8 Two Independent Sample T-Test Results of Successful Intelligence Scores 126

Table 4.9 Two Independent Sample *T*-Test Results of Learning Attitude Scores 127

Table 4.10 Results of Durbin-Watson and Breusch-Pagan Tests for Error Term Assumptions by Group and Outcome Variable 131

Table 4.11 ANOVA Paradigm of Academic Achievement Test Scores for Control Group 133

Table 4.12 Hierarchical Regression Results of Academic Achievement Test Scores or Control Group 134

Table 4.13 Coefficients of Academic Achievement Test Scores for Control Group 135

Table 4.14 ANOVA Paradigm of Successful Intelligence Scores for Control Group 137

Table 4.15 Hierarchical Regression Results of Successful Intelligence Scores for Control Group 138

Table 4.16 Coefficients of Successful Intelligence Scores for Control Group 139

Table 4.17 ANOVA Paradigm of Learning Attitude Scores for Control Group 140

Table 4.18 Hierarchical Regression Results of Learning Attitude Scores for Control Group 141

Table 4.19 Coefficients of Learning Attitude Scores for Control Group 143

Table 4.20 ANOVA Paradigm of Academic Achievement Test Scores for Experimental Group 144

Table 4.21 Hierarchical Regression Results of Academic Achievement Test Scores for Experimental Group 146

Table 4.22 Coefficients of Academic Achievement Test Scores for Experimental Group 147

Table 4.23 ANOVA Paradigm of Successful Intelligence Scores for Experimental Group 148

Table 4.24 Hierarchical Regression Results of Successful Intelligence Scores for Experimental Group 150

Table 4.25 Coefficients of Successful Intelligence Scores for Experimental Group 151

Table 4.26 ANOVA Paradigm of Learning Attitude Scores for Experimental Group 153

Table 4.27 Hierarchical Regression of Learning Attitude Scores for Experimental Group 154

Table 4.28 Coefficients of Learning Attitude Scores for Experimental Group 155

Table 5.1 Summary Results Of Hypothesis Testing 162

Table 5.2 Recommendations for the Component of the Flipped Classroom 176

Table 5.3 Recommendations for Implementing the Flipped Classroom 177

LIST OF FIGURES

		Page
Figure 1.1	Statistical chart of the Development of China's VTCs	4
Figure 1.2	Conceptual Framework	24
Figure 2.1	Theoretical Framework	30
Figure 2.2	Flipped Classroom and Traditional Classroom Models	36
Figure 2.3	Bloom's taxonomy levels achieved by Traditional and Flipped classroom methods	53
Figure 3.1	Empirical Research Process	106
Figure 3.2	Qualitative descriptors used for values/ranges of values of Cronbach's alpha reported in papers in leading science education journals	108
Figure 4.1	Normal (Q-Q) Plots for Control Group	118
Figure 4.2	Normal (Q-Q) Plots for Experimental Group	119
Figure 4.3	Linearity Diagnostic Plot for Academic Achievement Test	128
Figure 4.4	Linearity Diagnostic Plot for Successful Intelligence	129
Figure 4.5	Linearity Diagnostic Plot for Learning Attitude	129
Figure 4.6	Linearity Diagnostic Plot for Academic Achievement	129
Figure 4.7	Linearity Diagnostic Plot for Successful Intelligence	130
Figure 4.8	Linearity Diagnostic Plot for Learning Attitude (Experimental Group)	130
Figure 4.9	Normal Q-Q Plots of Model Residuals for Normality Assessment	132

LIST OF ABBREVIATIONS

CGS	Centre for Graduate Studies
UNIMAS	Universiti Malaysia Sarawak
VTC	Vocational and Technical College
VTE	Vocational and Technical Education
SOP	Style of Processing
MOE	Ministry of Education of the People's Republic of China
TA	Traditional Approach
FC	Flipped Classroom

CHAPTER 1

OVERVIEW OF STUDY

1.1 Introduction

This chapter provides the foundation for this research by outlining the framework and context for examining the impact of flipped classroom pedagogy and cognitive styles on learning performance within vocational and technical education (VTE) management courses. The chapter begins by emphasizing the growing importance of VTE, both globally and within China, and highlights the critical need for innovative pedagogical strategies to address contemporary challenges in teaching and learning. Central to the study is the flipped classroom model, which encourages active learning through engaging students with lecture content outside of class, allowing them to apply their knowledge in interactive, in-class activities.

Furthermore, the chapter introduces the concept of cognitive styles, underscoring the potential for personalized learning approaches that cater to individual preferences, ultimately enhancing student engagement and performance. Several gaps in the existing research are identified, particularly the lack of empirical studies on the flipped classroom's effects within VTE settings and the need for pedagogical strategies that align with students' diverse cognitive styles. These gaps shape the study's research objectives and questions, aiming to assess the flipped classroom's impact on learning performance while considering the moderating role of cognitive styles.

The research hypotheses are framed to evaluate the flipped classroom model's effects in comparison to traditional teaching methods, focusing on key outcomes such as academic achievement, successful intelligence, and learning attitudes. Potential limitations

of the study, including the variability in instructional strategies and resources across vocational training centers (VTCs), are also acknowledged, which may influence the generalizability of the results.

This chapter establishes the significance of the study and outlines the core concepts—flipped classrooms, cognitive styles, and learning performance—while providing a roadmap for the study's progression.

1.2 Research Background

Vocational education is crucial in global education systems by connecting theoretical knowledge with practical workforce skills. It prepares individuals for specific careers, providing technical expertise and competencies required by various industries. This dynamic form of education varies across countries, reflecting local economic, social, and cultural contexts (Li & Pilz, 2023). It addresses labor market skill gaps, enhances employability, and drives economic growth by aligning educational outcomes with industry demands, fostering economic development and viable career opportunities (Okoye & Edokpolor, 2021). Additionally, vocational education promotes social inclusion by offering alternative pathways to traditional academic routes, reducing unemployment and educational disparities (Ye & Yang, 2020).

The evolution of vocational education, from informal apprenticeships to formalized training systems, reflects broader economic and technological shifts. Initially rooted in family-based apprenticeships and guild traditions, it transitioned into institutionalized programs to meet industrialization needs. Post-World War II, vocational education became more formalized and integrated into secondary and higher education systems, addressing the demand for skilled workers across various sectors (Loogma et al., 2019). In the modern era, vocational education continues to evolve, driven by globalization, technological

advancements, and a knowledge-based economy, making adaptability and lifelong learning key components of its value proposition (Fairley, 2019).

A notable example of vocational education excellence is Germany's dual education system, which integrates on-the-job training with classroom-based education, rooted in medieval guilds and refined through industrialization (Yu, 2019). This system's collaboration between government, industries, and educational institutions ensures training aligns with labor market needs, contributing to low youth unemployment and smooth school-to-work transitions (Haasler, 2020). It underscores the importance of combining practical experience with academic learning, a model increasingly relevant in a changing global economy (Rözer & van de Werfhorst, 2020).

In China, vocational education has transformed significantly, shaped by economic and social developments (Liu & Hardy, 2023). Originating from ancient artisan traditions, it formalized in the early 20th century under Western influence (Kalafati, Flogaiti, & Daskolia, 2023). Post-1949, it adopted the Soviet model, focusing on industrial skills, but the Cultural Revolution shifted emphasis to ideological education (Ling, Chung, & Wang, 2023). The post-1978 reforms modernized vocational education, aligning it with China's market-driven economy (Guo & Wang, 2020).

In China, the great progress in vocational education has made it a pivotal component of the nation's education and a driving engine of its economic development. China has the largest number of students enrolled in vocational and technical education. According to UNESCO's Global Education Monitoring Report, China’s vocational education system enrolls over 29 million students annually, which surpasses the enrollment of any other country (UNESCO, 2020). The number is consistently among the highest in the world, reflecting the extensive reach of China's educational system. As is illustrated in

Figure 1.1, VTCs accounted for 42.3% of China's total student body in 2023, with enrollment exceeding 10 million students in higher education institutions—a 6.11% annual increase (MOE, 2023). These institutions play a pivotal role in advancing industrialization and technological innovation by training skilled professionals in critical sectors such as information technology and renewable energy (MOE, 2023).

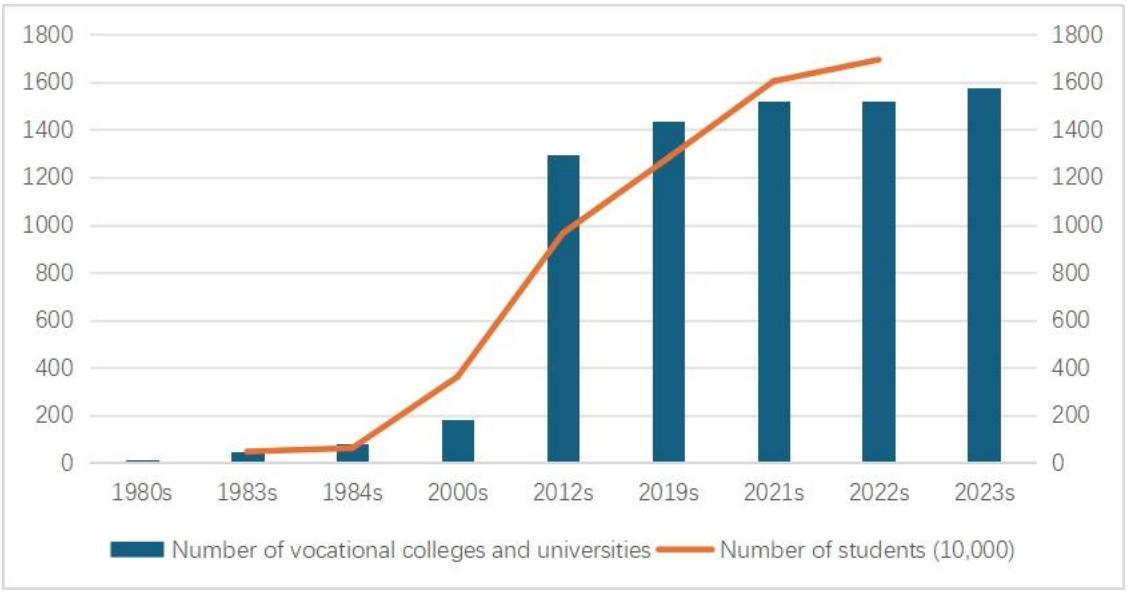


Figure 1.1: Statistical chart of the Development of China's VTCs (MOE, 2023)

This study provided empirical evidence on the effects of the flipped classroom in China's Vocational and Technical Colleges (VTCs). while explored the moderating role of cognitive styles to deepen the understanding of how different teaching methods influence learning performance. It offered insights into how cognitive styles affect learning and how the flipped classroom can enhance educational strategies. The findings aim to improve teaching practices and inform policies to enhance the effects and inclusivity of vocational education.

Vocational and Technical Education (VTE) in China is vital for developing a skilled workforce to support economic growth and modernization. The government

emphasizes VTE reform to bridge the skills gap between education and labor market needs, particularly in management education, where graduates must lead industries undergoing rapid technological and global changes. The National Vocational Education Reform Plan (2019-2025) highlights aligning vocational training with industry demands, such as digital transformation, green energy, and high-tech manufacturing (Cole, 2022), underscoring the importance of management courses in this evolving landscape (Chen, Schmidtke, & Jin, 2024).

VTE in China includes diverse programs equipping students with technical and professional skills. Management courses are particularly vital, providing knowledge and skills to lead organizations in a technology-driven global economy. Classified as VTE, these courses integrate practical and theoretical learning, preparing students for leadership roles. In China, they focus on business administration, marketing, human resource management, and financial management, emphasizing readiness for both traditional and emerging industries (Liu & Zhang, 2022).

Courses on management in VTCs aim to equip students with technical and managerial skills directly applicable to industry needs. The course is evaluated on their integration of practical applications with academic learning, typically emphasizing leadership, problem-solving, communication, and teamwork—key for effective management in modern business environments (Chen, Schmidtke, & Jin, 2024). Thus, management education in VTCs must align with both industry demands and broader economic goals, such as fostering innovation, entrepreneurship, and adaptability.

Despite its importance, vocational education in China faces challenges, including the stigma of lower academic value compared to traditional higher education, deterring students despite high demand for skilled professionals (Hake, 2022). Additionally, rapid

industry and technological advancements necessitate modernizing curricula and teaching methods (Huang et al., 2023). Traditional lecture-based approaches, still prevalent in many programs, often fail to develop problem-solving, critical thinking, and adaptability skills essential for today's complex work environments (Hafeez, 2021).

Anhui Province, an inland province located in East China, is a key case study due to its ongoing reforms to enhance vocational education quality and alignment with industry needs. As a region undergoing significant economic and industrial transitions—shifting from agriculture and heavy industries to high-tech sectors like automotive manufacturing, electronics, and new energy (China Daily, 2022)—Anhui exemplifies how vocational and technical education (VTE) adapts to economic demands (Li, 2020). Despite China's national VTE framework, regional disparities persist, particularly between urban and rural areas, making Anhui's efforts to address equitable access and labor mobility through vocational training critical to understanding inclusive development challenges (Zhou & Zhang, 2019; Cheng & Wang, 2018). As an eastern inland province, Anhui is transforming its educational landscape by prioritizing industry-education integration, such as partnerships between vocational schools and leading enterprises like Geely and Hefei-based tech firms, to design curricula that meet evolving skill needs (Anhui Education Department, 2021; Li, 2020). The province's participation in national pilot programs, such as the 13th Five-Year Plan for Education Reform (China State Council, 2017), further underscores its role as a testing ground for policies aimed at modernizing vocational programs, particularly in technical and management education. These initiatives reflect Anhui's strategic focus on aligning vocational training with labor market demands, serving as a microcosm of China's broader industrial and educational modernization (Lai, Lin, & Yueh, 2020; Anhui Education Department, 2021).

Anhui's reform efforts focus on modernizing curricula, integrating advanced technologies, and strengthening school-industry collaboration. These initiatives address critical challenges in its vocational education system, such as the persistent mismatch between educational outputs and industry needs, particularly in high-tech sectors like electronics and advanced manufacturing (Li, 2020). Additionally, regional disparities in access and quality of vocational training persist, with rural areas facing limited infrastructure and fewer qualified teachers compared to urban centers (Zhou & Zhang, 2019). Outdated teaching methods and curricula further exacerbate these issues, as many institutions struggle to incorporate practical, industry-aligned training (Chen, 2020). The province also grapples with uneven institutional development, where rural vocational colleges lag behind urban counterparts in resources and industry partnerships (Cheng & Wang, 2018). Despite efforts to enhance industry-education integration, collaborations with local enterprises like Geely and Hefei-based tech firms often remain superficial, limiting the relevance of student placements (Anhui Education Department, 2021). Furthermore, vocational education in Anhui faces social stigma, with students and families prioritizing academic pathways over vocational training, despite its potential to address labor market demands (Wu, 2017). By studying Anhui, this research explores how the flipped classroom model can improve learning performance in VTE management courses, offering a pathway to modernize pedagogical approaches, bridge skill gaps, and enhance employability. The findings could inform policies to address systemic challenges such as curriculum-industry misalignment, resource inequality, and outdated teaching practices, providing a template for similar regions undergoing industrial and educational transitions.

The study examined key variables influencing the flipped classroom's effects in vocational education, particularly in VTC management courses, each shaping students' learning experiences and outcomes:

The flipped classroom model reverses traditional teaching by having students engage with instructional content (e.g., videos, readings) outside class and apply knowledge through active, problem-solving activities during class. This shift from passive to active learning fosters deeper understanding, critical thinking, and collaboration, improving student outcomes (Bergmann & Sams, 2012).

In China's VTCs, the flipped classroom model is well-suited for management education, which requires both theoretical understanding (e.g., leadership theories) and practical application (e.g. team management, problem-solving). Its emphasis on hands-on, interactive learning aligns with VTE's practical focus, enabling students to apply theoretical knowledge in real-world scenarios. This approach enhances critical skills like decision-making, strategic thinking, and communication—essential for management success (Schrum, 2019). But the traditional approach (TA) still prevalent in many VTCs, relies on passive lectures where students take notes and memorize content. While effective for foundational knowledge, it often fails to develop critical skills like problem-solving, adaptability, and collaboration—skills crucial for preparing management students to lead in dynamic business environments.

The limitations of traditional teaching approaches in Vocational and Technical Education (VTE), particularly within management courses, have been extensively documented in prior research (Anhui Education Department, 2021). As industries evolve, demand grows for critical thinking, innovation, and adaptability—skills rarely cultivated by lecture-based methods. This necessitates exploring alternatives like the flipped

classroom. This study compares flipped classroom (FC) and TA to assess their impact on management students' learning performance, including academic performance, successful intelligence, and learning attitudes.

Learning performance, the dependent variable, encompasses academic achievement, successful intelligence (analytical, creative, practical), and learning attitudes. Academic achievement reflects mastery of course content, while successful intelligence involves applying knowledge to solve real-world problems and think critically. Learning attitudes—motivation, engagement, and interest—also determine student success.

In VTC management courses, improving learning performance is essential for workforce readiness. Students must not only grasp theory but also apply it in professional settings. This study evaluates how the flipped classroom impacts these dimensions, guiding optimization of teaching methods for cognitive (e.g., analytical skills) and non-cognitive (e.g., motivation) outcomes.

Cognitive styles refer to individual differences in processing information. In VTE management courses, students exhibit diverse styles: some excel in analytical tasks, others in creative problem-solving. Understanding these differences is critical for designing inclusive teaching methods.

The flipped classroom's success hinges on accommodating cognitive styles. For example, analytical learners may benefit from structured materials (e.g., case studies), while creative learners thrive in open-ended discussions. This study examines how cognitive styles moderate FC effects, identifying best practices for tailored instruction (Kahanec et al., 2022).

This study explored the flipped classroom's impact on management courses in China's VTCs by analyzing FC, traditional teaching (TA), learning performance, and cognitive styles. Findings aim to enhance pedagogical strategies in VTE, aligning education with the demands of a rapidly evolving economy.

1.3 Problem Statement

Vocational and Technical Education (VTE) in China, particularly in management courses, faces significant pedagogical and practical challenges. Despite the growing emphasis on aligning education with industry needs, traditional teaching methods persist, limiting the development of critical skills such as problem-solving, adaptability, and successful intelligence. This study identifies four key gaps that hinder the effects of VTE in management education: theoretical, ontological, epistemological, and practical.

1.3.1 Theoretical Gaps

The theoretical exploration of the flipped classroom model within Vocational and Technical Education (VTE), especially in the context of management education in Anhui Province, China, remains underdeveloped. Existing research has primarily focused on the application of flipped classrooms in general and higher education, with limited attention paid to vocational education (Lin et al., 2021). Moreover, while the flipped classroom model is considered to significantly improve student engagement and learning performance, there is limited theoretical research on how cognitive styles, such as visual and verbal preferences, interact with this model to influence learning performance, particularly in the VTE context (Avdeyeva & Krasnokutskaya, 2021). This theoretical gap needs further exploration to understand how the flipped classroom model can support diverse learning objectives, including the development of successful intelligence, comprising analytical, creative, and practical skills (Tang et al., 2023).

1.3.2 Ontological Gaps

Vocational and Technical Education (VTE) possesses a distinct ontological nature: its fundamental being is defined by its purpose to equip students with the practical competencies essential for workforce readiness. However, a significant ontological gap exists between this essential purpose and the pedagogical reality prevalent in many VTE contexts. Traditional lecture-based methods, dominant in VTE, embody a misaligned mode of educational being – one focused on passive knowledge transmission rather than the active development of applied competencies inherent to VTE's core identity. While the flipped classroom model has demonstrated potential elsewhere to reconcile theory-practice disjunctures (Lin et al., 2021), its ontological congruence with VTE's specific mandate – being preparation for the practical demands of work – remains largely unexamined. This gap is particularly pronounced in VTE management education and critically unexplored in specific regional contexts like Anhui Province (Guan, 2024; Li et al., 2020). This study directly addresses this ontological gap. It investigates whether implementing flipped classroom principles constitutes a pedagogical mode of being that is ontologically truer to VTE's fundamental nature. By examining how this approach fosters the practical competencies essential for workforce readiness, the study seeks to illuminate the relation between pedagogical form (being) and VTE's core purpose (being) and determine if the flipped classroom can more authentically realize VTE's fundamental purpose.

1.3.3 Epistemological Gaps

Current research on flipped classrooms in Vocational and Technical Education (VTE) exhibits significant epistemological limitations concerning validity, methodology, and scope. While studies often report improved engagement and academic achievement

(Lin et al., 2021), methodological constraints (e.g., over-reliance on self-reporting, short-term academic metrics) compromise the validity of claims regarding impacts on core VTE outcomes: authentic academic performance, demonstrable employability skills, and the analytical, creative, and practical facets of successful intelligence (Shi et al., 2020; Tang et al., 2023). Furthermore, the scope of inquiry has been narrow, lacking robust evidence on how these pedagogical outcomes translate into tangible job readiness – the fundamental objective of VTE. This study directly addresses these epistemological gaps by enhancing methodological rigor and expanding scope. It investigates the flipped classroom's bridge between theory and practice within management education, utilizing methods designed to capture complex skill development and employability linkages, thereby strengthening the validity and generalizability of findings and advancing the epistemological foundation of VTE pedagogy research.

1.3.4 Practical Gaps

Vocational and technical education (VTE) in Anhui Province faces significant practical gaps that hinder its alignment with modern workforce demands. Traditional teaching methods, which emphasize rote learning and standardized assessments, often fail to cultivate critical soft skills such as problem-solving, adaptability, and collaborative thinking (Williams et al., 2022; Diehl & Lee, 2022). While the flipped classroom model—a pedagogical approach where students engage with pre-class materials and apply knowledge through interactive activities during class—has shown promise in addressing these gaps (Liu & Hardy, 2023), its implementation in Anhui is complicated by systemic challenges.

A primary barrier lies in technological and infrastructural limitations, particularly in rural areas. Students in remote regions of Anhui often struggle with unreliable internet access and outdated equipment, making it difficult to engage with online learning platforms or stream instructional videos (Zhou & Zhang, 2019). This digital divide exacerbates existing educational inequalities, as urban institutions with better resources more easily adopt innovative teaching methods (Li, 2020). For example, vocational schools in Hefei may utilize advanced learning management systems, while rural colleges in Fuyang lack basic multimedia tools, widening the gap in educational quality.

Compounding this issue is the lack of teacher preparedness. Many vocational educators in Anhui are untrained in digital literacy or student-centered pedagogy, leaving them ill-equipped to design flipped classroom content or facilitate dynamic in-class activities (Chen, 2020). Professional development programs in the province often prioritize traditional teaching methods, perpetuating reliance on lecture-based instruction rather than fostering interactive learning. This mismatch between teacher skills and flipped classroom demands stifles innovation and limits the model's effectiveness.

Student motivation and support systems further complicate implementation. Vocational learners in Anhui, particularly those from rural backgrounds, may lack the self-directed learning habits required for flipped classrooms due to prior exposure to rigid, exam-focused education (Yang, 2018). Without adequate academic support — such as tutoring or accessible online resources—students who struggle with pre-class materials risk falling behind, leading to disengagement during collaborative in-class exercises. This challenge is amplified by cultural stigma, as vocational education in Anhui is often perceived as a “second-choice” pathway, discouraging students from embracing

non-traditional learning models (Wu, 2017). Resistance to pedagogical change, rooted in societal preferences for conventional academic routes, further entrenches systemic inertia.

Another critical gap is the misalignment of assessment practices. Traditional evaluation methods, such as written exams, fail to measure the practical and collaborative competencies fostered by flipped classrooms (Zhou & Zhang, 2019). For instance, vocational courses in electronics or advanced manufacturing require hands-on skill assessments, yet Anhui's institutions lack frameworks to evaluate problem-solving or teamwork effectively. This disconnect undermines the potential of flipped classrooms to bridge theoretical knowledge and real-world application.

Finally, while flipped classrooms emphasize active learning, adaptation to diverse cognitive styles remains underexplored in vocational contexts. Research has yet to fully address how strategies like flipped learning can be tailored to accommodate visual, auditory, or kinesthetic learners in technical fields (Evendi et al., 2022). Understanding these nuances is essential for maximizing student engagement and performance, particularly in a province like Anhui, where socioeconomic and regional disparities shape varied learning preferences (Zhang et al., 2022).

To address these gaps, targeted interventions are necessary. Upgrading rural infrastructure, enhancing teacher training in digital pedagogy, and developing assessment tools aligned with flipped learning outcomes could mitigate systemic barriers. Additionally, research into cognitive style adaptation, as proposed in this study, offers a pathway to personalize flipped classrooms for Anhui's diverse student population (Hsu et al., 2023). By tackling these challenges, Anhui's vocational education system can better align pedagogical innovation with labor market needs, fostering a workforce equipped with both technical expertise and critical soft skills.

1.4 Research Objectives

This research aims to assess the impact of flipped classrooms on learning performance at VTCs in China. The performance encompasses measures of academic achievement, successful intelligence, and learning attitudinal. The study also examines whether cognitive style moderates the relationship between demographic profiles (college, gender) and learning performance.

To achieve the aim of this study, the following research objectives are set:

i To assess the effects of the flipped classroom model in enhancing learning performance within the management course in VTE, based on the significant improvements in academic achievement, successful intelligence, and learning attitudes:

- To determine if the flipped classroom model leads to statistically significant improvements in academic achievement, successful intelligence, and learning attitudes.

ii To compare the impact of the traditional classroom model and the flipped classroom model on learning performance in VTE:

- To evaluate the changes in academic achievement test scores before and after the implementation of the traditional classroom model and the flipped classroom model.

- To assess the differences in successful intelligence scores (comprising analytical, creative, and practical) before and after the implementation of the traditional classroom model and the flipped classroom model.

- To examine the changes in students' learning attitudes before and after exposure to the traditional classroom model and the flipped classroom model.

iii To analyze the moderating role of cognitive style in the relationship between demographic profiles (college, gender) and learning performance for both traditional and flipped classroom models:

- To explore whether cognitive style moderates the relationship between demographic factors (college, gender) and learning performance in the traditional classroom model.

- To explore whether cognitive style moderates the relationship between demographic factors (college, gender) and learning performance in the flipped classroom model.

iv To integrate qualitative insights from students and teachers to enrich the understanding of the flipped classroom model's impact:

- To analyze the qualitative instruments, including Teacher's Teaching Records, Teaching Activity Worksheets, and Student's Reflection Reports, to gain deeper insights into the implementation of flipped classrooms and the perceived benefits and challenges of this approach from both the students' and teachers' perspectives.

These objectives focus on assessing the impact of the flipped classroom in improving learning performance in VTE, explore the potential moderating effect of cognitive style, and enrich the quantitative findings with qualitative data to better understand the practical benefits and challenges of implementing flipped classrooms in VTE settings.

1.5 Research Questions and Hypotheses

1.5.1 Research Questions

Based on the research objectives, the following research questions can be generated:

RQ1: Does the flipped classroom model lead to a improvement in academic achievement test scores from before to after its implementation?

RQ2: Does the flipped classroom model lead to a improvement in successful intelligence scores from before to after its implementation?

RQ3: Does the flipped classroom model lead to a improvement in learning attitude test scores from before to after its implementation?

RQ4: Are academic achievement test scores in the flipped classroom model significantly higher than those in the traditional classroom model?

RQ5: Are successful intelligence scores in the flipped classroom model significantly higher than those in the traditional classroom model?

RQ6: Are learning attitude test scores in the flipped classroom model significantly higher than those in the traditional classroom model?

RQ7: Does cognitive style moderate the relationship between selected demographic variables (college, gender) and learning performance (academic achievement, successful intelligence, learning attitudes) in the traditional classroom model?

RQ8: Does cognitive style moderate the relationship between selected demographic variables (college, gender) and learning performance (academic achievement, successful intelligence, learning attitudes) in the flipped classroom model?

RQ9: What are the perceived benefits and challenges of implementing the flipped classroom model from students' and teachers' perspectives?

RQ10: How do qualitative insights from teaching records and student reflections align with the quantitative findings on learning performance?

These research questions collectively aim to evaluate the effects of flipped classrooms, compare it with traditional methods, analyze the moderating role of cognitive style, and integrate qualitative insights to understand the broader impact of the flipped classroom model in vocational education and training.

1.5.2 Research Hypotheses

Here are the hypotheses for this research:

H1: There will be a significant improvement in academic achievement test scores from before to after the implementation of the flipped classroom model.

H2: There will be a significant improvement in successful intelligence scores from before to after the implementation of the flipped classroom model.

H3: There will be a significant improvement in learning attitude test scores from before to after the implementation of the flipped classroom model.

H4: Academic achievement test scores in the flipped classroom model will be significantly higher than those in the traditional classroom model.

H5: Successful intelligence scores in the flipped classroom model will be significantly higher than those in the traditional classroom model.

H6: Learning attitude test scores in the flipped classroom model will be significantly higher than those in the traditional classroom model.

H7: Cognitive style will moderate the relationship between selected demographic variables (college, gender) and learning performance (academic achievement, successful intelligence, learning attitudes) in the traditional classroom model.

H8: Cognitive style will moderate the relationship between selected demographic variables (college, gender) and learning performance (academic achievement, successful intelligence, learning attitudes) in the flipped classroom model.

1.5.3 Study Rationale

The development of the hypotheses for this study is based on a comprehensive review of existing literature, which provides theoretical and empirical insights into the relationships between the flipped classroom model, cognitive styles, academic achievement, successful intelligence, and learning attitudes. Each hypothesis is derived from findings in prior research and aimed at exploring how different teaching approaches impact students' learning outcomes in vocational education and training (VET), specifically within management courses. Below, we break down the explanation for each hypothesis, highlighting relevant studies and the theoretical frameworks that inform their development.

The first hypothesis (H1) proposes that there will be an improvement in academic achievement test scores before and after the flipped classroom model. Numerous studies have demonstrated that flipped classrooms lead to enhanced academic performance due to their active learning components, which encourage students to engage with the material at their own pace outside of class, followed by collaborative, problem-solving activities during class. For example, Bergmann and Sams (2012) and Zhang et al. (2019) found that flipped classrooms provide opportunities for deeper understanding and retention of content. These findings suggest that flipped classrooms, by fostering student autonomy and active learning, result in improved academic outcomes. The underlying theoretical support for this hypothesis comes from Piaget's Constructivist Theory, which emphasizes the role of active engagement in learning, where students build knowledge through interaction with content and peers.

The second hypothesis (H2) proposes that the flipped classroom model will lead to improvements in successful intelligence scores, encompassing analytical, creative, and practical intelligence. Sternberg's Triarchic Theory of Intelligence (2003) argues that intelligence is not limited to academic achievement but also includes the ability to think creatively, solve problems, and adapt to different contexts. Research by Liu and Xu (2019) and Anderson and Krathwohl (2001) highlights the flipped classroom's capacity to enhance these cognitive skills, as it emphasizes application, collaboration, and critical thinking. Studies suggest that flipped classrooms promote higher-order thinking skills, which are central to successful intelligence. These findings support the hypothesis that flipped classrooms will lead to an improvement in students' scores on measures of analytical, creative, and practical intelligence.

The third hypothesis (H3) suggests that students' learning attitudes will improve before and after the flipped classroom model is implemented. Previous studies have found that flipped classrooms positively affect student motivation and engagement, which in turn enhances learning attitudes. Bishop and Verleger (2013) and Tian et al. (2018) found that flipped classrooms increase student satisfaction by making learning more interactive and student-centered, leading to more positive attitudes toward learning (Nguyen et al., 2021). Furthermore, research by Johnson et al. (2014) demonstrated that students in flipped classrooms report greater enjoyment and perceived value in their learning experiences, which enhances their overall learning attitude. This hypothesis aligns with Self-Determination Theory (Deci & Ryan, 1985), which emphasizes the role of autonomy, competence, and relatedness in fostering positive learning attitudes. The flipped classroom's provision of autonomy and collaborative learning opportunities can increase students' intrinsic motivation, leading to more favorable learning attitudes.

The fourth hypothesis (H4) posits that students in flipped classrooms will outperform students in traditional classrooms on academic achievement tests. This hypothesis draws on studies comparing flipped classrooms with traditional teaching models, such as those by Liu et al. (2019) and Graham et al. (2016), which consistently show that flipped classrooms yield better academic results. By shifting the focus from passive lecture-based learning to active, student-driven engagement, the flipped model enables deeper learning and retention of material. The flipped classroom model provides more opportunities for students to engage with content, apply knowledge in real-world contexts, and receive immediate feedback, all of which contribute to improved academic achievement. This finding aligns with Vygotsky's Zone of Proximal Development (1978),

which stresses the importance of interactive learning in advancing students' cognitive development.

The fifth hypothesis (H5) suggests that students in the flipped classroom model will score higher on successful intelligence measures than students in traditional classrooms. As highlighted in the literature, flipped classrooms promote active learning environments that encourage problem-solving, creativity, and critical thinking, which are key components of successful intelligence. Studies like those by Liu and Xu (2019) and Sternberg and Grigorenko (2004) support the idea that the flipped model nurtures these skills more effectively than traditional teaching approaches, which tend to prioritize rote memorization over higher-order cognitive skills. In comparison to the traditional classroom model, the flipped classroom fosters an environment where students apply their knowledge to new and complex situations, thereby enhancing their ability to think analytically, creatively, and practically. Thus, it is hypothesized that students in flipped classrooms will demonstrate superior successful intelligence compared to their peers in traditional classrooms.

The sixth hypothesis (H6) proposes that students in flipped classrooms will exhibit superior learning attitudes compared to those in traditional classrooms. Studies by Kim et al. (2014) and Mokhtari et al. (2020) suggest that flipped classrooms lead to higher levels of student engagement and satisfaction, which contribute to more positive learning attitudes. Unlike the traditional lecture-based approach, which can be passive and disengaging, the flipped classroom fosters an interactive and collaborative learning environment, promoting active participation and motivation. This hypothesis is also supported by Deci and Ryan’s Self-Determination Theory (1985), which posits that providing students with autonomy and opportunities for meaningful engagement leads to more positive attitudes toward learning. Given the flipped classroom’s emphasis on active,

student-centered learning, it is expected that students will develop a more favorable attitude toward their studies.

The seventh hypothesis (H7) suggests that cognitive style (visual vs. verbal) moderates the relationship between demographic factors (such as college and gender) and learning performance in traditional classrooms. Research by Pashler et al. (2009) and Dunn and Dunn (1992) indicates that cognitive style influences how students respond to traditional instructional methods. Visual learners, for instance, may benefit more from instructional methods that incorporate diagrams, charts, and visual aids, whereas verbal learners may excel in traditional lecture-based settings. Given the passive nature of traditional classrooms, cognitive style may play a significant role in determining how well students from different demographic backgrounds perform. This hypothesis is based on the premise that traditional teaching methods may not effectively accommodate the diverse cognitive styles of all students, leading to variability in learning outcomes.

Finally, the eighth hypothesis (H8) suggests that cognitive style moderates the relationship between demographic factors and learning performance in the flipped classroom model. Research by Mayer and Moreno (2003) indicates that the multimodal nature of the flipped classroom, which combines visual, auditory, and hands-on learning activities, is more likely to cater to students with varying cognitive styles. The flexibility of the flipped classroom, which allows for a range of instructional materials and active learning strategies, can reduce the cognitive load for different types of learners. As such, it is hypothesized that cognitive style will moderate the relationship between demographic factors and learning performance, with students exhibiting varying levels of success based on how well their cognitive preferences are supported by the flipped classroom model.

These hypotheses are developed from the existing body of research, which highlights the potential benefits of the flipped classroom in enhancing academic achievement, successful intelligence, and fostering more positive learning attitudes in management education. By considering the moderating role of cognitive styles, the study aims to contribute new insights into how instructional methods can be optimized to meet the needs of diverse learners in vocational education and training settings.

As is illustrated in Figure 1.2, the conceptual framework of this study examines the impact of teaching methods (traditional vs. flipped classroom) on learning performance, which includes academic achievement, successful intelligence, and learning attitudes. Cognitive styles (visual vs. verbal) serve as moderating variables, influencing how students respond to these teaching methods. The study controls for factors such as grade level, instructional focus, teaching materials, and teaching hours to isolate the effects of the teaching methods. This framework aims to understand how different teaching approaches, alongside students' cognitive preferences, affect their academic performance and engagement in vocational education settings.

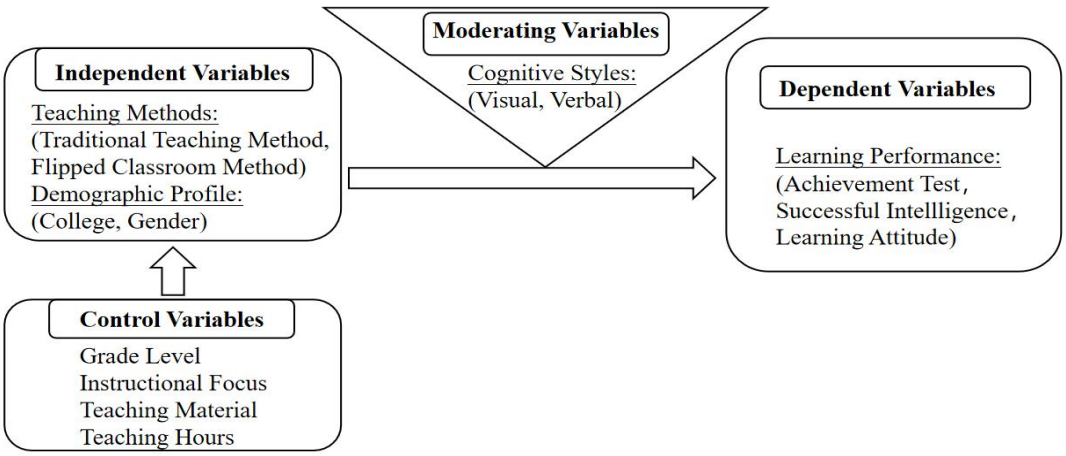


Figure 1.2: Conceptual Framework

1.6 Significance of Study

This study is crucial for advancing pedagogical practices in Vocational and Technical Education (VTE) in China, particularly in Anhui Province, where educational reforms are underway to meet the demands of a rapidly evolving economy. The flipped classroom model, which promotes active learning and engagement, addresses key gaps in traditional teaching methods that fail to adequately prepare students for the modern workforce (Galindo-Dominguez, 2021). This study contributes to understanding how flipped classrooms can enhance the development of practical skills, critical thinking, and adaptability—skills that are essential for success in the contemporary job market (Sailer & Sailer, 2021).

1.6.1 Stakeholder Relevance

This research offers practical insights for educators in VTE, providing evidence on how the flipped classroom model can be integrated to create more engaging and effective learning environments. It helps educators move beyond traditional lecture-based methods and adopt student-centered approaches that better engage learners (Al-Samarraie et al., 2020).

This study benefits students by providing a learning model that accommodates diverse cognitive styles, improves learning performance, and prepares them for the workforce with both technical and soft skills. The flipped classroom addresses their need for practical, real-world applications of knowledge.

The findings inform education policy decisions, guiding the integration of flipped classroom methods into VTE systems nationwide. This research supports the need for

teacher training, curriculum redesign, and investment in educational technologies that align with labor market needs.

Employers stand to benefit from graduates who possess not only technical skills but also the critical thinking, problem-solving, and teamwork abilities needed to thrive in today's workforce. The flipped classroom model helps cultivate these competencies, making VTE graduates more attractive to employers (Ge et al., 2020).

1.6.2 Practical Implications of the Study

This research directly informs the practice of teaching and learning in VTE, especially in how the flipped classroom model can be implemented effectively. It provides evidence on how VTE institutions can foster better engagement, improve learning performance, and better align education with industry needs. The practical application of this model addresses the challenge of preparing students for the workforce by emphasizing active learning and skill development over passive content absorption.

1.6.3 Theoretical Contributions

Theoretically, this study contributes to the field by expanding the application of the flipped classroom model within VTE, which has been underexplored. It also integrates cognitive styles into this pedagogical framework, which adds nuance to the understanding of how teaching methods can be personalized to accommodate different learning preferences. This theoretical development enriches current models of active learning by emphasizing the importance of aligning teaching strategies with students' cognitive styles, thus optimizing learning outcomes and bridging the gap between theoretical knowledge and practical application in vocational settings.

1.6.4 Relevance to the Chinese Vocational Technical Education System

This study is particularly relevant to the Chinese education system, where the government has placed increasing emphasis on improving Vocational and Technical Education (VTE) to meet the demands of a rapidly changing economy. In China, VTE faces unique challenges, such as outdated teaching methods and a gap between theoretical knowledge and practical skills, which hinder students' readiness for the workforce. The flipped classroom model, with its focus on active learning, student engagement, and the integration of practical application, has the potential to address these challenges (Galindo-Dominguez, 2021). By applying this model in the VTE context, this study aims to provide valuable insights into how teaching methods can be modernized to better prepare students for the demands of the labor market, while simultaneously supporting the development of critical soft skills such as problem-solving, adaptability, and teamwork, which are increasingly valued by employers in China. This research is not only timely but also essential for shaping the future of VTE in China, aligning education with industry needs and contributing to national economic development goals.

1.7 Research Scope

In this research, our primary focus is on assessing the impact of the flipped classroom on the learning performance of students at VTCs. The outcomes derived from this investigation are anticipated to offer valuable insights for VTCs. Students from five VTCs in Anhui province in China serve as the primary subjects for this experiment. Consequently, the pedagogical strategies employed in this research have been tailored accordingly.

Regarding the teaching methods used, this research mainly employs two approaches: the "flipped classroom" and the "traditional teaching." No other pedagogical

models have been explored in this study, limiting the teaching methodological domain to these two. When it comes to measuring student learning performance, the study hones in on factors like cognitive achievements, aspects of successful intelligence, and students' attitudes towards their studies. Exploration into other facets impacting learning performance remains outside the purview of this particular investigation.

1.8 Chapter Summary

Chapter 1 introduced the research framework for examining the impact of flipped classroom pedagogy and cognitive styles on learning performance in vocational and technical education (VTE) management courses. The chapter highlighted the growing importance of VTE both globally and within China, emphasizing the need for pedagogical innovation to address current challenges in teaching and learning. Central to this study is the flipped classroom model, which encourages active learning by having students engage with lecture content outside of class and apply this knowledge through interactive in-class activities. Additionally, the concept of cognitive styles was explored to demonstrate how tailoring educational approaches to individual learning preferences can improve student engagement and performance.

The chapter also identified several gaps in existing research, including the lack of empirical studies on the flipped classroom's effects in VTE settings, and the need for pedagogical strategies that align with students' diverse cognitive styles. These gaps formed the basis for the research objectives and questions, which are designed to assess the impact of the flipped classroom model on learning performance, while also considering how cognitive styles might moderate these effects. In doing so, the study seeks to contribute to both theoretical advancements and practical improvements in VTE pedagogy, with potential implications for workforce development and the broader educational landscape.

The research hypotheses were framed to test the effects of the flipped classroom model in comparison to traditional teaching methods, with a focus on academic achievement, successful intelligence, and learning attitudes. The chapter also acknowledged potential limitations of the study, including the variability of instructional strategies and resources across VTCs, which might affect the generalizability of the results.

In conclusion, Chapter 1 set the stage for the study by outlining the research's significance, objectives, and the key concepts of flipped classrooms, cognitive styles, and learning performance. The chapter also presented a structure for the study, which will unfold in subsequent chapters, beginning with a detailed literature review in Chapter 2.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter presents a comprehensive literature review that establishes the theoretical and contextual foundation for the study. It begins with an exploration of the flipped classroom model, detailing its origin, development, and the core principles that define this innovative teaching strategy, clarifying its alignment with the aims of the current study in vocational and technical education (VTE). The chapter then moves on to explore the concept of learning performance, defining it, reviewing the various aspects and factors influencing it, considering the methods used for its assessment, and examining how learning attitudes contribute to academic success. Additionally, it shifts focus to the impact of demographic factors, particularly college and gender, on learning performance, exploring how these variables might interact with different teaching approaches, such as traditional versus flipped classrooms, and their influence on students' academic outcomes.

The chapter concludes by outlining the theoretical framework for the study, synthesizing the key guiding theories, which integrates the flipped classroom model, learning performance, and demographic factors, offering a cohesive basis for the investigation and outlining how these concepts relate to each other to contribute to the understanding of student outcomes in vocational education settings.

2.2 Theoretical Framework

The theoretical framework for this study is designed to explore the effects of the flipped classroom model in Vocational and Technical Education (VTE). It integrates educational psychology and pedagogical theories to understand how the flipped classroom

can impact learning performance, addressing the limitations of traditional teaching methods.

As is illustrated in Figure 2.1, the flipped classroom model shifts direct instruction to individual learning, typically through digital platforms, and uses classroom time for active engagement. This approach is grounded in constructivist theory, which emphasizes that learners build knowledge through active interaction with content, positioning the learner as central to their own understanding. This directly challenges traditional models, suggesting the flipped classroom could foster deeper learning and engagement in VTE.

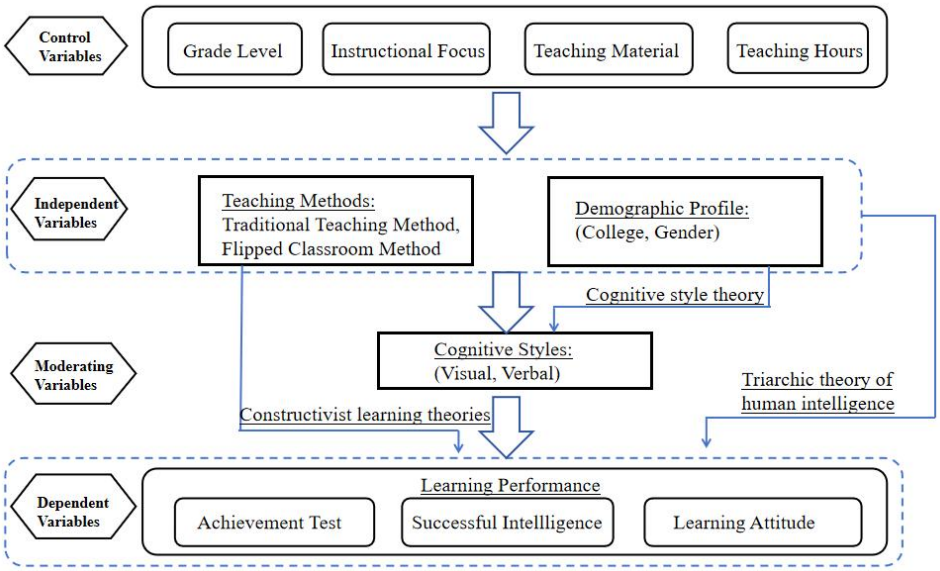


Figure 2.1: Theoretical Framework

The study also broadens the definition of learning performance to include traditional academic metrics, such as test scores, and extends to measures like successful intelligence and learning attitudes. Sternberg's theory of successful intelligence, which integrates analytical, creative, and practical skills, aligns with VTE's goal of preparing students for real-world challenges, offering a comprehensive evaluation of flipped classroom effects.

Additionally, the study also examines through the lenses of visual-verbal cognitive style theory, recognizing that individual differences in information processing affect learning outcomes. This supports the idea that the flipped classroom can cater to diverse learning styles, improving the educational experience for vocational students.

Finally, the comparison between traditional and flipped classroom models highlights their relative strengths and weaknesses, with a focus on how each affects learning performance. Control variables like grade level, subject area, materials, and instructional hours help account for potential confounding factors, ensuring the study's findings are valid.

In sum, the theoretical framework synthesizes relevant theories to examine the flipped classroom model's potential in VTE, guiding both the research methodology and the interpretation of results.

2.3 Flipped Classroom

A flipped classroom involves students learning by themselves before class, and then engaging in interactions and in-depth discussions with teachers and fellow students during class. This approach flips the traditional classroom model's one-way cognitive style from teacher to student, shifting the focus to a student-cantered model. It has become one of the current trends in educational innovation (Galindo-Dominguez, 2021). This section will discuss the origins, content, characteristics, and application cases of “flipped classroom” teaching.

2.3.1 Origin of the Flipped Classroom

In recent years, the term "flipped classroom" has gained popularity. The concept's origin dates back to 2007 when two chemistry lecturers, Bergmann and Sams, from

Woodland Park High School in Colorado, USA, created videos for students' remedial learning and uploaded them to YouTube. Their successful approach drew widespread attention (Sams & Bergmann, 2013). The concept of the flipped classroom originated in the 1990s when Mazur in computer-assisted classroom teaching shifted the teacher's role from a lecturer to a learning facilitator, significantly enhancing student learning performance (Gopalan et al., 2022). In 2000, Baker presented a paper titled "Classroom Flip" at the 11th International Conference on College Teaching; the same year, some courses at the University of Wisconsin-Madison used Eteach software to record videos and support materials, replacing traditional lecture-style teaching. In 2006, Mausumi used the model to teach calculus at Lamar University, where the experimental group showed significantly better performance than the control group (Syam, 2014). In 2011, the Economist magazine explored integrating information technology and teaching strategies in its digital education column with the article "Flipping the Classroom," recognizing this model as a new concept differing from past teaching styles (Barkley, 2015). Also in 2011, the University of Wisconsin-Madison established the Wisconsin Collaboratory for Enhanced Learning (WisCEL), a centre encouraging teachers to adopt non-traditional classroom models, with a focus on technology and collaboration-friendly approaches, further extending flipped and blended learning (Morrow, 2014).

Examining the key drivers of the flipped classroom model, Salman Khan, the founder of Khan Academy, stands out prominently (Plasencia & Navas, 2014). Khan recorded his mathematics teaching and problem-solving processes and uploaded them to YouTube to help his relatives' children with their math problems, allowing them to learn without being constrained by time and place. Subsequently, Khan expanded his teaching materials to include other subjects, gradually evolving into what Khan Academy is today.

When invited to speak at the TED (Technology, Entertainment & Design) conference, Khan mentioned that any lecturer at any time could use the resources of Khan Academy to achieve the ideal of promoting the flipped classroom (McNaughton & Bhardwaj, 2022). The impact of Khan Academy on education highlighted the advantages and core values of the flipped classroom, contributing to its increased recognition and widespread adoption (McNaughton & Bhardwaj, 2022).

For example, due to budget cuts and the inability to afford updates to math textbooks, teachers at Byron High School in Minnesota came up with the idea of creating their own teaching materials (Morgan, 2014). In early 2010, teachers reorganized teaching resources based on students' abilities and the state's educational standards. They integrated learning content, assignments, assessments, and answer sheets into the Moodle website for course learning. Teachers could also use the YouTube platform to upload their own recorded videos, which students could then use at home to aid their learning.

Another example is from 2011 at Lake Elmo Elementary School in Minnesota, USA, where the adoption of flipped classroom teaching strategies led to increased student receptiveness to the lessons, with parents also expressing satisfaction with their children's learning performance (Walne, 2012). The majority of teachers indicated a preference for not returning to traditional teaching methods. Algonquin College in Canada also implemented flipped classroom teaching in courses on how to use software for video editing, which allow students to watch videos before class and engage in creative learning projects with classmates during class. At Penn State University in the USA, a course in accounting was designed to include guest lectures, open-ended discussions, and practical problem-solving activities. A physics professor at Harvard University applied the flipped classroom model and further developed the Learning Catalytics platform, a website

offering free and interactive software to teachers, promoting student discussion and application (Alrowais, 2014).

The evolution of technology-enhanced pedagogical models is exemplified by pioneering implementations ranging from Byron High School's proprietary digital curriculum (Morgan, 2014) to Lake Elmo Elementary School's systematic flipped classroom deployment (Walne, 2012). These educational innovations strategically employed digital platforms including Moodle and YouTube to circumvent traditional resource constraints, effectively decoupling knowledge acquisition through pre-class content delivery from application-oriented classroom interactions. By reconceptualizing instructional sequencing through this temporal-spatial reorganization, these implementations cultivated synergistic relationships between educators and learners while strengthening school-family partnerships. Such developments substantiate the flipped classroom paradigm's maturation from conceptual frameworks to empirically grounded educational methodologies, demonstrating cross-institutional replicability through systematic integration of technological affordances and pedagogical restructuring.

2.3.2 The Essence of the Flipped Classroom

2.3.2.1 The Concept of the Flipped Classroom

The flipped classroom is seen by some as an old technology applied in a new teaching method, but Ahmed (2016) views it as a philosophical shift away from traditional approaches (Gnutova, 2020). It focuses on active student engagement, blended course design, and podcasting-based classes. Sams and Bergmann (2013) define "flipping" as the use of technology to replace traditional lectures, allowing students to access learning materials before class through devices like computers and tablets, while classroom time is used for interactive learning (Ozdamli & Asiksoy, 2016). This shift moves the lecturer's

role from the central figure to a facilitator or coach (Awidi & Paynter, 2019).

Analysing the shift in teaching focus from traditional model to flipped classroom teaching, we can interpret this transition using Bloom's cognitive domain (memory, understanding, application, analysis, evaluation, and creation) teaching objectives (Seddon, 1978). In traditional teaching, lecturers primarily instruct students in the lower-order cognitive skills of "memory" and "understanding" through classroom teaching processes. The middle-order abilities of "application" and "analysis" can be achieved through exercises, experiments, and tests during teaching. However, the higher-order cognitive skills of "evaluation" and "creation" often cannot be fully realized due to the limitations of fixed class times and insufficient lecturer-student interaction in traditional lecture-based teaching. In flipped classroom teaching, the lower-order cognitive skills of "memory" and "understanding" can be acquired through pre-class learning by students, while the middle to higher-order skills of "application", "analysis", "evaluation", and "creation" can be achieved through classroom discussions, cooperative learning with peer interaction, and lecturer guidance (Wu et al., 2018).. Compared to traditional teaching, flipped classroom teaching is more likely to enhance students' higher-order cognitive abilities.

Ahmed (2016) emphasizes a crucial concept behind promoting flipped classroom teaching: lecturers should rethink when students most need face-to-face time with them. The concept of the flipped classroom arises from the idea that students may need assistance to understand difficult concepts and clear up confusion, whether when listening to a lecturer’s lecture or while at home. It uses lecturer-prepared pre-class teaching videos, allowing students to choose when and where to watch them, on any device, and at their own pace (Jdaitawi, 2019). Students can slow down, pause, skip, or re-watch before or after class. In school, lecturers can more flexibly assist students during class time through

student presentations, questioning, and group discussions. They can offer individual guidance to clarify concepts and misconceptions and provide help to students who encounter difficulties. Additionally, lecturers can design their courses considering students' learning progress, moderately deepening and broadening the learning content to challenge students and guide them towards higher-level cognitive domain learning (Tang et al., 2023).

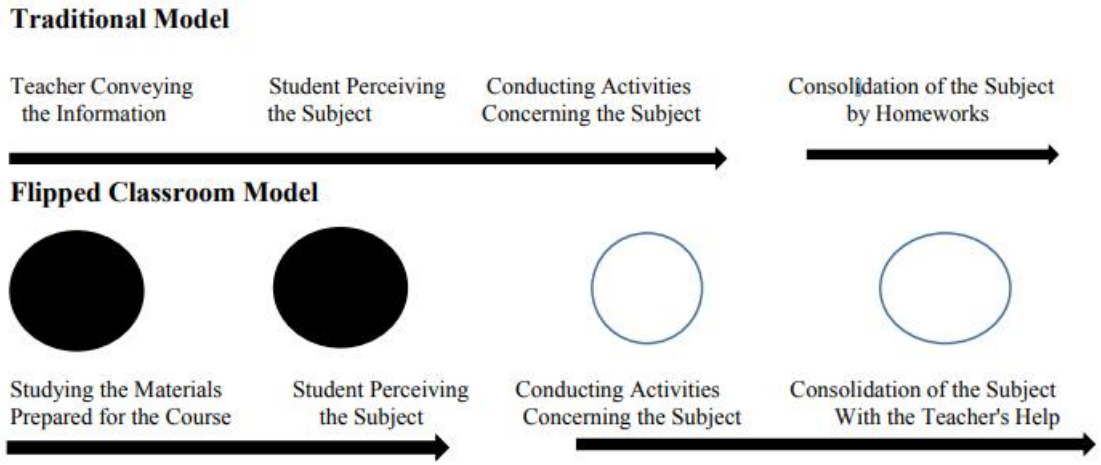


Figure 2.2: Flipped Classroom and Traditional Classroom Models (Say & Yildirim, 2020)

As is shown in Figure 2.2, the essence of the flipped classroom, as a philosophical pivot from traditional to student-centered education, underscores a critical shift towards integrating technology in learning, aiming to adapt education systems to the digital age. However, challenges exist, including the digital divide and the need for self-regulated learning. Successful implementation requires high-quality pre-class materials, effective in-class activities, and teacher readiness to shift from traditional roles. The flipped classroom's potential in VTE depends on addressing these issues (Tang et al., 2023).

2.3.2.2 Key Components of Flipped Classroom

The flipped classroom has two key components: pre-class preparation and in-class collaboration. In the preparation phase, lecturers provide course materials (Rasheed et al., 2020), which students access through various devices, engaging in self-directed learning. In the classroom, activities like presentations, discussions, and Q&A sessions help resolve questions and deepen understanding (Youhasan et al., 2021).

This model reverses the traditional learning sequence. Students encounter material before class and are motivated to engage in discussions and activities, which are designed to build on their prior knowledge (Mojtahedi et al., 2020). Pre-class assignments help lecturers assess students' understanding, guiding the focus of class activities (Santos & Serpa, 2020). By flipping the sequence, students can engage in more complex cognitive tasks during class time, aligned with learning goals and curriculum (Santos & Serpa, 2020).

While the model offers a significant shift in pedagogy, its success depends on factors like student motivation, material accessibility, and lecturer support. The reliance on self-directed learning presumes a level of discipline that may not be universally present, and successful implementation requires thoughtful planning to ensure all students are adequately prepared and supported.

2.3.2.3 Characteristics of the Flipped Classroom

Proponents of the flipped classroom believe that this method is conducive to student self-learning, providing better lecturer-student interaction through face-to-face feedback opportunities in the classroom (Jiang et al., 2022). Fulton (2012) listed the characteristics of the flipped classroom, including: Students can plan their own learning

pace; classroom learning interactions allow lecturers to better understand the differences in students' learning methods and potential difficulties they may encounter; lecturers can more easily provide and update course materials; classroom time can be planned more efficiently and flexibly; using reports in the classroom can increase diverse learning opportunities, enhancing learning interest and participation; new methods supported by learning theories; the use of technology is highly flexible and suitable for 21st-century learning; students spend more time on authentic research; students are exposed to more technological use in the classroom; students who miss classes can receive remediation; promotes methods for “inside and outside the classroom thinking”; students are more actively involved; the flipped classroom is well received.

Despite the rapid evolution of digital technology, making class videos for the flipped classroom is not new technology. However, the long-standing model of students listening to lecture-based courses in school and doing homework at home is worth rethinking under the flipped classroom model. This model suggests that classroom time should be a student-centered environment. The flipped classroom can not be a panacea, but it emphasizes the maximization of learning opportunities in the classroom, aligning with the fundamental spirit of education (Reidsema et al., 2017).

Webb et al. (2021) list the following effective characteristics of the flipped classroom: Discussions are student-led; discussion content involves higher-level critical thinking; cooperative learning and discussion activities can be adapted and changed according to students' needs and interests; learning content is contextual, related to real-world situations; students are encouraged to challenge different viewpoints during discussions; mutual guidance and cooperative learning are student-directed; without lecturer prompts, students can use their own learning materials and knowledge to guide

[redacted] issues beyond the core curriculum; students shift from passive to active learners.

The [redacted]ed classroom model, celebrated for fostering self-learning and enhancing lecturer-student interactions, embodies a significant shift towards student-centered education, highlighting its various characteristics as beneficial for modern learning environments. However, critical examination suggests that while the model promotes autonomy, personalized pacing, and increased engagement through technology-enhanced learning, it assumes a level of digital literacy and access that may not be universally available, potentially exacerbating educational inequalities. Furthermore, the effects of flipped classrooms in facilitating higher-level critical thinking and student-led discussions hinges on students' preparedness and willingness to engage, which can vary widely. This model's reliance on student initiative for pre-class preparation and active participation might not fully account for the diverse motivational and situational factors affecting different student populations. Additionally, while the model aims to make classroom time more interactive and focused on applying knowledge to real-world contexts, the success of these activities depends largely on the quality of the pre-class materials and the teacher's ability to adapt teaching strategies to meet students' needs. Despite its popularity and alignment with educational advancements, the flipped classroom model requires careful implementation, support mechanisms for students and teachers, and consideration of the diverse contexts in which students learn to truly maximize its potential benefits.

2.3.2.4 Classroom Use Case Examples

The flipped classroom model has garnered significant attention for its ability to promote active learning and improve student outcomes. This approach has been effectively implemented in China, ASEAN, and other Asian regions, leading to improvements

engagement, academic performance, and critical thinking skills. Below are examples from various countries, showcasing the successful integration of flipped classrooms.

In Anhui Province, a study explored the use of flipped classrooms in vocational colleges to teach traditional culture as part of college language courses. The study, conducted by Cheng et al. (2024), highlighted that the flipped classroom model significantly enhanced student participation and learning performance. By shifting theoretical learning to online modules and utilizing in-class time for interactive discussions, students were able to better understand complex cultural concepts and engage in collaborative problem-solving. This approach, paired with digital tools, allowed students to absorb content at their own pace, ultimately improving their academic performance (Cheng et al., 2024).

Flipped classrooms have also been implemented at major universities across Shanghai and Beijing, with Wei (2019) investigating its impact in college English classes. The study found that the flipped classroom model, which emphasized pre-class learning through online lectures and in-class activities such as discussions and debates, significantly boosted student engagement and academic performance. The approach allowed students to develop their language skills more effectively and at their own pace, which led to improved test scores and higher overall satisfaction with the course (Wei, 2019).

In Singapore, the flipped classroom model has been widely adopted in various institutions, including the National University of Singapore (NUS). A study by Al Mamun (2020) examined the flipped classroom approach used in an engineering course, specifically focusing on first-year students in the Faculty of Engineering. The study showed that the flipped classroom increased students' engagement, helped them grasp complex concepts more effectively, and improved overall academic performance. By

leveraging digital technologies such as pre-recorded lectures and online quizzes, students could review materials at their convenience, allowing for more dynamic and interactive class sessions (Al Mamun, 2020).

In Malaysia, the flipped classroom model was introduced in a physics course to enhance student learning. Govindaraj and Silverajah (2017) blended the flipped classroom approach with a station rotation model, where students rotated between different learning stations. This combination of methods significantly improved students' understanding of physics concepts by providing them with opportunities for hands-on activities and peer discussions. The study concluded that the model fostered greater interaction and deeper understanding of the subject matter (Govindaraj & Silverajah, 2017).

In Indonesia, Masud et al. (2024) conducted a bibliometric analysis on the effects of flipped learning practices across various Asian countries, including Indonesia and Bangladesh. The analysis found that flipped classrooms promoted more active participation, collaboration, and critical thinking, especially in STEM subjects. The study suggested that the adoption of flipped learning in Indonesia helped bridge the gap between traditional and modern pedagogies, making education more student-centered (Masud et al., 2024).

The impact of the flipped classroom model extends beyond national borders in Southeast Asia. Davi (2020) explored the implementation of the flipped classroom model in transnational education settings across the region. Her research focused on the role of flipped learning in enhancing student engagement and fostering a sense of belonging among students from diverse cultural backgrounds. The study found that flipped classrooms helped bridge gaps between geographically dispersed students, allowing them to learn at their own pace while fostering a community through online discussions and

collaborative activities. These factors were critical for enhancing students' learning experiences and academic success, especially in transnational education contexts where students may otherwise feel isolated.

The flipped classroom model has been recognized for its ability to offer more flexible learning opportunities, especially in contexts where traditional lecture-based learning methods have been less effective. According to Akçayır and Akçayır (2018), flipped classrooms enable students to engage with content in a manner that suits their individual learning styles, which can lead to better retention and understanding. This approach has been particularly useful for students who need extra time to grasp complex concepts, as well as for those with busy schedules.

Furthermore, the flipped classroom model has been shown to improve collaboration and interpersonal skills among students. Ha et al. (2019) found that in Asian higher education institutions, the flipped classroom allowed students to interact more frequently with peers and instructors, leading to a more collaborative learning environment. In their study, both students and teachers reported positive experiences with the flipped model, citing increased student motivation and participation in class discussions.

In Vietnam, Das et al. (2019) explored the impact of flipping a business degree course, finding that students who engaged in flipped learning demonstrated improved problem-solving skills and greater critical thinking. The study also highlighted the flexibility of the model, as students were able to learn independently and then apply their knowledge in real-time class activities. The success of this approach encouraged other institutions in Vietnam to experiment with flipped classroom strategies in various disciplines.

Across Asia, the flipped classroom model has provided valuable insights into improving educational outcomes. It allows for more student-centered learning, where students take ownership of their learning by accessing lecture materials at their own pace. Instructors, in turn, can focus on facilitating discussions, providing personalized feedback, and fostering deeper learning during class time. Moreover, the flipped classroom supports the development of 21st-century skills, such as collaboration, communication, and critical thinking.

The model also enables educators to diversify their teaching methods, using a range of digital tools and online resources to enhance learning. As Cheng et al. (2019) pointed out, the use of flipped classrooms in conjunction with other teaching strategies can lead to better learning performance, as it creates an interactive and flexible learning environment.

For policymakers, the flipped classroom model presents an opportunity to modernize education systems, particularly in countries where traditional education methods are still dominant (Davi, 2020). The model not only supports academic achievement but also fosters essential skills that students need to thrive in the workforce.

2.3.2.5 Literature Research on Flipped Classroom Teaching

To establish the theoretical foundation for investigating the impact of flipped classrooms on vocational education, the researcher systematically analyzed literature sourced from library catalogs, electronic journals, academic databases, and internet search engines. Using a structured literature review methodology, relevant studies were objectively organized, synthesized, and evaluated to explore the theoretical frameworks and practical implementations of flipped classrooms in vocational education settings.

The findings, theoretical perspectives, and methodological tools derived from this literature review provided a robust academic basis for constructing the analytical framework of this study. Special attention was given to validating measurement instruments through literature-based assessment to ensure their applicability in vocational education contexts. These elements served as the theoretical groundwork for the subsequent empirical research design.

2.3.2.6 Empirical Research about Flipped Classroom

The empirical foundation of this study derives from a systematic review of flipped classroom implementations across diverse academic disciplines. To establish a robust analytical framework, journal articles published between 2019 and 2023 were systematically identified through comprehensive database searches encompassing Web of Science and supplementary sources including Google Scholar and discipline-specific repositories. Inclusion criteria required peer-reviewed empirical studies containing quantifiable outcome measures, with search parameters utilizing controlled vocabulary ("flipped teaching", "flipped classroom", "inverted classroom") combined with Boolean operators to optimize precision and recall.

Through rigorous screening protocols, twenty three methodologically sound studies were selected for detailed examination, representing twelve distinct academic domains ranging from STEM disciplines to social sciences. These investigations exhibited systematic variation in pedagogical design, featuring two primary implementation models: sequential adoption (traditional instruction preceding flipped classroom implementation) and concurrent model deployment. Common design elements across studies included pre-class knowledge acquisition through multimedia resources (lecturer-generated videos, MOOC content, Khan Academy modules) coupled with structured in-class application

activities such as problem-solving sessions, collaborative discussions, and competency assessments.

The analytical metrics presented in Table 2.1 synthesizes core methodological components from thirteen studies meeting complete data reporting standards. This structured comparison examines four critical dimensions: instructional design, pedagogical model, discipline, research outcomes. Notably, 85% of analyzed studies employed controlled implementation sequencing, permitting direct comparison between traditional and flipped pedagogies. Disciplinary distribution reveals concentrated applications in healthcare education (31%), engineering sciences (23%), and quantitative disciplines (23%), with emerging implementations in humanities fields such as law and history.

Table 2.1: Summary of Empirical Research Literature

S/N	Author	Instructional Design	Pedagogical Model	Discipline	Research Outcomes
1	Cavert (2020)	LLAM (Integrated Learning Accelerator Module): Offload content, whole class responses and open-ended questions, group sharing activities, student speeches and discussions, individual or group tests	Implemented separately, traditional teaching first, then flipped classroom	Pharmacy	Improved learning performance, enhanced engagement, better critical/problem-solving skills, stimulated innovative thinking
2	Lai, Hsieh, Uden, & Yang (2021)	Khan Academy online courses; online tests, classroom group activities, homework and tests, group post-class homework, individual evaluations	Implemented separately, traditional teaching first, then flipped classroom	Statistics	Improved learning performance, more positive student attitudes
3	Özbay & Çınar (2021)	Video demonstrations, discussions, clarification, and practice	Implemented separately, traditional teaching first, then flipped classroom	Nursing	Improved learning performance, higher student satisfaction
4	Shnai (2020)	Video demonstrations, classroom assistance, and guidance, assessment of learning performance	Simultaneous implementation	Information Systems(MS Excel)	Enhanced learning performance, increased student satisfaction
5	Shahba, Alashban, Sales, Sherif, & Yusuf (2022)	Recorded courses on websites, whole class responses and open-ended questions, group sharing activities; student speeches and discussions, individual or group tests	Implemented separately, traditional teaching first, then flipped classroom	Pharmacy	Enhanced learning performance, improved litigation skills, better cognitive abilities

Table 2.1 continued - Summary of Empirical Research Literature

S/N	Author	Instructional Design	Pedagogical Model	Discipline	Research Outcomes
6	Han & Klein (2019)	Pre-recorded videos; tests; classroom discussions; homework practical exercises; assessments	Simultaneous implementation	Medicine	Improved learning performance
7	Suárez, Mosquera Feijóo, Chiyón, & Alberti (2021)	Video demonstrations; YouTube; Matlab's problem solutions; tests; discussions; assessments	Implemented separately, traditional teaching first, then flipped classroom	Engineering	Improved learning performance, enhanced cognition
8	Clark & Kaw (2020)	MOOCs presentations; tests; coursework; discussions; assessments	Implemented separately, traditional teaching first, then flipped classroom	Mechanical Engineering	Improved learning cognition
9	Domu, Pinontoan, & Mangelep (2023)	ALEKS (Assessment and Learning in Knowledge Spaces) presentations; inter-class discussions	Simultaneous implementation	Statistics	Enhanced learning cognition
10	Beatty, Merchant, & Albert (2019)	Videos, tests, discussions, practical assessments	Implemented separately, traditional teaching first, then flipped classroom	Statistics	Improved learning performance
11	Baldock, Fernandez, Franco, Provencher, & McCoy (2021)	Doceri online, tests, discussions, practical assessments	Implemented separately, traditional teaching first, then flipped classroom	STEM	Enhanced learning performance

Table 2.1 continued - Summary of Empirical Research Literature

S/N	Author	Instructional Design	Pedagogical Model	Discipline	Research Outcomes
12	Goh and Ong (2019)	Video podcasts, tests, inter-class discussions, assessments	Implemented separately, traditional teaching first, then flipped classroom	Pharmacy	Improved learning performance, more positive attitudes
13	Chou (2020)	Videos, discussion interactions, assessments	Implemented separately, traditional teaching first, then flipped classroom	Psychology	Enhanced learning performance, increased participation

The analysis of flipped classroom studies summarized in Table 2.1 reveals several insights regarding its implementation and impact on student learning. Most studies indicate that when implemented effectively, flipped classrooms enhance learning performance, foster engagement, and improve critical thinking, especially in theoretical fields like Medicine and Statistics. These studies suggest that flipped classrooms are particularly effective in promoting cognitive outcomes. Additionally, many studies report positive shifts in student attitudes, satisfaction, and active learning, highlighting the benefits of a student-centered approach. However, variability in outcomes is noted, with some studies showing negative effects on learning, suggesting success is highly dependent on implementation quality.

Effective designs that incorporate diverse pre-class materials (videos, assignments, tests) and interactive in-class activities are crucial for success. Larger class sizes tend to yield more positive results, indicating that class dynamics and collaboration may enhance effects. However, the lack of research on flipped classrooms in technical and vocational education (VTE) points to potential challenges in practical, skill-based fields, warranting further exploration.

This study analyzed twenty three use case studies across diverse fields such as law, engineering, nursing, and psychology. Most research focused on higher education, with an emphasis on cognitive and attitudinal outcomes, particularly academic achievement. While 90% of studies examine the impact on academic performance, 22% also explore effects on learning attitudes, satisfaction, and lecturer-student interaction.

Most studies show that flipped classrooms improve learning performance compared to traditional methods, though two studies reported negative outcomes. It suggests that flipped classrooms generally enhance learning, especially when instructors deeply understand and apply its principles. Effective teaching designs, including the use of technology, collaborative activities, and diverse pre-class materials, are key to success. Positive outcomes in the studies often reflect these principles of student-centered learning.

The study also found that flipped classrooms primarily promote cognitive learning, with some positive effects on student satisfaction and attitudes. However, the relationship between cognitive and affective outcomes remains under-explored. Additionally, studies with more than 50 participants reported stronger positive impacts, suggesting that sample size may influence effects. More research is needed to explore this and further investigate the dynamics of flipped classrooms in VTE contexts.

Overall, while flipped classrooms show a positive impact on learning, their success depends on effective design, lecturer expertise, and the specific needs of the discipline and student population. Further research is required to fully understand their applicability across different educational contexts.

2.3.3 Critical Review of Flipped Classroom

The literature on flipped classrooms presents a comprehensive exploration of its application and efficiency across diverse educational landscapes, revealing a complex picture of benefits, challenges, and situational dependencies (Vitta & Al-Hoorie, 2023). The core of the flipped classroom model lies in its promise to transform passive learning environments into active, student-centered experiences (Senali et al., 2022). This pedagogical shift is predicated on the assumption that by reallocating information transmission outside of class, teachers can dedicate class time to engaging activities that enhance understanding, application, and critical thinking (Sointu et al., 2023).

While many studies advocate for the flipped classroom's effects in enhancing student engagement and performance, the outcomes are not universally positive (Vitta & Al-Hoorie, 2023). A critical gap often noted was the variability in the implementation of flipped classrooms, which ranges widely in terms of the quality and type of pre-class materials, in-class activities, and the extent of teacher support. This variability complicates efforts to synthesize findings and draw broad conclusions about the model's efficacy, suggesting that its success may be highly context-dependent (Nja et al., 2022). Moreover, the literature frequently underscores the importance of student motivation and self-regulation as determinants of the flipped classroom's success. However, less attention has been paid to how these factors can be systematically cultivated and supported within the flipped model, leaving a gap in understanding best practices for fostering an environment where all students can thrive (Aydin & Demirer, 2022).

Another notable gap is the lack of research on the flipped classroom's impact in vocational and technical education (VTE), particularly in non-Western contexts

(Torres-Martín et al., 2022). Much of the existing evidence is drawn from general and higher education, with less focus on vocational and technical disciplines where the integration of practical skills and theoretical knowledge is paramount. This omission highlights a significant research gap, given the unique pedagogical challenges and opportunities presented by VTE, such as the need for practical learning and direct applicability of skills.

The flipped classroom is often praised for its potential to accommodate diverse cognitive styles and learning preferences, but empirical evidence supporting this claim is not as robust as the theoretical discourse suggests (Polat & Karabatak, 2022). While the model is promoted as offering personalized learning experiences, there is a lack of empirical studies demonstrating how these benefits are realized across different learner populations, especially those with diverse cognitive styles.

In the evolving landscape of education, where the demands of the workforce are continually shifting towards more complex and technical skills, the traditional approaches of teaching and learning are increasingly under scrutiny. The quest for more effective, engaging, and practical pedagogical strategies has led to the exploration and adoption of innovative approaches that promise to bridge the gap between theoretical knowledge and real-world application. Among these innovations, the flipped classroom model has emerged as a particularly compelling strategy which redefines teachers and students' roles and reshaping the learning environment. The flipped classroom model inverts the traditional learning sequence, encouraging digital means like online courses, readings, and interactive content (Jaiswal, 2021). Classroom time, then, is devoted to deepening understanding through discussion, problem-solving, and practical activities that apply

concepts in practical contexts. This pedagogical strategy leverages the power of technology to cater to individual cognitive styles and preferences. The real magic happens in the classroom, where teachers become facilitators of learning rather than mere dispensers of information, guiding students through complex concepts, facilitating discussions, and providing direct support where needed (Martins, 2020).

The flipped classroom model aligns particularly well with the objectives of VTE, which is inherently practical and application-focused. VTE aims at specific knowledge which can be used in the workforce, making the integration of theoretical learning with practical application a cornerstone of its pedagogical approach (Swerzenski, 2021). Furthermore, the model addresses several persistent challenges in VTE, such as the need for personalized learning experiences and the integration of evolving technological advancements into the curriculum. By utilizing digital platforms for content delivery, the flipped model provides up-to-date, relevant learning experiences that mirror the dynamic nature of industries (Popkewitz et al., 2020).

Despite the potential of the flipped classroom to transform vocational education, its adoption in VTE settings, particularly in regions like Anhui Province, China, has been relatively slow and uneven. Several factors contribute to this hesitancy, including the need for significant upfront investment in digital infrastructure and teacher training, as well as concerns about students' access to technology and their ability to engage with content independently. Additionally, the effects of the flipped classroom in VTE has not been extensively documented, particularly regarding its long-term impact on student success and employability (Martins, 2020). The lack of empirical evidence in specific contexts like vocational colleges in China underscores a critical gap in both theory and practice.

Implementing the flipped classroom model in VTE also raises practical challenges. These include the need to address the socio-economic context of students' lives, ensure equitable access to technology, support independent learning, and train teachers to effectively facilitate the flipped classroom (Popkewitz et al., 2020). The successful integration of this model in vocational education depends on a deep understanding of the diverse needs and preferences of learners. Vocational and technical colleges cater to a wide range of students, each with unique backgrounds, cognitive styles, and career aspirations. The flexibility of the flipped classroom offers an opportunity to personalize learning and improve educational outcomes, but achieving this requires ongoing research and adaptation of teaching strategies (Lepper & Malone, 2021; Zhu & Kadirova, 2022).

In the context of this study, the flipped classroom refers to a pedagogical approach where traditional teaching is reversed. As is shown in Figure 2.3, instead of delivering lectures during class time and assigning homework for after-class review, students engage with course content outside of class (e.g., via videos or readings). During class, they apply this knowledge through interactive activities such as discussions or projects under the teacher's guidance (Threlkeld, 2017). This method encourages more engagement, collaboration, and independent inquiry, with teachers acting as facilitators of active learning (Alias et al., 2020). Specifically, in VTE management courses, the model enables students to engage with theory beforehand and apply practical skills during class time, enhancing critical thinking, problem-solving, and collaborative skills (Kasat et al., 2020).

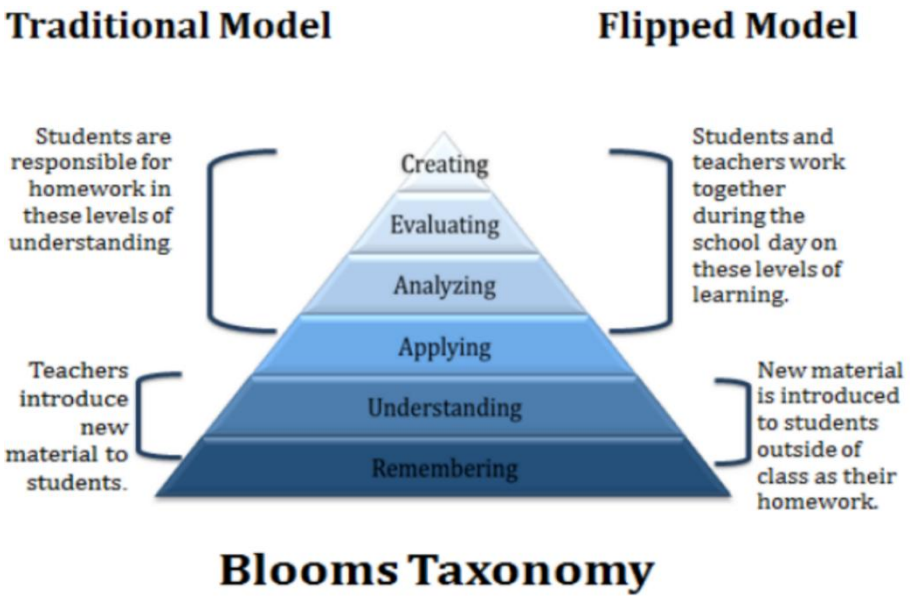


Figure 2.3: Bloom's taxonomy levels achieved by Traditional and Flipped classroom methods (Kasat et al., 2020)

In conclusion, while the flipped classroom model holds considerable promise for enhancing learning performance, the literature reveals a need for more nuanced research that addresses the complexities of implementation, the role of student motivation and self-regulation, and the model's applicability and effects in VTE settings. Additionally, empirical evidence substantiating the model's capacity to cater to diverse learning preferences remains an area ripe for further investigation. Addressing these gaps is crucial for teachers and policymakers aiming to leverage the flipped classroom model to its fullest potential, ensuring that it not only promises but also delivers enhanced educational outcomes across all settings and disciplines.

2.4 Learning Performance

One of the important aspects of evaluating the quality of teaching is the performance of learners in terms of learning performance. This section will discuss the learning performance as defined in this study, including achievement tests, successful intelligence , and learning attitudes among other variables.

2.4.1 Definition of Learning Performance

Learning performance refers to the changes in knowledge, skills, and attitudes of learners at the conclusion of a learning activity (Law et al., 2019). The achievement of predetermined learning performance can be assessed through evaluation and testing results. Sung et al. (2016). note that learning performance is the enduring behavioural outcome that learners achieve after undergoing a certain learning process, with changes in cognition, affection, and skills. Liu et al. (2019) consider learning performance an important indicator for measuring learners' learning performance and assessing the quality of teaching.

The narrow definition of "learning performance" refers to concepts such as academic performance and grades (Lynch & Hennessy, 2017); while the broader definition includes the tendencies in overt behaviour, emotions, and cognition that learners possess in the learning process, interacting to affect consistent and enduring performance (Schwab et al., 2018). Learning performance should encompass temporality, acquired nature, measurability, content, and diversity; under predetermined goals, the extent to which learning performance is achieved can be examined through assessment after a period of learning or training. A compilation of scholars' definitions of learning effects is shown in Table 2.2.

Table 2.2: Summary of Learning Performance Definitions

S/N	Author	Definition of Learning Performance.
1	Hosen et al. (2021)	The process of learning that results in a persistent and consistent change in behaviour, which is facilitated by activities or experiences.
2	Hew, Jia, Gonda, & Bai (2020)	The learning performance and performance after participating in all activities.
3	Wang & Zhu (2019)	Learning performance is the outcome of the learner's participation in learning activities and subsequent assessments.

Table 2.2 continued - Summary of Learning Performance Definitions

S/N	Author	Definition of Learning Performance.
4	Iglesias-Pradas, Hernández-García, Chaparro-Peláez, & Prieto (2021)	The permanent behavioural outcomes of learners obtained through evaluation or tests after a period of learning.
5	Qureshi, Khaskheli, Qureshi, Raza, & Yousufi (2023)	Learning performance refers to the behavioural change in learners before and after learning activities. The change between the endpoint behaviour of the learner's learning and the starting point behaviour is called direct learning effectiveness. The effect that manifests after a period following the learning activity is called indirect learning effectiveness.

The definitions of learning performance provided in Table 2.2 offer a comprehensive view of how learning performance can be assessed, emphasizing not only knowledge, skills, and attitudes but also behavioral and emotional changes that result from learning activities. Scholars like Law, Law et al. (2019) and Sung et al. (2016) highlight the importance of enduring, measurable changes in students' cognition, skills, and behavior as indicators of learning success. The definitions also distinguish between direct learning effects (immediate outcomes) and indirect learning effects (long-term effects), with Qureshi et al. (2023) suggesting that learning performance should be viewed as a dynamic, evolving process. This broadens the scope of learning assessment beyond just academic grades, incorporating a more holistic perspective that includes emotional and cognitive shifts. For this study, these varied definitions imply that evaluating the effects of flipped classrooms should go beyond traditional tests and grades to include student engagement, critical thinking, self-regulation, and attitudes toward learning. Moreover, recognizing the importance of long-term learning performance, this study could benefit from adopting longitudinal assessments to capture the sustained impact of flipped classroom methods on student learning. Ultimately, by embracing this broader definition of learning performance, the study can provide a more comprehensive analysis of how flipped classrooms influence

not just immediate academic achievement, but also student behavior, motivation, and overall learning experience.

2.4.2 Aspects and Factors of Learning Performance

In Giannakos's (2013) perspective on learning performance, several key concepts are essential: It should account for both the immediate “direct learning performance” and the long-term “indirect learning performance” that influence future development. A balanced emphasis on different learning dimensions is crucial, ranging from cognitive understanding of knowledge and skills to critical analysis, emotional and ethical values, and the progression from basic skills to creativity and mastery. Moreover, learning performance should be considered at multiple levels, including institutional, programmatic, and classroom contexts (Amjad et al., 2022).

As for measuring student learning performance, Qureshi et al. (2023) suggest it is primarily about gauging the effects of cognitive, affective, and skills learning processes during their educational journey. The conditions for achieving learning performance involve several factors: The content must be appropriate for the learner's level, offering a challenge that makes learning meaningful. The arrangement of learning should allow learners to study in preferred ways and at their own pace, building new knowledge and skills on what they already know, while also facilitating the use of learning strategies, peer and social interactions, and receiving feedback. Lastly, the learning environment should provide purposeful support and cultivate a positive learning atmosphere.

The conceptualization of learning performance by Giannakos (2013) underscores the importance of considering both immediate and long-term outcomes across cognitive, affective, and skill-based dimensions. This broad perspective rightly highlights the need

for educational strategies to balance a variety of learning dimensions and adapt to different contexts—institutional, programmatic, and classroom levels. However, while this approach offers a comprehensive framework for understanding learning performance, it also presents challenges in terms of measurement and implementation. The criteria for effective learning—content appropriateness, pace flexibility, and a supportive environment—are undoubtedly crucial, yet they require nuanced understanding and substantial resources to implement effectively across diverse learning settings. Additionally, the emphasis on long-term learning performance, though valuable, complicates the assessment of educational interventions, as the impact on future development may be influenced by numerous variables beyond the educational context. This complexity necessitates a sophisticated approach to evaluation that can accommodate the dynamic and interconnected aspects of learning performance, raising questions about the practicality of applying such a comprehensive framework in everyday educational practice.

2.4.3 Assessment of Learning Performance

Law et al. (2019) pointed out that the assessment of learning performance involves using a systematic process to make reasoned judgments based on collected information. The specific indicators for measuring learning performance include three major learning domains: cognitive, affective, and psychomotor. From an educational perspective, teaching and assessment are two sides of the same coin in the learning process. Assessment results are used to evaluate the effects of teaching and learning, to understand students' learning situations and difficulties, and to provide lecturers with the opportunity to review and improve their teaching methods. In traditional classroom models, the process of teaching and learning is often unidirectional, emphasizing mechanical and mastery learning processes (Rennert-Ariev, 2019). The authority in learning is held by the teacher, with

students being passive and inactive learners. In such scenarios, students often lack autonomy in learning, displaying low motivation and willingness to learn, which in turn affects learning performance. However, in today's environment of diverse learning methods, multimedia, and multiple assessment types, unidirectional, passive, and inactive learning has transformed into bidirectional, active, and proactive knowledge-seeking (Wu et al., 2020). This change increases students' learning motivation and willingness to learn over a longer period, resulting in proportionate growth in learning performance.

Learning performance in this study refers to the measurable outcomes of students' academic achievement and their ability to apply the knowledge and skills learned during the flipped classroom model in management courses. The assessment of learning performance includes understanding the extent to which students have assimilated theoretical knowledge, developed practical competencies, and improved their problem-solving skills (Sun et al., 2020). Key performance indicators for this study will include both pre- and post-intervention achievement tests, which will measure changes in students' understanding of management principles (Munna & Kalam, 2021). Additionally, students' learning attitudes, and their ability to demonstrate critical, creative, and practical intelligence will be evaluated to determine overall learning performance (Wang & Zhang, 2020).

2.4.3.1 Achievement Test

An achievement test refers to the assessment conducted by lecturers to understand the outcomes of students' learning tasks in areas such as knowledge and skills as part of teaching activities (Aljaser, 2019). Assessing students' academic achievements helps lecturers know students' knowledge and skills and the percentage of achievement under the

predetermined educational objectives (Aljaser, 2019). Simultaneously, it can also diagnose students' difficulties in learning and identify problems that arise in teaching. This serves as a reference for lecturers to adjust their teaching content and methods (Demir & Seferoğlu, 2019). Furthermore, it provides direction for improvements in future teaching strategies, educational activities, and teaching design (Haw & Sharif, 2020). In this research, an achievement test, in the form of a written examination, is employed to assess the student's understanding and grasp of the curriculum once the teaching sessions conclude. Scoring higher in this test implies a commendable grasp of the subject, whereas a lower score reflects a less satisfactory comprehension. The test paper for this evaluation was designed by the researcher specifically for this investigation. To discern the variations in the academic learning of students, this test is given both before and after the teaching experiment.

2.4.3.2 Successful Intelligence

i. The Essence of the Theory of Successful Intelligence

Human intelligence is multidimensional, and Sternberg (2003) expanded beyond the traditional concept of IQ by incorporating his own experiences and various theories of intelligence. His theory of successful intelligence posits that intelligence is essential for academic performance and real-life achievements. It is critical for individuals to attain success within their societal and cultural contexts while achieving self-set goals. Traditional intelligence tests, which primarily focus on “academic intelligence,” may align with the learning needs of in-school students. However, they often fall short in applicability to everyday life and fail to consider the socio-cultural influences on intelligence, as well as the practical characteristics of intelligence.

Sternberg (1997) proposed that human intelligence could be understood through three dimensions. These dimensions encompass three sub-theories: the first, the sub-theory of components of intelligence, refers to the internal psychological mechanisms of intelligent behavior. These mechanisms involve adaptation, shaping, and selection of the environment or handling novel tasks and situations. This sub-theory also includes internal representations and information processing components, which transform sensory inputs into conceptual representations or actions. The components sub-theory includes meta-components, performance components, and knowledge-acquisition components (Sternberg et al., 1996; Sternberg, 1997).

The second dimension is the experience intelligence, which explains the relationship between intelligence and the level of experience in tasks or situations. It deals with how individuals approach new tasks and automate information processing (Sternberg, 1997). The third dimension is the context of intelligence, emphasizing the role of social and cultural environments in shaping intelligence. Different historical, cultural, and social settings have varying standards for intelligent behavior, revealing diverse perspectives on intelligence across cultures (Sternberg, 1997). This sub-theory includes purposiveness, the selection and adaptation to environments, and the shaping of environments.

Sternberg's model of successful intelligence is hierarchical rather than parallel, progressing from internal psychological mechanisms to external world tasks, and involving a balance of all three sub-theories. Successful intelligence, therefore, is not merely about innate cognitive abilities but about how one applies analytical, creative, and practical abilities to adapt, modify, and select environments in real-world contexts (Sternberg, 1997).

ii. Successful Intelligence Theory's Definition of Intelligence

Traditional intelligence tests, such as those commonly used in the United States, measure only a small part of the essence of intelligence. Successful intelligence is fundamentally different from traditional academic intelligence in that it represents a combination of analytical, creative, and practical abilities, tailored to help individuals succeed in real-life situations. The application of these abilities is influenced by an individual's sociocultural background, and successful intelligence involves adapting to, modifying, and selecting environments effectively.

Sternberg (2000) defined successful intelligence as a blend of abilities designed to achieve success in life, contingent on an individual's context. This includes the ability to identify and utilize one's strengths while acknowledging and addressing weaknesses. It also involves adapting thinking and behavior to align with environments in which one can function most effectively, as well as selecting new environments as necessary. Sternberg argues that the three aspects of successful intelligence—analytical, creative, and practical — are interconnected and crucial for success. Analytical intelligence helps in problem-solving and evaluating ideas, creative intelligence is essential for generating new ideas or questions, and practical intelligence is necessary for effectively implementing those ideas and solutions in real-life contexts.

In contrast to traditional intelligence, which focuses mainly on analytical abilities, successful intelligence embraces a broader approach that includes creative and practical intelligence. Sternberg emphasizes that intelligence is not fixed; it is adaptable and can evolve. This view contrasts with traditional intelligence assessments, which primarily

measure analytical intelligence, thus overlooking other critical cognitive capacities needed for success in everyday life (Sternberg, 2000).

iii. Assessment of Successful Intelligence in Relation to Familiar Problems Requiring Abstract Judgment

Sternberg (1997) suggests that while analytical intelligence is best measured by traditional assessment tools, creative intelligence is more applicable to novel tasks and situations. Creative intelligence involves finding unique solutions to problems or creating new products, and it is used in less familiar contexts. Similarly, practical intelligence is action-oriented and involves the application of learned knowledge to real-life situations. Sternberg (2000) states that practical intelligence is necessary for dealing with everyday challenges and often involves tacit knowledge that cannot be easily articulated. This dimension of intelligence is crucial for navigating real-world environments, such as adapting to work settings or solving practical life problems.

In 2006, Sternberg developed the Sternberg Triarchic Abilities Test (STAT), which embodies the theoretical principles of successful intelligence. The STAT assesses intelligence from the three dimensions of analytical, creative, and practical intelligence, using subtests that cover verbal, quantitative, and figural types of questions. The test format is primarily multiple-choice, yet it differs from traditional intelligence tests by incorporating a broader range of cognitive abilities (Sternberg & Rainbow Project Collaborators, 2006). Unlike traditional IQ tests, the STAT measures not only analytical intelligence but also creative and practical intelligence, offering a more comprehensive view of an individual's cognitive potential.

iv. Research Related to Successful Intelligence

Numerous studies have explored the applications of successful intelligence in educational settings. Gardner (1993) conducted the "Practical Intelligence for School" (PIFS) project, where students with developmental potential were identified and provided with specialized training. The results of this study indicated that the PIFS program significantly enhanced students' academic performance, increased their enthusiasm for learning, and fostered a greater sense of responsibility for their education.

Sternberg and Clinkenbeard (1995) applied the theory of successful intelligence in a summer psychology program for high school students at Yale University. This program focused on measuring students' analytical, creative, and practical abilities. Results showed that students who were taught according to their strengths achieved better learning outcomes, highlighting the importance of a personalized approach to education (Sternberg et al., 1999). In a similar study, Sternberg et al. (1998) found that students taught using the triarchic theory of intelligence performed better on achievement tests and traditional memory-based tests compared to those taught using traditional methods.

Further research by Chan (2007) explored the relationship between successful intelligence, emotional intelligence, and leadership abilities in a sample of gifted students in Hong Kong. This study demonstrated that successful intelligence could predict self-efficacy and personal achievement, and that practical intelligence was particularly significant in reducing job burnout. Another study by Chan (2008) examined the interplay between emotional intelligence and successful intelligence, finding a strong correlation between the two constructs.

In the context of this research, the theory of successful intelligence provides a useful framework for evaluating the impact of flipped classrooms on students' cognitive

development. Successful intelligence, as defined by Sternberg (2003), encompasses the application of analytical, creative, and practical intelligence in real-world educational environments. As Ayoub and Aljughaiman (2016) assert, these cognitive abilities are crucial not only for academic success but also for real-life achievements, making them integral to understanding how flipped classrooms influence student learning outcomes.

2.4.4 Learning Attitudes

2.4.4.1 Definition of Learning Attitudes

Attitude refers to a person's persistent and consistent behavioural tendency towards people, events, or objects, based on cognition and preferences. It is generally believed that cognition, emotion, and action intention constitute what is called attitude. In the learning process, these three components interactively affect learning performance (Hwang & Chang, 2011). Factors determining learning performance are only half related to intelligence or cognition; the other influencing factors come from the emotional side, among which attitude is one. Therefore, knowing the attitudes learners hold towards things can help predict their reactions (McAuley et al., 2012). Research shows that students' interest in teaching materials affects their learning attitudes, with positive attitudes displayed towards interesting materials and negative attitudes towards uninteresting ones (Tandlichová, 2015). Therefore, students learning from materials they find interesting will feel more engaged and pleased, leading to a positive development in learning attitude, increasing their willingness to confront and overcome difficulties during the learning process, and thereby gaining more confidence and a sense of achievement.

Attitude is a hypothetical construct representing the degree to which a person likes or dislikes something. When people have conflicting or contradictory feelings towards an attitude object, it indicates the coexistence of positive and negative views towards this object, so attitude can also be described as a kind of evaluation (Eagly & Chaiken, 1993).

According to Katz (1960), the functions of attitude are divided into value-expressive function, ego-defensive function, knowledge function and utilitarian function.

The implications of learning attitude are quite broad. In the learning context, learners are significantly influenced by various factors such as the teaching curriculum, classmates, school, environment, and self. The scholars' interpretations and definitions of the content and meaning of learning attitude are organized as shown in Table 2.3.

Table 2.3: Summary of Learning Attitude Definitions

S/N	Author	Definition of Learning Attitude
1	Getie (2020)	A persistent inclination of an internal state that influences an individual's behavior choices during the learning process.
2	Zulfikar, Dahliana, & Sari (2019)	The tendencies and psychological responses in behavior, cognition, and emotion exhibited by students in the learning process.
3	Peng & Xu (2020)	Holding cognitive, emotional, and behavioral aspects as a stable and consistent way of thinking and acting.
4	Jumriani, Subiyakto, Hadi, Mutiani, & Ilhami (2022)	The formation of a learning attitude is closely related to the learner's education and can be changed.
5	Schneider, Beege, Nebel, Schnaubert, and Rey (2022)	Learning attitude involves cognitive, emotional, and behavioral components of an individual and is influenced by people, events, objects, and the environment.
6	Ruiz-Jiménez et al. (2022)	The psychological responses of perception or feeling expressed by learners during the learning process.

Previous studies on learning performance and learning attitude contribute significantly to this study by providing a comprehensive framework for evaluating the flipped classroom model. Definitions of learning performance emphasize its multidimensional nature, encompassing cognitive, emotional, and behavioral changes, which align with the flipped classroom's focus on active learning, critical thinking, and engagement. These theories guide the assessment of how flipped classrooms enhance not only academic achievement but also higher-order thinking skills and self-regulated learning. Similarly, learning attitude theories highlight cognitive, emotional, and

behavioral dimensions, illustrating how the flipped classroom model can positively influence students' motivation, engagement, and perceptions of the learning process. The recognition of external factors, such as peer interactions, teacher support, and environmental influences, further emphasizes the model's potential to reshape students' attitudes and behaviors toward learning. Additionally, the malleability of learning attitudes underscores the adaptability of flipped classrooms in catering to diverse learning styles, fostering improved attitudes and long-term academic success. Together, these theories allow the study to evaluate both short-term outcomes and long-term impacts, offering a holistic understanding of the flipped classroom's effects in enhancing learning performance and influencing student attitudes.

2.4.4.2 The Essence of Learning Attitude

Marzano's (1992) research suggests that learning attitude is a phenomenon, not inherent or innate, but can be shaped by the environment. Classroom atmosphere also affects learning attitudes. Herguner et al. (2020);Zhu et al. (2020) view learning attitude as the student's interest in academic learning, motivation, and subjective perception of variables in the surrounding learning environment. Herguner et al. (2020);Zhu et al. (2020) consider learning attitude a consistent and enduring psychological readiness state, shaped by acquired experiences, which can indicate the direction of learning and be appropriately measured in terms of intensity and orientation. Weissgerber et al. (2018) believe that learning attitude guides the cognitive direction of learners, presenting emotional cultivation towards learning objectives, where positive attitudinal behaviour can act upon the learning situation to achieve good learning performance.

In summary, learning attitude is a psychological state that learners develop towards the content, process, and environment of learning, manifested in emotions, cognition, and

behaviour, and reflected in behavioural performance or tendencies. Learning attitudes can change depending on the learner's own experiences, background, abilities, and the environment they are exposed to, making it one of the key factors influencing students' learning performance. Therefore, the teaching attitude and methods of teachers should aim to stimulate students' motivation and interest in learning, enabling them to learn with a positive attitude and achieve better learning performance.

2.4.4.3 Assessment of Learning Attitude

Learning attitude refers to the consistent and persistent behavioural tendencies that learners develop throughout the course of studying a subject (McAuley et al., 2012). In this study, the Learning Attitude Scale developed by Koballa Jr (1988) is used as the measurement tool. The scale includes three constructs: cognition, affect, and intention to act, with the format being multiple-choice questions. The cognitive construct consists of eight questions, the affective construct has ten questions, and the intention to act construct comprises nine questions, totalling twenty seven questions on the scale. The scale uses a Likert-type five-point scale for scoring, and the respondents' scores on the scale serve as an indicator of their learning attitude. Higher scores on the scale indicate a better learning attitude performance by the students.

In this study, learning attitude is operationalized as a student's sustained behavioural proclivity towards a subject, engendered through teaching processes (Kpolovie et al., 2014). Methodologically, this study adopts the Koballa Jr (1988) Learning Attitude Scale to gauge variations in students' learning attitudes pre and post-instruction, positioning it as a metric to discern student receptiveness to the flipped classroom pedagogy.

2.4.5 Learning Performance

The scholarly discourse surrounding learning performance encompasses a broad spectrum of definitions, metrics, and theoretical frameworks, each contributing to our understanding of how students absorb, process, and apply knowledge. A critical review of this literature reveals both the strides made in measuring and enhancing learning performance and the persistent challenges that complicate our understanding of educational effects. In light of these developments, this section relates the findings of the literature to the context of the present study on flipped classroom implementation.

One of the fundamental revelations from the review is the evolving nature of learning performance assessment. Traditionally, learning performance have been quantified through standardized tests and academic grades, focusing predominantly on memorization and recall (Qureshi et al., 2023). However, this narrow focus is increasingly criticized for its inability to capture the complexity of learning, including critical thinking, problem-solving, and creativity. The current study aligns with these critiques, recognizing that traditional assessments may not capture the full spectrum of skills that students develop in a flipped classroom environment. In this research, learning performance is not just quantified through academic tests but also includes measures of analytical, creative, and practical intelligence, echoing the arguments of Kew and Tasir (2022) who argue for a more holistic approach to assessing learning performance.

Learning performance is a multifaceted concept that encompasses various domains, each contributing to how students achieve success in their educational journey. These domains—academic achievement, successful intelligence, and learning attitudes—are

distinct but interconnected aspects that provide a more comprehensive understanding of students' learning performance.

Academic achievement traditionally refers to measurable outcomes of a student's learning, such as test scores, grades, and other forms of assessment. This domain primarily focuses on the cognitive aspects of learning, specifically knowledge acquisition and recall. Standardized tests and academic grades are commonly used to evaluate academic achievement, which typically emphasizes the memorization and application of learned content (Qureshi et al., 2023). However, while these metrics remain essential, they are increasingly seen as limited in capturing the full scope of student development. Traditional assessments often fail to measure higher-order thinking skills such as critical thinking, problem-solving, and creativity, which are crucial in today's complex learning environments. This limitation is particularly relevant in the context of the flipped classroom model, where assessments go beyond academic tests and include project-based evaluations and peer assessments that better reflect students' ability to apply knowledge and think critically.

The concept of successful intelligence, introduced by Sternberg (2003), expands the definition of learning performance to include not just academic success but also a broader set of cognitive skills. Successful intelligence involves three main components: analytical intelligence, creative intelligence, and practical intelligence. Analytical intelligence refers to the ability to critically evaluate and analyze information; creative intelligence involves innovative thinking and the capacity to solve novel problems; and practical intelligence emphasizes the application of knowledge in real-world situations (Sternberg, 2003). This domain goes beyond academic measures to assess how well students can apply their

knowledge in practical, real-life contexts, thus reflecting a more holistic view of learning. The flipped classroom model aligns well with the principles of successful intelligence, as it encourages active learning through problem-solving tasks, creativity in project work, and the application of knowledge in practical settings. By focusing on these diverse skills, the flipped classroom model supports the development of all three components of successful intelligence, ensuring that students are not only learning facts but also developing the ability to apply their knowledge in real-world situations.

Furthermore, the literature on learning performance often overlooks the affective dimensions of education, such as motivation, engagement, and learning attitudes (Vitta & Al-Hoorie, 2023). Learning attitudes refer to the emotional and psychological responses that students have toward the learning process, which significantly affect their motivation, engagement, and overall success. This domain encompasses students' cognitive, emotional, and behavioral responses to learning activities, including their motivation, interest in the subject, persistence, and self-efficacy (Vitta & Al-Hoorie, 2023). Positive learning attitudes are strongly correlated with better learning performance, as students with a positive attitude are more likely to engage deeply with the material, persist through challenges, and achieve higher academic success. Conversely, negative attitudes—such as frustration or lack of interest—can result in disengagement, which hampers learning performance. The flipped classroom model has been shown to have a positive impact on students' learning attitudes. By giving students more autonomy over their learning, fostering interactive and engaging activities, and emphasizing collaboration, the flipped classroom enhances student motivation, engagement, and satisfaction. These positive shifts in learning attitudes are crucial for improving long-term learning performance, as they encourage sustained effort and deeper involvement in learning processes. These factors are

increasingly recognized as critical to student success, yet they are difficult to measure and are often excluded from assessments of learning performance. The present study acknowledges this gap by including measures of students' attitudes toward learning, which are evaluated both before and after the flipped classroom intervention.

Together, these three domains—academic achievement, successful intelligence, and learning attitudes—offer a more comprehensive framework for understanding learning performance, particularly within the flipped classroom context. Academic achievement remains an essential indicator of how well students master factual knowledge. However, the inclusion of successful intelligence provides a broader perspective, recognizing that students must also develop analytical, creative, and practical skills that extend beyond traditional academic measures. Learning attitudes further enrich the understanding of learning performance by emphasizing the emotional and motivational components of student success. In the flipped classroom model, students' academic achievement is evaluated alongside their ability to apply knowledge in creative and practical ways, as well as their attitudes toward learning.

The flipped classroom model is designed to support the three domains of learning performance. By fostering active, student-centered learning environments, it encourages students to develop both cognitive and affective skills. This holistic approach ensures that students are not only acquiring knowledge but also developing critical thinking, creativity, and practical problem-solving skills, while also cultivating positive learning attitudes that enhance their overall educational experience. Thus, the integration of academic achievement, successful intelligence, and learning attitudes provides a more nuanced and

comprehensive measure of learning performance, particularly in the context of the flipped classroom model.

Moreover, the literature points to significant disparities in learning performance across different educational settings, disciplines, and student demographics, suggesting that factors external to the individual learner—such as teaching methods, curriculum design, and classroom environment—play a crucial role (Sharma & Gupta, 2023). While the flipped classroom model has been posited as a strategy to address some of these disparities by fostering active learning and engagement, empirical support for its efficacy is mixed. Studies vary widely in their findings, often due to differences in implementation, context, and the measures used to assess learning performance (Hwang & Chen, 2023). This variability is reflected in the current study, where the outcomes of flipped classroom implementation in vocational management courses in Anhui Province are specifically considered, highlighting the importance of the local educational context in determining the success of this pedagogical approach.

The role of cognitive styles in learning performance has also received attention, with research suggesting that alignment between teaching methods and students' preferred modes of information processing can enhance learning performance (Oliván-Blázquez et al., 2023). This study also acknowledges the potential role of cognitive styles in influencing learning performance. While it does not explicitly test for cognitive style alignment, the flipped classroom model, with its emphasis on personalized, self-paced learning, naturally accommodates different cognitive preferences. This flexibility may explain why some students experience improved outcomes, as they can engage with the content in ways that match their preferred learning styles. However, this body of work is

marked by methodological limitations. These limitations raise questions about the generalizability of findings and suggest a need for more rigorous, empirically robust investigations into how cognitive styles influence learning in different educational contexts.

In summary, the literature on learning performance provides valuable insights into the factors that influence educational outcomes, but it also highlights significant gaps and challenges. The need for more comprehensive, contextually sensitive measures of learning performance, a deeper understanding of the role of cognitive styles, and greater attention to the affective dimensions of learning are all critical areas for future research. The current study contributes to these discussions by focusing on the flipped classroom model's impact on learning performance in a vocational setting, with a specific focus on the interactions between cognitive styles, student attitudes, and the use of technology in the learning process. By addressing these dimensions, this study aims to provide a more nuanced understanding of how the flipped classroom model can be optimized to improve student outcomes in the context of management courses at VTEs, in Anhui, China.

2.5 The Impact of Demographic Profiles on Learning Performance

Understanding the impact of demographic profiles such as college affiliation and gender on learning performance is crucial for developing effective educational strategies and policies. This subsection explores how these factors influence learning performance in VTE, with a particular focus on management courses. By examining existing research, we can gain insights into the differential effects of demographic variables and identify potential areas for intervention and support.

College affiliation can significantly influence learning performance due to variations in institutional resources, teaching quality, curriculum design, and student support services. Colleges differ in their levels of funding, faculty expertise, infrastructure, and access to educational technology, all of which can impact students' learning experiences and outcomes. Research suggests that students attending well-resourced institutions often benefit from smaller class sizes, more experienced faculty, and greater access to learning materials and technologies (Chen et al., 2010). These factors can contribute to higher academic achievement and better overall learning performance. For instance, a study by Trespalacios et al. (2023) found that institutional resources and faculty quality were strongly correlated with student learning performance. Students at colleges with better resources and more qualified faculty were more likely to achieve higher academic performance. Conversely, students at less-resourced institutions may face challenges such as larger class sizes, less experienced faculty, and limited access to learning materials and technologies. These challenges can hinder learning performance and exacerbate educational inequalities. The academic environment across colleges in Anhui Province exhibits notable heterogeneity, with institutional variations in peer dynamics, educational philosophies, and cultural norms significantly influencing student development outcomes. A case in point is Wuhu Institute of Technology, a leading vocational institution in Anhui, which adopts practice-oriented pedagogical models and industry-aligned curricula that contrast sharply with the theoretical knowledge frameworks emphasized by other provincial colleges (Li, 2020). These divergent educational priorities—manifested in curriculum design, teaching methodologies, and assessment systems—create measurable disparities in cultivating core competencies. Students from technical institutions frequently demonstrate enhanced practical implementation skills and creative problem-solving

abilities in applied fields such as advanced manufacturing and electronic engineering, whereas their counterparts from theoretically-focused institutions may exhibit stronger academic research capabilities (Rienties & Toetenel, 2016). Such institutional differentiation underscores the critical role of educational orientation in shaping discipline-specific skill development trajectories across Anhui's higher education landscape.

Gender is another critical demographic factor that can influence learning performance. Research has shown that gender differences in educational outcomes are influenced by a complex interplay of biological, psychological, social, and cultural factors (Chen et al., 2019). These differences can manifest in various ways, including disparities in academic achievement, learning attitudes, and cognitive styles. Several studies have documented gender differences in academic achievement across different subjects and educational levels. For example, Voyer and Voyer (2014) conducted a meta-analysis of gender differences in academic performance and found that females generally outperformed males in language arts, while males tended to perform better in mathematics and science. These differences are often attributed to social and cultural expectations, as well as differences in cognitive styles and development. Gender differences in learning attitudes and motivation also play a significant role in shaping learning performance. Studies have shown that female students tend to exhibit higher levels of intrinsic motivation and positive learning attitudes compared to their male counterparts (Voyer et al., 2021). This difference can contribute to better academic performance among females, particularly in subjects that require sustained effort and engagement. For instance, a study by Yu and McLellan (2019) found that girls were more likely to adopt mastery-oriented goals and exhibit higher levels of academic self-efficacy, which positively impacted their

learning performance. Conversely, male students often exhibit higher levels of extrinsic motivation, driven by external rewards such as grades and career prospects. While this motivation can lead to high performance in specific contexts, it may not always translate to sustained academic engagement. Additionally, social and cultural stereotypes about gender and academic ability can influence students' self-perceptions and aspirations (Wongwatkit et al., 2020). For example, stereotypes that suggest males are better at mathematics and females are better at language arts can affect students' confidence and performance in these subjects.

The intersection of college affiliation and gender can further complicate the analysis of learning performance. Different colleges may provide varying levels of support and opportunities for male and female students, leading to differential outcomes. For instance, colleges with robust support systems for female students in traditionally male-dominated fields such as engineering and technology may help bridge gender gaps in these areas. Moreover, the institutional culture and climate can significantly impact gender dynamics and learning performance. Colleges that promote gender equality and inclusivity are more likely to create environments where all students can thrive, regardless of gender. Conversely, institutions with entrenched gender biases and stereotypes may perpetuate disparities in learning performance. A study by Legewie and DiPrete (2012) examined the impact of college environments on gender differences in academic performance. The researchers found that female students at coeducational institutions experienced a decline in self-confidence in traditionally male-dominated fields, such as mathematics and engineering, compared to their counterparts at women's colleges. This finding highlights the importance of institutional context in shaping gendered educational experiences and outcomes.

Understanding the impact of demographic profiles on learning performance has important implications for educational practice. To address the disparities related to college affiliation and gender, teachers and administrators need to implement targeted strategies and interventions. For colleges, enhancing institutional resources and support services is crucial for improving learning performance. This includes investing in faculty development, upgrading educational infrastructure, and providing access to advanced learning technologies. Additionally, colleges should adopt inclusive pedagogical approaches that cater to diverse learning needs and cognitive styles (Sheromova et al., 2020). By fostering an equitable learning environment, institutions can help mitigate the effects of demographic disparities on student outcomes. Gender-specific interventions can also play a vital role in promoting equitable learning performance. Teachers should be aware of gender differences in learning attitudes and motivation and adopt teaching strategies that address these differences. For instance, promoting mastery-oriented goals and providing positive reinforcement can help enhance female students' self-efficacy and engagement in traditionally male-dominated subjects. Similarly, incorporating collaborative and practical learning activities can help engage male students and foster intrinsic motivation. Creating an inclusive and supportive institutional culture is essential for promoting gender equality in education. Colleges should implement policies and practices that promote diversity, equity, and inclusion. This includes providing mentorship programs, leadership opportunities, and resources for underrepresented groups. By fostering a positive and inclusive learning environment, colleges can help all students achieve their full potential, regardless of gender.

2.6 Chapter Summary

This chapter established the research foundation through a comprehensive literature review on the flipped classroom model's impact on learning performance in VTE management courses. It synthesized educational psychology, instructional design, and learning performance theories to construct the core theoretical framework; examined the origin, principles, and empirical effectiveness of flipped classrooms in vocational contexts; defined the multidimensional construct of learning performance with emphasis on integrated assessment of analytical, creative, and practical abilities; analyzed how visualizer-verbalizer cognitive styles influence learning outcomes and teaching adaptability; and investigated the interaction between demographic factors (college, gender) and cognitive styles across instructional approaches. The review provided a theoretical basis for exploring the efficacy boundaries of flipped classrooms and their interplay with individual characteristics, while identified research gaps to guide subsequent empirical design.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter employed a quasi-experimental design to explore the application of flipped classrooms in management courses at Vocational and Technical Colleges (VTC) and their impact on student learning performance. The research framework included independent variables (teaching methods, demographic profiles), dependent variables (academic achievement, successful intelligence, learning attitude), moderating variables (cognitive styles), and control variables (grade level, teaching materials, etc.).

Participants comprised of 1,000 first-year management students from five vocational colleges in Anhui Province, randomly assigned to experimental (flipped classroom) and control (traditional classroom) groups.

A two-week pilot study involving 160 participants was conducted to validate the reliability and validity of the research instruments, including academic tests, successful intelligence scales, learning attitude scales, Cognitive Style of Processing (SOP) scale and Teacher's Teaching Records, Teaching Activity Worksheets, and Student's Reflection Reports.

This chapter described the implementation procedure, which consisted of three phases: preparation (including literature review and instrument development), a six-week teaching intervention, and data analysis. The entire process adhered to rigorous ethical standards to ensure data integrity.

3.2 Research Variables

This study aims to explore the teaching effects of the flipped classroom model in management courses at VTCs. To achieve the research objectives, the study first establishes a research framework, using both flipped classrooms and traditional teaching methods in teaching experiments, with the data from the results of these experiments as the basis for analysis. Subsequently, it further explores the moderating effect of students' cognitive styles in this relationship.

The main variables in this study include independent variables (experimental manipulative variables), dependent variables, moderating variables, and control variables, described as follows.

3.2.1 Independent Variables

In this study, the independent variables, also known as the predictor variables, include the type of classroom model and the selected demographic profiles. Specifically, the type of classroom model encompasses the traditional classroom model and flipped classroom model. These independent variables are for assessing their effects on various dimensions of learning performance, which include academic achievement, successful intelligence, and learning attitude.

3.2.2 Dependent Variables

The dependent variables in this study are the learning performance in management courses, divided into the following three parts:

i. Academic Assessment: The Academic Achievement Test Papers in management courses were compiled by the researchers, and the scores obtained from the test are used as the indicator.

ii. Successful Intelligence: Including three types of abilities - analytical, creative, and practical intelligence, assessed using the Successful Intelligence Scale.

iii. Learning Attitude: The scores obtained on Koballa's Learning Attitude Scale by the subjects were used as the indicator for learning attitude.

3.2.3 Moderating Variables

The moderating variable in this study is the student's cognitive style. Based on cognitive style theory, the researchers classified cognitive styles into two types: visually oriented and verbally oriented. The Style of Processing (SOP) scale developed by Childers et al. (1985) is used to measure the degree of preference for processing visual and verbal information. These two types of cognitive styles were explained as follows:

i. Visually oriented: This refers to learners who show a more significant attention and processing preference for visual information (such as images, charts, and animations). Students who score above the average of all participants on the Cognitive Style SOP Scale are classified as visually oriented.

ii. Verbally oriented: This refers to learners who show a more significant attention and processing preference for verbal information (such as language, and text). Students who score below the average of all participants on the Cognitive Style SOP Scale are classified as verbally oriented.

Additionally, the demographic profiles under consideration were the college attended by the students and their gender. The study also examines how these relationships are moderated by the cognitive style of the students, highlighting the potential influence of

cognitive style on the interaction between instructional methods, demographic factors, and learning performance.

3.2.4 Control Variables

To effectively understand the impact of experimental manipulation, this study used the pre-test results of the students as covariates to effectively control the source of the dependent variable's effects. In addition, factors such as the grade level of students in the experimental and control groups, the teaching area of the teachers, teaching materials, teaching hours, and the teachers and subjects were all controlled to minimize the interference that might be caused by extraneous variables. The explanations are as follows:

i. Grade Level: All were first-year college students.

ii. Teaching Focus: All courses focused on developing theoretical knowledge and practical competencies within the foundational management curriculum.

iii. Teaching Materials: All used "Fundamentals of Management" published by Higher Education Press.

iv. Teaching Hours: All were one hour and a half, for a total of 6 weeks (The experimental group had one hour preview time due to the teaching method.).

3.3 Participants

The participating instructors were seasoned educators with an average of eight or more years of experience teaching management courses in Vocational and Technical Education (VTE) settings. This substantial teaching experience ensured their pedagogical expertise encompassed both conventional instruction methods and the flipped classroom approach under investigation.The researcher, one of the teachers, played an active role in

ensuring the consistency and alignment of teaching methods across all classes. Although all the teachers involved in the study have extensive teaching experience in both flipped classrooms and traditional classrooms, in order to ensure the effectiveness of the research, we organized teacher training sessions every week. First, we clarified the research focus and its significance. Second, we made a clear distinction between the two teaching formats, emphasizing the unique strategies, activities, and assessment methods required for each approach. We also discussed the lesson plans submitted by the teachers, conducted demonstration lessons for both flipped and traditional classrooms, and held discussions. Additionally, we shared videos and teaching resources. Third, we ensured that accurate and standardized records were kept throughout the intervention process, both before and after the teaching intervention. This collaborative effort helped standardize teaching delivery and fostered a shared understanding of the instructional goals.

This study selected first-year students majoring in management at five VTCs in Anhui Province to participate. These students were chosen based on their enrollment in the "Fundamentals of Management" course, a core subject for management majors at the participating VTCs. The sample consisted of 1,000 students in total, with 20 students per class, across 50 classes (10 classes from each VTC). To ensure a diverse and representative sample, students were selected from a range of academic backgrounds within the first-year cohort, as all students majoring in management were eligible to participate. This allowed for a broad representation of students' academic abilities, learning styles, and demographic backgrounds, which is important for examining the impact of flipped classroom teaching across different learner profiles.

Table 3.1: Participants Distribution by Gender

S/N	College	Gender	Experimental Group (Flipped Classroom)	Control Group (Traditional Classroom)	Total Students
1	College T	Male	55	58	113
		Female	45	42	87
2	College M	Male	53	56	109
		Female	47	44	91
3	College W	Male	52	55	107
		Female	48	45	93
4	College B	Male	54	56	110
		Female	46	44	90
5	College E	Male	50	56	106
		Female	50	44	94
6	Total	Male	264	281	545
		Female	236	219	455
			500	500	1000

In Table 3.1, College T denotes Wuhu Institute of Technology, College M signifies Anhui Medical College, College W represents Anhui Water Conservancy Technical College, College B denotes Anhui Business College of Vocational Technology, and College E refers to Anhui Technical College of Mechanical and Electrical Engineering.

The distribution by gender shows a slight male majority, with 545 males and 455 females participating in the study. The experimental group consisted of 264 males and 236 females, while the control group comprised 281 males and 219 females.

The selection process for assigning students to the experimental and control groups was randomized. Specifically, the academic affairs office at each participating VTC assigned students to different classes based on their entrance examination registration numbers. This random assignment ensured that there was no bias in the allocation of students to the experimental and control groups, providing a more accurate comparison of the flipped classroom and traditional teaching methods. Among the ten classes in each

VTC,The experimental group (five classes) received flipped classroom teaching, while the control group (five classes) followed traditional teaching methods.

Importantly, the research took precautions to avoid biases that could arise from students' awareness of their participation in an experimental study. To prevent the Hawthorne effect (where participants alter their behavior due to the awareness of being observed) and the John Henry effect (where control group participants improve because they know they are not receiving the new treatment), the researcher did not inform the students in either group that they were part of a formal teaching experiment. This ensured that any observed differences in student performance could be attributed to the teaching methods themselves, rather than to the students' awareness of their participation in a study.

In summary, the sampling method relied on a combination of random assignment by the academic affairs office and the inclusion of first-year management students across multiple VTCs in Anhui Province, ensuring that the sample was both diverse and randomly assigned for a fair comparison of the flipped classroom and traditional teaching methods.

3.4 Research Design

3.4.1 Quasi-Experimental Research Design

This study, focusing on students at five Vocational and Technical Colleges (VTCs) in Anhui Province, utilized a quasi-experimental research design to investigate the effects of Flipped Classroom on Learning Performance in Management Courses at VTCs. The participants were drawn from fifty first-year management classes, with twenty-five classes assigned to the experimental group and the remaining twenty-five to the control group. These classes were randomly formed at the time of admission, ensuring unbiased assignment. The teaching content for both the experimental and control groups was

identical, following the curriculum provided by the Anhui Education Department, with the sole distinction being the teaching method used. Same goes for pre-test and post-test. This allowed for a clear comparison between the flipped classroom and traditional teaching methods while maintaining consistency in the subject matter.

The research was conducted over a six-week period, which aligns with the standard academic cycle in China for evaluating the effects of teaching interventions. This duration is considered appropriate for assessing learning outcomes in Chinese educational settings, as it is typically regarded as a complete teaching cycle. The teaching experiment took place within the "Fundamentals of Management" course, a core course in management, ensuring that both groups were exposed to the same content and academic rigor.

In both groups, the curriculum and assessment methods strictly adhered to the requirements set by the Anhui Education Department, ensuring that the study was conducted in a manner consistent with institutional and governmental guidelines. The study's design thus allows for a valid comparison of the flipped classroom and traditional teaching methods, providing insights into how different pedagogical approaches can impact student learning in VTE settings.

For the experimental group, a flipped classroom model was used. Students were instructed to watch materials before class. The classroom time was then used for presentations, questions, and discussions. The control group, on the other hand, received traditional teaching during class by the lecturer.

Both groups were assessed on learning performance before and after class to facilitate comparison. Teaching Experiment Research Design as shown in Table 3.2:

Table 3.2: Quasi-Experimental Research Design

S/N	Group	Pre-test	Experimental Treatment	Post-test
1	Experimental Group	T1	G1	T2
2	Control Group	T3	G2	T4

G1: Experimental treatment involving flipped classroom teaching.
G2: Control treatment involving traditional teaching.
T1, T3: Pre-test, including Achievement Test, Analytical, Creative, and Practical Intelligence, Learning Attitude, and Cognitive Style.
T2, T4: Post-test, including Achievement Test, Analytical, Creative, and Practical Intelligence, and Learning Attitude.

Table 3.2 outlines the quasi-experimental research design used to assess the impact of flipped classroom teaching compared to traditional teaching methods. The study involved two groups: the experimental group, which received flipped classroom teaching (G1), and the control group, which followed traditional teaching methods (G2). Both groups underwent the same pre-test (T1 and T3) to measure baseline achievement, analytical, creative, and practical intelligence, learning attitudes, and cognitive styles. The pre-test served as a starting point to understand students' initial performance and characteristics. After the intervention, both groups took a post-test (T2 and T4) to measure changes in the same areas. The experimental group (G1) participated in the flipped classroom approach, engaging in active learning through pre-class assignments and in-class collaborative activities, while the control group (G2) received traditional, lecture-based teaching. The post-tests (T2 and T4) were designed to measure improvements or changes in learning performance, enabling the comparison of the effects of the flipped classroom model versus the traditional teaching method. This design provides a clear framework for evaluating the effects of the flipped classroom in enhancing students' learning performance and cognitive development.

3.4.2 Teaching Design Explanation

3.4.2.1 The "Management" Curriculum at VTCs

The management curriculum at Vocational and Technical Colleges (VTCs) in China is meticulously designed to balance educational goals with market needs, merging theoretical understanding with practical applications (Wu & Ye, 2018). As a mandatory first-year course across VTC programs, it provides foundational training essential for career readiness, progressing systematically from core management theories to advanced specialized topics to ensure a comprehensive learning trajectory. This structural coherence not only equips students with practical managerial skills and an in-depth understanding of contemporary Chinese business practices but also aligns with industry expectations. Empirical studies indicate that excellence in this curriculum strongly correlates with employer recognition, as graduates demonstrating proficiency in its competency-based modules exhibit higher employability rates in China's vocational labor market (Li et al., 2021; Ministry of Education, 2022).

Courses within the management program blend essential theoretical frameworks with real-world applications. This integration is achieved through case studies, simulations, and projects that reflect the complexities of the Chinese business environment. Such a practical approach not only cements theoretical knowledge but also prepares students for actual workplace scenarios (Li et al., 2019). Furthermore, the curriculum is distinctly tailored to the Chinese market. It includes specific courses on local business practices and management strategies, acknowledging the unique economic and industrial landscape of China. Cultural considerations are also a pivotal part of the learning process, equipping students with the skills to navigate the nuances of managing within the Chinese cultural context.

An interdisciplinary approach is another hallmark of this curriculum. It encompasses subjects from related fields like economics, law, and technology, providing students with a broad perspective of the business world. Additionally, industry-specific courses are offered, targeting key sectors in China, such as manufacturing, technology, or retail, which are crucial to the nation's economy.VTCs have established mechanisms to adapt their curriculum swiftly in response to industry changes. This includes the incorporation of emerging trends such as digital transformation and sustainability, ensuring that the education provided is both current and relevant (Cao & Zhang, 2020).

In summary, the management curriculum at VTCs in China is a well-rounded program that not only imparts essential management knowledge and skills but also aligns closely with the specific requirements and challenges of the Chinese business environment(Bikard, Vakili, & Teodoridis, 2019). This alignment ensures that graduates are well-prepared for and relevant to the modern workforce.

In the realm of management education at VTCs in China, the curriculum is strategically crafted to develop a diverse range of skills and competencies crucial for future managers (Cebrián, Junyent, & Mulà, 2020). At the core of this educational endeavour are essential management skills such as strategic planning, organizational management, and effective leadership. These foundational skills are vital for navigating the complexities of the modern business environment, particularly within the fast-evolving Chinese marketplace. Equally emphasized are the soft skills that are indispensable in today's management roles. These include effective communication, teamwork, and problem-solving abilities (Whysall, Owtram, & Brittain, 2019). The curriculum is designed to cultivate these skills through various interactive and collaborative learning methods, reflecting the real-world scenarios where such skills are applied. This focus is particularly

relevant in the context of Chinese business culture, where relational dynamics and communication styles play a significant role.

The education system in China places a significant emphasis on bridging the gap between theoretical knowledge and practical application (Brundiers et al., 2021). This approach ensures that students are not only well-versed in management theories but are also adept at applying these concepts in real-world situations (Rybnicek & Königsgruber, 2019). The curriculum often includes project-based learning, internships, and real-case scenarios, enabling students to experience firsthand the challenges and dynamics of the business world. In preparing students for the workforce, the curriculum also addresses the balance between technical skills and industry-specific knowledge. This includes an understanding of the latest technological tools used in management, as well as insights into specific industries that are pivotal to China's economy (Yan, Yinghong, Lui, Whiteside, & Tsey, 2019). This comprehensive skill set is designed to equip students with the versatility and adaptability required in a rapidly changing business landscape. Lastly, the management education at these colleges is not static; it evolves in response to the shifting demands of the job market and the global business environment(Warner, 2020). This dynamic approach ensures that graduates are not only proficient in current management practices but are also prepared to tackle future challenges and innovations in their field (Abdunabievich, Ugli, & Norbutaevna, 2022).

The management education offered at VTCs in China is closely aligned with the demands and dynamics of the country's evolving industrial landscape(Song, 2023). This alignment is critical for ensuring that the curriculum remains relevant and that graduates are well-prepared for the workforce (Cui, Sun, & Bell, 2021).

3.4.2.2 Cognitive Style

Riding (2014) notes that cognition is the psychological perception process through which an individual consciously understands and comprehends things. Cognitive psychology primarily utilizes Information Processing Theory to study how people absorb and apply cognitive processes through internal psychological activities such as sensory perception, memory, identification, attention, and transformation (Steichen & Fu, 2020). Information Processing Theory divides the sequence of human information processing into sensory register, short-term memory, and long-term memory. While these stages are distinct, they are not linear but involve back-and-forth interaction. Cognitive style refers to the habitual characteristics and traits an individual exhibits in activities related to thinking, understanding, and information processing. It can be observed through the individual's learning process and possesses stable traits that do not significantly change over time or with varying environments (Riding & Cheema, 1991). Messick (1984) points out that cognitive style is the unique pattern people exhibit in perception, memory, thinking, problem-solving, and decision-making. Typically, there is a consistent underlying tendency in information processing. Several definitions of cognitive style are summarized as shown in Table 3.3:

Table 3.3: Summary of Cognitive Style Definitions

S/N	Author	Definition of Cognitive Style
1	Tariq, Marriam Bashir, & Iqbal (2023)	A habitual or stylistic way of thinking, without a distinction of good or bad; not a capability, but a preferred method of utilizing innate abilities and attitudes towards situations; not a measure of intelligence, but a tendency in how individual wisdom is applied.
2	Bakken, Hansson, & Hærem (2024)	Cognitive style is the individual's unique habitual pattern in perception, thinking, memory, and problem-solving.
3	Chang, Lin, & Chen (2019)	Observed through an individual's learning process, it is the preferred habit of organizing and processing information.
4	Dantas & Cunha (2020)	A person's preferred method of integrating, processing, and evaluating information.

Table 3.3 continued - Summary of Cognitive Style Definitions

5	Menap, Bayani, & Prayogi (2021)	The individual differences are consistently displayed by people in processing, and organizing information, and experiences.
6	Andri Nugroho (2023)	An individual's habitual behaviour in processing and organizing information through internal psychological activities such as perception, memory, and thinking.
7	Yulianto, Dwijanto, & Mulyono (2021)	An individual's preference or habit in processing information, a stable latent tendency with distinctive characteristics.

In summary, cognitive style is a defined and enduring personality trait. It represents the habitual preferences in cognitive skills developed through accumulated learning experiences when an individual processes stimuli and information in their environment (Weller, Repman, & Rooze, 2020).

The study examines how well the flipped classroom accommodates different cognitive styles and whether it leads to better learning performance compared to traditional methods. Given that cognitive styles are stable traits (Yulianto, Dwijanto, & Mulyono, 2021), understanding how these styles interact with flipped classroom strategies is crucial for addressing individual differences in learning performance.

Cognitive styles represent individuals' stable preferences in information processing, independent of intellectual capacity (Weller et al., 2020) and devoid of hierarchical valuation (Jonassen & Grabowski, 2012). Historically, classifications have evolved from Keefe's (1987) dichotomy of perceptual versus conceptual styles to Riding and Cheema's (1991) holistic framework categorizing styles as Wholist-Analytic or Verbalizer-Imager. The latter distinction—between visualizers reliant on imagery and verbalizers dependent on linguistic processing—has gained empirical traction in multimedia learning contexts (Mayer & Massa, 2003; Jonassen & Grabowski, 2012).

Visualizers demonstrate enhanced performance with graphical aids (Di Vesta et al., 1971), whereas verbalizers excel in text-based tasks (Hasan, 2019). This dichotomy extends to information retrieval: visualizers favor pictorial stimuli, while verbalizers prioritize textual input (Kirby et al., 1988; Richardson, 1977). Such preferences correlate with distinct cognitive strategies: visualizers employ mental imagery for problem-solving, while verbalizers manipulate abstract symbols (Hasan, 2019; Jonassen & Grabowski, 2012).

Operationalizing these styles necessitates validated instruments. Paivio's (2013) 86-item Individual Differences Questionnaire (IDQ) and Richardson's (1977) 15-item Verbalizer-Visualizer Questionnaire (VVQ) laid early foundations. Childers et al. (1985) refined these into the Style of Processing (SOP) scale—a 20-item tool with demonstrated reliability—adopted in this study to classify learners.

Empirical findings on style-performance relationships remain contested. While Mayer (2019) observed negligible effects of illustrations on text comprehension, Howard et al. (2011) reported superior outcomes for visualizers in multimedia environments. Conversely, Chen and Sun (2012) identified style-material interactions affecting evaluation but not performance, and Liao and Lin (2016) noted style-mediated variations in multimedia learning strategies. These inconsistencies underscore the multifactorial nature of learning, where cognitive styles intersect with instructional design variables (Effken & Doyle, 2001; Ghinea & Chen, 2003).

Theoretical implications for vocational education are significant yet underexplored. Although flipped classrooms theoretically accommodate diverse styles through blended multimedia resources, empirical validation in vocational settings remains sparse (Cole et al., 2021; Ke et al., 2023). Current literature highlights methodological fragmentation in

style measurement (Altan-Atalay et al., 2023) and insufficient attention to confounding variables like pedagogical strategies (Safitri & Masduki, 2023). Furthermore, the dynamic evolution of styles through instructional interventions warrants longitudinal investigation (Giancola et al., 2022).

This study addresses these gaps by examining how SOP-classified visual/verbal preferences mediate flipped classroom efficacy in vocational management courses. By integrating rigorous scale-based assessment with quasi-experimental design, it aims to clarify the contingent role of cognitive styles in technology-enhanced vocational pedagogy.

3.4.2.3 Examples of Teaching Design

This study adopted the management courses at five VTCs for conducting instructional design and implementing teaching experiments. The flipped classroom teaching activities for the experimental group were designed as follows: before class, the lecturer compiles the key points of the teaching unit according to the teaching goals of the unit and pre-records practical videos or finds suitable videos from YouTube, Bilibili, or other online platforms to send to the students, assigning them to study these before class. In class, the lecturer started by motivating the students, followed by student presentations, questions, and discussion activities, and finally, the lecturer concluded with a comprehensive wrap-up activity. The teaching time, content, and progress schedule were planned for both the experimental and control groups based on the teaching schedule of the Management course at the VTC, as shown in Table 3.4. The design example for the learning activities of Unit 1 in the management course for the experimental group is shown in Table 3.5. Details on the learning activities design for all other units, for both the experimental and control groups, are provided in the appendix. Prior to the commencement of the experiment, all five teachers, each responsible for one college, collected data and

aligned on teaching content, data collection methods, and strategies for categorizing and organizing data through a series of meetings.

Table 3.4: Unit Teaching Time, Content, and Progress Schedule

S/N	Teaching Time (Weeks 1-6)	Main Teaching Content (Units 1-6)
1	Week1	Unit 1: Introduction to Management Unit 1-1: Introduction to Management Concepts Unit 1-2: Organizational Structures and Culture
2	Week2	Unit 2: Leadership and Management Unit 2-1: Leadership Theories and Styles Unit 2-2: The Role of Management in Leadership
3	Week3	Unit 3: Decision Making and Problem Solving Unit 3-1: Techniques and Tools for Decision Making Unit 3-2: Problem-Solving Strategies and Approaches
4	Week4	Unit 4: Human Resource Management Unit 4-1: Recruitment and Selection Unit 4-2: Employee Training and Development
5	Week5	Unit 5: Organizational Change and Development Unit 5-1: Understanding Organizational Change Unit 5-2: Strategies for Effective Change Management
6	Week6	Unit 6: Management Change and Innovation Unit 6-1: Contemporary Change Management Issues Unit 6-2: Inspiring Innovation

Table 3.5: Example of Teaching Activity Design for Experimental Group in Management Course Unit 1-1

S/N	Teaching Plan	Unit 1-1: Introduction to Management Concepts
1	Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
2	Teaching Resources	Videos, interactive forums, case studies
3	Teaching Objectives	Understand the basic principles of management. Identify different management styles and their applications.
4	Activity Objectives	Engage students in critical thinking and application of management concepts.
5	Activity Process and Content	Pre-Class: Students watch video lectures and complete readings. Participate in online discussions. In-Class: Group discussion on case studies. Interactive Q&A. Practical exercises in identifying management styles in different scenarios.
6	Time	Pre-Class: An hour, In-Class: An hour and a half
7	Assessment	Homework

Table 3.6: Example of Teaching Activity Design for Experimental Group in Management Course Unit 1-2

S/N	Teaching Plan	Unit 1-2: Organizational Structures and Culture
1	Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
2	Teaching Resources	Videos, podcasts, real-world organization examples, online discussion boards
3	Teaching Objectives	Understand various organizational structures and their impact on company culture. Recognize the relationship between management and organizational culture.
4	Activity Objectives	Develop analytical skills by examining different organizational structures. Encourage critical thinking about the impact of culture on business operations.
5	Activity Process and Content	Pre-Class: Students engage with interactive modules and listen to podcasts on organizational structures. Participate in online forums discussing real-world examples. In-Class: Group activities to design an organizational structure for a hypothetical company. Role-playing to understand cultural impacts in organizations.
6	Time	Pre-Class: An hour, In-Class: An hour and a half
7	Assessment	Homework

The design example for the teaching activities of Unit 1 in the management course for the control group is shown in Tables 3.7 and 3.8.

Table 3.7: Example of Teaching Activity Design for Control Group in Management Course Unit 1-1

S/N	Teaching Plan	Unit 1-1: Introduction to Management Concepts
1	Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
2	Teaching Resources	Textbook, PowerPoint slides, chalkboard/whiteboard
3	Teaching Objectives	Understand the basic principles of management. Identify different management styles and their applications.
4	Activity Objectives	Engage students in critical thinking and application of management concepts.
5	Activity Process and Content	Pre-Class: The lecturer prepares lessons, reviews textbook content, and organizes PowerPoint slides. In-Class: The lecturer begins with a motivational introduction, explains key points through the lecture, uses slides for visual aids, engages in Q&A with students, and concludes with a summary of the unit.
6	Time	In-Class: An hour and a half
7	Assessment	Homework

Table 3.8: Example of Teaching Activity Design for Control Group in Management Course Unit 1-2

S/N	Teaching Plan	Unit 1-2: Organizational Structures and Culture
1	Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
2	Teaching Resources	Textbook, PowerPoint presentations, handouts
3	Teaching Objectives	Understand various organizational structures and their impact on company culture. Recognize the relationship between management and organizational culture.
4	Activity Objectives	Develop analytical skills by examining different organizational structures. Encourage critical thinking about the impact of culture on business operations.
5	Activity Process and Content	Pre-Class: The lecturer prepares detailed lecture notes and organizes PowerPoint slides based on the textbook chapters covering organizational structures and culture. In-Class: The session starts with a brief overview of organizational theories, followed by a detailed lecture on different types of organizational structures and their cultural implications. This is supplemented with real-world examples and case studies. The class concludes with a summary and an interactive Q&A session.
6	Time	In-Class: An hour and a half
7	Assessment	Homework

For the control group, traditional lecture-based teaching was used. Before class, the lecturer prepared the lesson according to the teaching objectives of the unit. In class, the lecturer first led with learning motivation then proceeded to elaborate and demonstrate the key points of the teaching unit.Finally, the lecturer conducted a summary that includes a comprehensive learning activity.

3.5 Research Instruments

The instructional plans and qualitative assessment scales used in this study were standardized instruments published by the Anhui Provincial Education Department. These well-established tools, including curriculum frameworks and learning activity designs, were widely recognized and routinely employed for educational assessment throughout the region. Quantitative instruments demonstrated acceptable reliability, with construct validity evidenced by factor analyses, ensuring validity and reliability.

3.5.1 Academic Achievement Test Paper

In this study, academic achievement refers to the student's scores on the test papers in the course of management. These scores were used to understand the student's academic performance. Higher scores indicate better academic achievement, while lower scores indicate poorer achievement. The Academic Achievement Test papers were developed by the researcher before the experimental study, based on the teaching objectives and the content of the curriculum. They were then reviewed and modified with the assistance of three lecturers experienced in teaching management courses within the college. The test papers were used for pre-tests and post-tests during the experimental study.

3.5.2 Successful Intelligence Scale

Successful Intelligence Scale was developed by Sternberg (1997) and has been revised accordingly (Jiang, 2007). This scale aims to assess intelligence in analytical, creative, and practical dimensions. Each dimension comprises three parts: verbal, quantitative, and figural, making a total of nine major questions. Each major question consists of four multiple-choice questions, totalling 36 questions. Each question is scored one point, with a subtotal of 12 points for each dimension and a total score of 36 points.

The first to third major questions in the scale belong to the analytical dimension, focusing on skills such as comparison, contrast, analysis, evaluation, criticism, questioning, explanation, and interpretation. The content of the scale includes: the first major question is verbal analysis, where the method of answering involves reading the description of each question and choosing the most appropriate word or phrase to fill in the blanks in the sentence, making the overall meaning more appropriate. This section consists of four multiple-choice questions, with a response time of 3 minutes. The second major question is quantitative analysis, which involves finding the unknown number in a series based on the

rule of change in the series and selecting the matching number from the options, comprising four multiple-choice questions with a response time of 3 minutes. The third major question is figural analysis, where the method of answering involves selecting the most appropriate figure from the options for the second column based on the pairing method of the figures in the first column. This section consists of four multiple-choice questions, with a response time of 3 minutes.

The fourth to sixth major questions in the scale fall under the practical dimension, emphasizing the assessment of problem-solving abilities based on life experiences. The fourth major question is verbal practicality, where the method of answering involves reading problems based on real-life situations and selecting the most appropriate answer from the options, comprising four multiple-choice questions with a response time of 3 minutes. The fifth major question is quantitative practicality, which involves using information related to real-life situations to select the most appropriate answer from the options, comprising four multiple-choice questions with a response time of 3 minutes. The sixth major question is figural practicality, where the method of answering involves finding routes on a map and selecting the best route from the options, comprising four multiple-choice questions with a response time of 3 minutes.

The seventh to ninth major questions in the scale are under the creative dimension, mainly measuring the abilities of imagination, design, invention, innovation, and prediction. The seventh major question is verbal creativity, where each question is preceded by a hypothetical statement that sometimes helps the respondent choose the correct answer but is not always helpful. The method of answering involves finding the corresponding relationship between the first two underlined words in the question and selecting the corresponding answer for the third underlined word from the options, comprising four

multiple-choice questions with a response time of 3 minutes. The eighth major question is quantitative creativity, where the method of answering involves using the definitions of three mathematical symbols provided in the question to select the corresponding answer from the options, comprising four multiple-choice questions with a response time of 3 minutes. The ninth major question is figural creativity, where the method of answering involves determining the pattern followed by the figures in the first row of boxes to decide the figure in the second row of spaces and selecting the answer from the options, comprising four multiple-choice questions with a response time of 3 minutes.

In summary, it can be understood that the analytical dimension of the Successful Intelligence Scale emphasizes the ability to analyse problems, the creative dimension values innovative thinking in problem-solving, and the practical dimension applies common knowledge in life to the process of problem-solving. The abilities of "analysis, creativity, and practicality" measured by this scale are helpful in observing students' application of knowledge and practical skills in management courses in a flipped classroom setting. This, in turn, aids in the effective transformation of these skills in real-life situations and contributes to successful career development.

The Successful Intelligence Scale, which assesses students' abilities in analytical, creative, and practical thinking, is closely related to the flipped classroom model in this study, as the flipped classroom emphasizes self-directed learning, problem-solving, and applying knowledge. By administering the scale as a pre-test and post-test, the study can examine whether the flipped classroom enhances students' development in these areas compared to traditional teaching. The items on the scale were tailored to reflect the content of the management course, ensuring they assessed relevant skills such as decision-making, leadership, and strategic thinking. Since the items were aligned with the course syllabus,

the scale effectively measured whether the flipped classroom model fostered the growth of successful intelligence in students, demonstrating its impact on their learning performance.

The reliability and validity of the Successful Intelligence Scale have been tested. In Sternberg's psychometric study involving 326 high school students (1997), the internal consistency reliability of the Successful Intelligence Scale was .63 for the analytical dimension, .58 for the practical dimension, and .62 for the creative intelligence dimension. The internal consistency of the scale reached a satisfactory level.

The validity of the Successful Intelligence Scale is primarily evaluated in two aspects: construct validity and internal cohesion (Sternberg & Rainbow Project Collaborators, 2006). The first aspect is construct validity. Using confirmatory factor analysis techniques, three factors with eigenvalues greater than 1 were identified, accounting for 61.74% of the cumulative variance. This result provided a certain level of support for the construct validity of the Successful Intelligence Scale.

The second aspect is the test of internal cohesion. In the correlation analysis of the different sub-measurements, the correlations between the scores of the three dimensions and the total score ranged from .79 to .82, indicating a high correlation and demonstrating good internal consistency of the Successful Intelligence Scale. Additionally, the correlations among the three sub-measurements ranged from .43 to .50, all reaching a statistically significant level of .01, indicating a moderate to low correlation and showing that the three sub-measurements still possess unique intrinsic characteristics.

3.5.3 Learning Attitude Scale

In this study, learning attitude refers to the extent of a persistent and consistent behavioural tendency that students develop during the learning process in a Management

course. The Learning Attitude Scale by Koballa (2012) was used as the measurement tool in this research, encompassing three constructs: cognitive, affective, and behavioural intentions. Firstly, the cognitive construct refers to an individual's views, beliefs, and knowledge about learning attitudes during the learning process. There is no definite right or wrong answer; it reflects the individual's state regarding learning attitudes. The affective construct involved emotional reactions to learning, showing likes or dislikes, ranging from very strong to very weak. The behavioural intentions construct primarily described observable behaviour tendencies related to learning attitudes. The scale consisted of multiple-choice questions, with eight questions in the cognitive construct, ten in the affective construct, and nine in the behavioural intentions construct, totalling twenty-seven questions.

This scale adopted a Likert-type five-point scale for scoring. Respondents selected from five levels ranging from “strongly agree” to “strongly disagree” based on their actual feelings.

A five-point Likert scale was employed, with responses ranging from "Strongly disagree" (scored 1) to "Strongly agree" (scored 5), where higher scores indicated more positive learning attitudes. The questionnaire underwent rigorous translation into Chinese by two certified bilingual translators with professional expertise in academic translation and relevant pedagogical backgrounds.

The Learning Attitude instrument is crucial to this quasi-experimental study as it assesses how students' emotional and motivational engagement with the learning process is influenced by the teaching methods (flipped classroom vs. traditional). Administered before and after the teaching intervention, the instrument measures changes in students' attitudes, such as motivation, interest, and emotional engagement, which could impact

learning performance. By comparing the attitudes of students in the experimental group (flipped classroom) and the control group (traditional classroom), the study explores how different teaching approaches affect student engagement. Regarding the reliability and validity of the scale, the overall Cronbach's α value is 0.88, indicating good internal consistency reliability. Using principal component analysis for factor analysis, three factors with eigenvalues greater than 1 were identified, and the cumulative variance accounted for 62.27%. These results indicate that the scale had a certain degree of construct validity (Koballa Jr, 1988; Koballa, 2012).

3.5.4 Cognitive Style SOP (Style of Processing) Scale

In this research, the modified version of the Cognitive Style SOP scale developed by Childers et al. (1985) was used to measure students' cognitive style patterns. The Cognitive Style SOP scale categorized test-takers into two types: Verbal style indicates learners who show a more significant preference for processing verbal and textual information; visual style indicates learners who have a more marked preference for processing visual information, such as graphics, charts, animations, etc. The scale consists of 20 questions, divided into two types of information processing preferences: visual and verbal, with 10 questions each. It used a five-point scale ranging from strongly agree to strongly disagree to measure cognitive styles. For visual-style questions, strongly agree is scored as 5 points, decreasing to 1 point for strongly disagree. The verbal-style questions require reverse scoring, with strongly agree scored as 1 point and strongly disagree as 5 points. The questions requiring reverse scoring in the scale are numbers 1, 3, 4, 6, 8, 12, 13, 15, 17, and 18 (Childers et al., 1985). A higher score in the verbal style suggests a preference for processing verbal and textual information. A higher score in the visual style indicates a preference for processing visual information like graphics, charts, and

animations. In this research, the questionnaire was translated into Chinese by two professionals who are good at Chinese-English translation.

Regarding the reliability of the Cognitive Style SOP Scale, Cronbach's α value is .81 for the verbal part and .86 for the visual part, with an overall Cronbach's α value of 0.88, indicating good reliability of the Cognitive Style SOP Scale. In terms of validity, using principal component analysis and the varimax rotation method, two factors with eigenvalues greater than 1 were identified, with a cumulative variance of 59.69%, indicating that the scale has a certain degree of construct validity.

3.5.5 Qualitative Instruments

The qualitative dimension of this study utilized three validated instruments: Teacher's Teaching Records, Teaching Activity Worksheets, and Student's Learning Reflection Reports. These qualitative research tools, underwent pre-study validity assessments by an expert panel comprising seasoned scholars in educational pedagogy and vocational education research. Content validity was ensured through alignment with theoretical frameworks and curricular objectives, while construct validity was established via iterative revisions to eliminate measurement ambiguity.

To strengthen methodological rigor, inter-coder reliability was systematically maintained through dual-independent coding protocols and detailed audit trails of analytical procedures. Concurrently, methodological triangulation—synthesizing data from observational records, reflective narratives, and activity artifacts — was employed to corroborate findings and mitigate interpretive bias. This multilayered validation framework adheres to established benchmarks for qualitative trustworthiness (Lincoln & Guba, 1985), ensuring the integrity and generalizability of emergent thematic patterns.

3.6 Pilot Study

A pilot study involving 160 students was conducted prior to the main experimental phase to ensure the appropriateness and effects of the research instruments and methodologies designed for the study. This pilot study involved a select group of students from a VTC who were not part of the main study cohort. The primary objective of this preliminary investigation was to test the practicality of the experimental design, the clarity of the research instruments, and the overall feasibility of the data collection procedures.

During the pilot study, the Academic Achievement Test Paper, the Successful Intelligence Scale, and the Learning Attitude Scale were administered to evaluate their comprehensibility and relevance to the subject matter of management courses. Feedback was solicited from both participants and a panel of educational experts to identify any ambiguous or biased items and to assess the time needed to complete these tests comfortably. Adjustments were made based on this feedback to refine the wording of questions, the layout of the test papers, and the timing protocols to better align with the cognitive load and attention span typical of the student demographic.

Furthermore, the pilot study explored the functionality of the Cognitive Style SOP Scale, ensuring that the questions effectively captured the diverse cognitive styles present in the student population. This involved analysing the distribution of responses for normalcy and variance, which informed potential recalibrations of the scales to enhance their sensitivity and specificity.

3.7 Implementation Procedure

This study's implementation procedure was systematically divided into three primary stages: preparation of the research plan, development of teaching designs and

experimental research for flipped classroom model, and the organization and analysis of research data.

3.7.1 Preparation Stage

The tasks in this stage involved defining the research problem, establishing the research framework, selecting research participants, designing data collection methods, and determining the research tools. This stage served as the foundational base for launching the research. Activities in the research plan preparation include:

i. Gathering relevant literature as a basis for quantitative research and qualitative analysis following the definition of the research problem;

ii. Coordinating experimental classes and teaching activities, as well as organizing the teaching schedule;

iii. Preparing materials required for both flipped classroom and traditional teaching activities.

Through comprehensive data collection and literature review, various research instruments were developed, including the Academic Achievement Test Paper, the Successful Intelligence Scale, the Learning Attitude Scale, the Cognitive Style SOP Scale, and supplementary materials such as Teacher's Teaching Records, which detailed the instructional strategies and content covered, to be filled out by lecturers, once per unit; Teaching Activity Worksheets, which provided insight into the practical exercises and in-class activities, to be filled out by students, once per unit; and Student's Learning Reflection Reports, offering a firsthand perspective on the learning experiences from the student's viewpoint, to be filled out by students, to be submitted after the 6-week course ends.

3.7.2 Development of Teaching Design and Experimental Research for Flipped Classroom Model

This stage primarily involved conducting literature research on flipped classroom teaching and empirical research, aiming to develop flipped classroom teaching designs through literature research and experimental research.

3.7.2.1 Empirical Approach

As is illustrated in Figure 3.1, the study adopted a quasi-experimental research method and conducted classroom teaching experiments. The research procedure involved a sequence of steps, as shown in Figure 3.1 below.

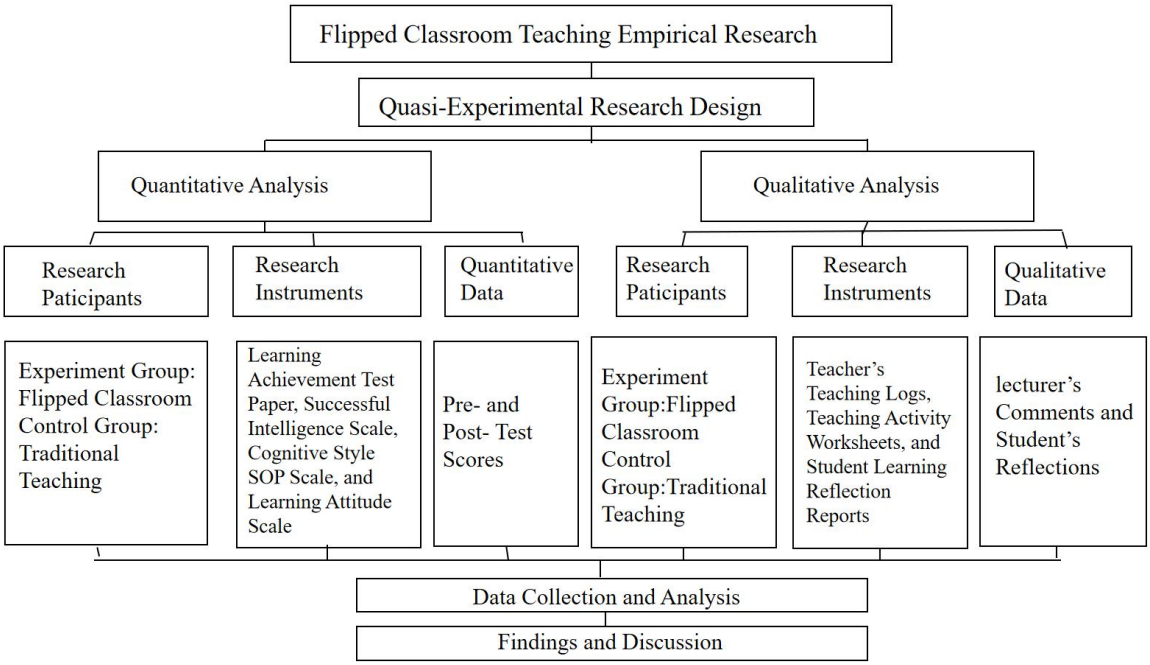


Figure 3.1: Empirical Research Process

Pre-test: Administered before the teaching experiment to assess baseline student knowledge and performance.

Teaching Intervention: Conducted through the flipped classroom approach for the experimental group and traditional teaching for the control group.

Teacher's Teaching Records: During the experiment, lecturers maintained detailed records of their teaching experiences, reflections on the strategies used, challenges faced, and any modifications made during the lessons. These records provided qualitative insights into the teaching process.

Student Involvement: Students completed Teaching Activity Worksheets to share feedback on the unit's content and classroom activities. Additionally, students submitted Learning Reflection Reports at the end of the course, where they evaluated their learning progress and experiences.

A post-test was administered after the teaching experiment to evaluate changes in student learning performance. This post-test used the same instruments with the pre-test to assess the effects of the flipped classroom model versus traditional teaching.

3.7.3 Pilot Study Results

As is shown in Table 3.9, 160 students from five VTCs in Anhui Province participated in the pilot study. Each college contributed 32 first-year students majoring in management, divided equally into control and experimental groups (16 students each per group). The pilot phase lasted for two weeks, with both groups following their respective instructional methods.

Table 3.9: Questionnaire Collection Statistics from the Pilot Study

Case Processing Summary	N	%
Valid	160	100.0
Excluded[a]	0	0.0
Total	160	100.0

Cronbach's Alpha is a widely used measure for accessing the reliability of scales and instruments. As is illustrated in Figure 3.2, the higher the Cronbach's Alpha coefficient,

the higher the reliability of the tool. In basic research, a coefficient of at least 0.80 is acceptable. In exploratory research, a value of 0.70 is acceptable. Values above 0.70 are considered to indicate good reliability, while values below 0.3 are considered as problematic and suggest that the instrument should be rejected (Taber, 2018).

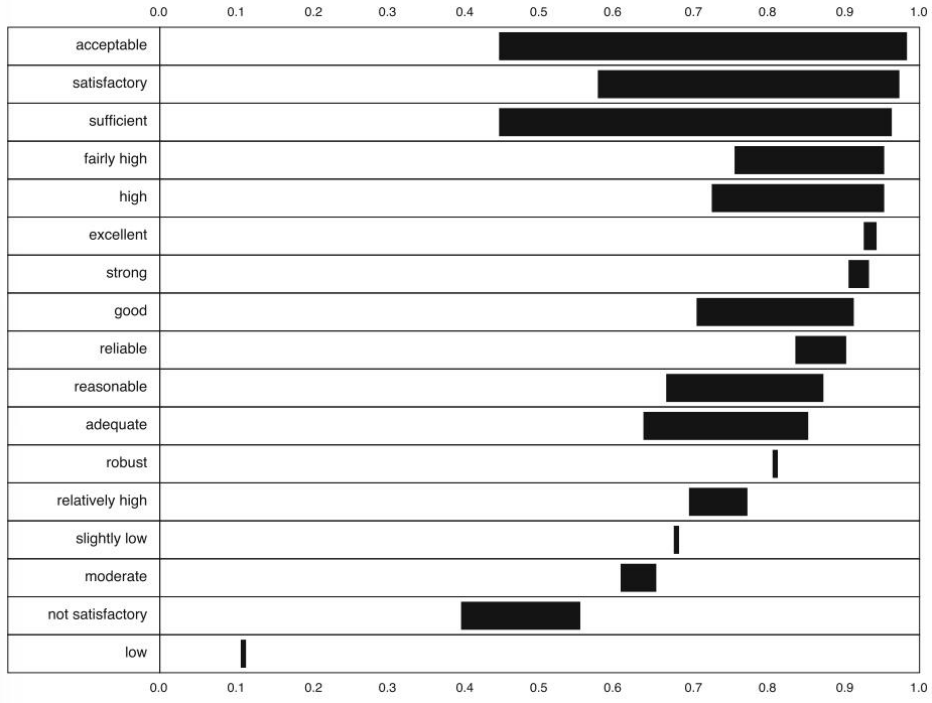


Figure 3.2: Qualitative descriptors used for values/ranges of values of Cronbach's alpha reported in papers in leading science education journals (Taber, 2018)

As summarized in Table 3.10, all instruments demonstrated robust psychometric properties. The Academic Achievement Test exhibited excellent internal consistency (α=0.97) and high test-retest reliability (r=0.98), confirming both item coherence and temporal stability. For the Successful Intelligence Scale, all subscales exceeded the 0.70 reliability threshold (Analytical: α=0.81; Creative: α=0.82; Practical: α=0.82), with factor analysis validating alignment with Sternberg's triarchic framework. Similarly, the Learning Attitude Scale achieved high internal consistency (α=0.95), and exploratory factor analysis supported its three distinct cognitive-affective-behavioral dimensions. The

Cognitive Style SOP Scale also showed strong reliability (α=0.93), with principal component analysis confirming its differentiation between verbal and visual modalities. Collectively, these results establish the instruments' suitability for full-scale deployment.

Table 3.10: Interpretation of Cronbach's Alpha Results of the Pilot Study

S/N	Questionnaire of the Pilot Study	Cronbach's Alpha	Cronbach's Alpha Results	Cronbach's Alpha Range	Questionnaire Indicator
1	Academic Achievement	Test	.97	>0.8	good
		Retest	.98	>0.8	good
2	Successful Intelligence	Analytical	.81	>0.8	good
		Creative	.82	>0.8	good
		Practical	.82	>0.8	good
3	Learning Attitude		.95	>0.8	good
4	Cognitive Style		.93	>0.8	good

Finally, the reliability of the instruments was assessed again with the data from the main study, which involved 1,000 data points. In Table 3.15, the Cronbach's alpha values for these data points were consistent with the pilot study, with values of 0.90 for the Academic Achievement Test, 0.81 to 0.82 for the Successful Intelligence subscales, 0.95 for the Learning Attitude Scale, and 0.88 for the Cognitive Style SOP Scale, all indicating strong internal consistency and reliability. These findings confirm the robustness of the instruments for measuring the intended constructs in the study's full experimental phase.

Table 3.11: Interpretation of Cronbach's Alpha Results of 1,000 Data Points

S/N	Questionnaire of 1000 Data Points		Cronbach's Alpha	Cronbach's Alpha Range	Questionnaire Reliability
1	Academic Achievement		.90	>0.8	good
2	Successful Intelligence	Analytical	.81	>0.8	good
		Creative	.81	>0.8	good
		Practical	.80	0.7-0.8	acceptable
3	Learning attitude		.95	>0.8	good
4	Cognitive style		.88	>0.8	good

3.7.4 Data Collection

Quantitative and qualitative data were systematically captured through a multi-source protocol aligned with the quasi-experimental design. Pre- and post-intervention assessments administered standardized instruments—Academic Achievement Tests, Successful Intelligence Scales, and Learning Attitude Scales—to both experimental and control groups, ensuring longitudinal comparability of learning performance metrics. Concurrently, triangulated qualitative evidence was derived from three artifacts: Teacher's Teaching Records documenting pedagogical adaptations, Teaching Activity Worksheets capturing in-class engagement patterns, and Student Learning Reflection Reports providing insights into self-regulated learning behaviors. This kind of data architecture enabled robust cross-validation while preserving methodological coherence with the study's mixed-methods framework.

3.8 Data Analysis

The data collected in this study included both quantitative and qualitative data. Quantitative data comprised the results of the Academic Achievement Test Paper, the Successful Intelligence Scale, the Cognitive Style SOP Scale, and the Learning Attitude Scale. Qualitative data encompassed Teacher's Teaching Records, Teaching Activity Worksheets, and Student's Learning Reflection Reports.

3.8.1 Quantitative Data Analysis

The data analysis for this study involved a series of statistical tests designed to address the research objectives, answer the research questions, and test the hypotheses. The data were collected from pre- and post-intervention assessments, including academic achievement tests, intelligence tests, and attitude surveys. The analysis was carried out

using both parametric and non-parametric statistical methods, depending on the distribution and nature of the data.

Initially, descriptive statistics were calculated to summarize the demographic characteristics of the sample and provide an overview of the data. Measures of central tendency (mean, median) and dispersion (standard deviation, range) were used to describe the academic, intelligence, and attitude scores before and after the interventions.

To determine the differences in learning performance before and after the traditional classroom model, paired *t*-tests was conducted for each dependent variable: academic achievement, successful intelligence, and learning attitude. If the data did not meet the assumptions of normality required for parametric tests, the non-parametric Wilcoxon Signed Rank Test would be used as an alternative.

Similarly, paired *t*-tests or Wilcoxon Signed Rank Tests was employed to analyze the differences in learning performance before and after the flipped classroom model for the same dependent variables. These tests helped in understanding whether there were statistically significant improvements in academic achievement test scores, successful intelligence scores, and learning attitude scores after the implementation of flipped classrooms.

To examine the moderating effect of cognitive style on the relationship between demographic profiles (college, gender) and learning performance, hierarchical regression analysis was conducted. In this analysis, learning performance outcomes were regressed on demographic variables and cognitive style was added as an interaction term to investigate its moderating effect. This approach helped in identifying whether the impact of

demographic factors on learning performance differs based on students' cognitive styles, under both traditional and flipped classroom settings.

All statistical analyses were performed using specialised software (e.g., SPSS and R). Results were considered statistically significant at $p<0.05$.The findings from these analyses provided insights into the effects of the traditional versus flipped classroom model and the role of cognitive style in shaping learning performance.

3.8.2 Qualitative Data Analysis

Qualitative analysis was collected and organized by lecturers from the five colleges, focusing on categorizing the research objectives. It involved selecting and discussing statements related to the research hypotheses by identifying keywords. Before qualitative data analysis, five lecturers standardized the methods and criteria for data collection.The qualitative data in this study were analyzed through manual content coding procedures to ensure systematic categorization and interpretation.

The first code in the qualitative data coding classification used A, B, and C to represent different sources of data: Teacher's Teaching Records (A), Teaching Activity Worksheets (B), and Student's Learning Reflection Reports (C). The second code was represented by a number indicating the week of the teaching activity, and the third code by a number representing the number of classes, the fourth code by a number representing the student's seat number. For example, a code of A1-3-12 would represent Teacher's Teaching Record from the first week of teaching, the third class, and the twelfth student's entry.

Following data coding, thematic analysis was conducted to identify recurring patterns, themes, and insights related to the research hypotheses. The analysis focused on identifying keywords and phrases that reflect the underlying attitudes, behaviors, and

learning experiences of both teachers and students. The qualitative findings were then compared and contrasted with the quantitative data results, providing a richer and more nuanced interpretation of the experimental findings. This cross-method comparison allowed for a more comprehensive understanding of how flipped classroom teaching influenced student learning performance, engagement, and other relevant outcomes.

3.9 Research Ethics

This study adhered to rigorous ethical standards to ensure participant rights, safety, and confidentiality throughout the research process. Informed consent was obtained from all participants prior to their involvement, with clear communication of the study's objectives, procedures, potential benefits/risks, and the unconditional right to withdraw without consequences.

Confidentiality was maintained through comprehensive measures: all personal and academic data were anonymized, securely stored, and presented exclusively as aggregated findings in accordance with data protection regulations. The research design further embedded transparency and inclusivity by pilot-testing instruments with participants, incorporating their feedback to refine technical jargon clarity and cultural relevance.

Qualitative data received specialized handling through bilingual expert translation of personal reflections, strictly following cross-cultural research standards (Translation Guidelines for Equity in Research, 2024) while preserving terminological consistency. All qualitative excerpts remained subject to the same anonymization and secure storage protocols as quantitative data.

Finally, research dissemination responsibly acknowledged participant contributions, prioritizing educational improvement applications that safeguard individual rights and academic freedom.

3.10 Chapter Summary

This chapter delineated the empirical methodology for examining flipped classrooms' impact in vocational management education, employing a quasi-experimental design that compared learning outcomes between an experimental group (flipped classroom) and a control group (traditional classroom) after a six-week intervention. Validated research instruments demonstrated high reliability and validity through pilot testing. Data analysis integrated quantitative methods (independent t-tests, hierarchical regression) with qualitative thematic coding of reflective reports and instructional records. The pilot study optimized protocols for the main study's 1,000-participant cohort while ensuring strict compliance with ethical standards. Collectively, this chapter established a methodologically rigorous foundation for generating significant, actionable insights into how flipped classrooms and cognitive styles enhance learning performance.

CHAPTER 4

FINDINGS

4.1 Introduction

This chapter systematically examines the impact of the flipped classroom model on learning outcomes in management courses within vocational and technical education (VTE) through an integrated quantitative and qualitative approach. The quantitative analysis employs parametric statistical methods to evaluate differences in academic achievement, successful intelligence, and learning attitudes between traditional and flipped classroom models, while the qualitative component explores underlying mechanisms through theoretical frameworks. Together, these methodologies provide complementary insights into the practical value of pedagogical innovation.

The study begins with descriptive statistics and normality tests to establish baseline equivalence between the experimental (flipped classroom) and control (traditional classroom) groups. Pre-intervention assessments confirmed comparable scores in academic achievement, successful intelligence, and learning attitudes across groups (Tables 4.1–4.3), with normality validated via Q-Q plots (Figures 4.1–4.2). Paired t-tests revealed statistically significant post-intervention improvements in all three metrics for the flipped classroom group, while independent samples t-tests demonstrated its superior efficacy compared to the traditional model.

To examine the moderating role of cognitive style, hierarchical regression analyses were conducted after verifying assumptions of linearity, homoscedasticity, and residual normality. Results indicated no significant moderation effects of cognitive style on the relationship between demographic variables (gender, college) and learning outcomes. This

suggests that the benefits of the flipped classroom are broadly applicable, independent of individual cognitive styles or demographic backgrounds.

Grounded in Sternberg's (2003) theory of successful intelligence and Vygotsky's (1978) social constructivism, the qualitative inquiry addresses two research questions: (1) perceptions of the flipped classroom's benefits and challenges among students and teachers (RQ9), and (2) theoretical explanations for its efficacy (RQ10). Manual coding of teacher logs and student reflections identified three core themes: (1) engagement dynamics, exemplified by shifts from passive listening to active debate; (2) cognitive skill development, encompassing analytical, creative, and practical intelligence; and (3) pedagogical adaptation, particularly the model's responsiveness to diverse cognitive styles through multimodal resources. Methodological rigor was ensured via member checking, negative case analysis, and strong inter-rater reliability (Cohen's $\kappa = 0.83$).

By cross-validating methodologies, this chapter elucidates the flipped classroom's mechanisms for enhancing learning outcomes. Quantitative results confirm its effectiveness, while qualitative data reveal how these gains are achieved through scaffolded pre-class preparation, collaborative in-class activities, and adaptive resource design. For instance, teachers observed that "students engaged in deeper discussions by building on pre-class foundational knowledge" (Teacher 5), aligning with quantitative improvements in academic achievement. This synthesis provides empirical and theoretical grounding for the study's conclusions, demonstrating how the flipped classroom bridges individual cognition and social knowledge co-construction in VTE contexts.

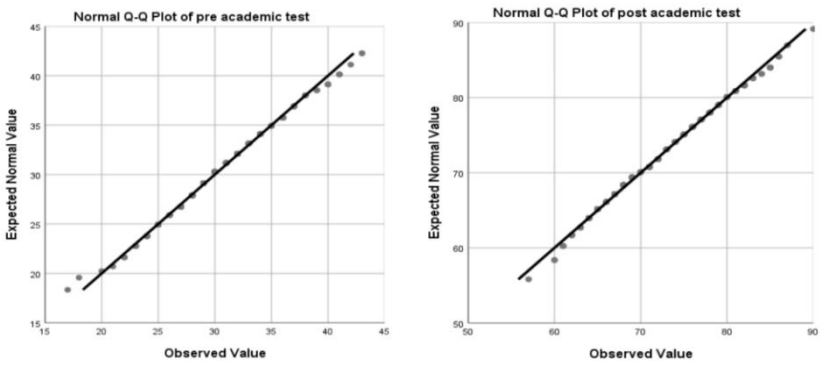
4.2 Quantitative Findings

4.2.1 Descriptive Statistics

4.2.1.1 Normality Tests

Before performing any parametric tests, it was essential to verify the normality of the data to ensure the assumptions of the tests were met. To achieve this, normality tests were conducted on the pre-intervention and post-intervention scores for academic achievement tests, successful intelligence, and learning attitudes for both the control and experimental groups. The results of these normality tests are presented in Figure 4.1 and Figure 4.2, which display the Q-Q (Quantile-Quantile) plots for the control and experimental groups, respectively.

Figure 4.1 shows the Q-Q plot for the control group, which visualizes the distribution of the data for academic achievement, successful intelligence, and learning attitudes. In a Q-Q plot, if the data points lie approximately along a straight line, this indicates that the data follows a normal distribution. For the control group, the Q-Q plot demonstrates that the majority of the data points align closely with the reference line, suggesting that the pre-intervention and post-intervention scores for the control group are normally distributed.



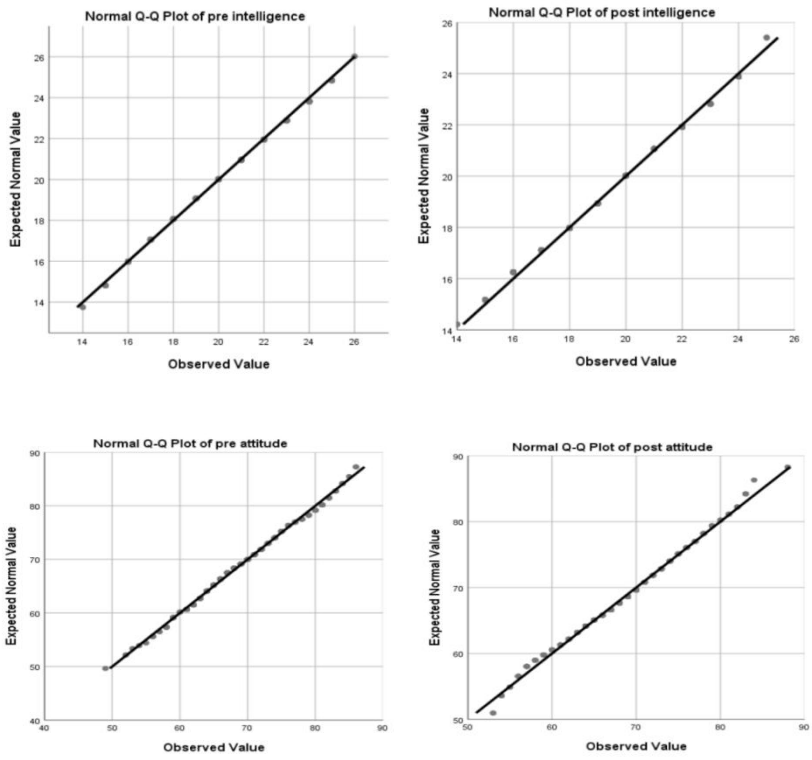
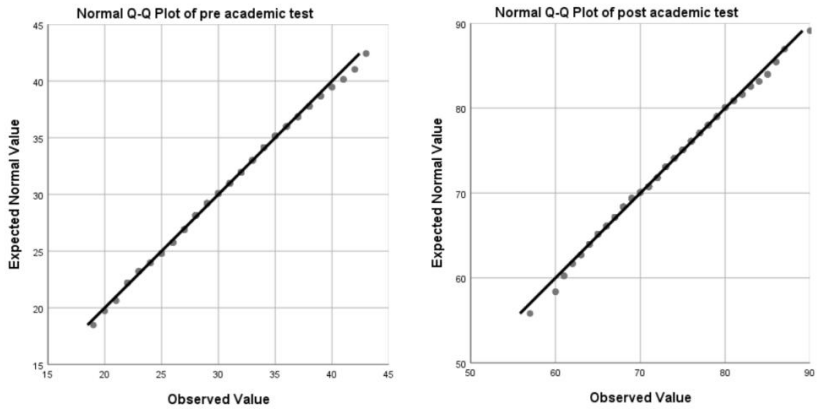


Figure 4.1: Normal (Q-Q) Plots for Control Group

Similarly, Figure 4.2 presents the Q-Q plot for the experimental group. As with Figure 4.1, the data points in Figure 4.2 lie near the reference line, indicating that the pre-intervention and post-intervention scores for the experimental group also follow a normal distribution. The consistency of the data distribution for both groups supports the appropriateness of using parametric tests to analyze the data.



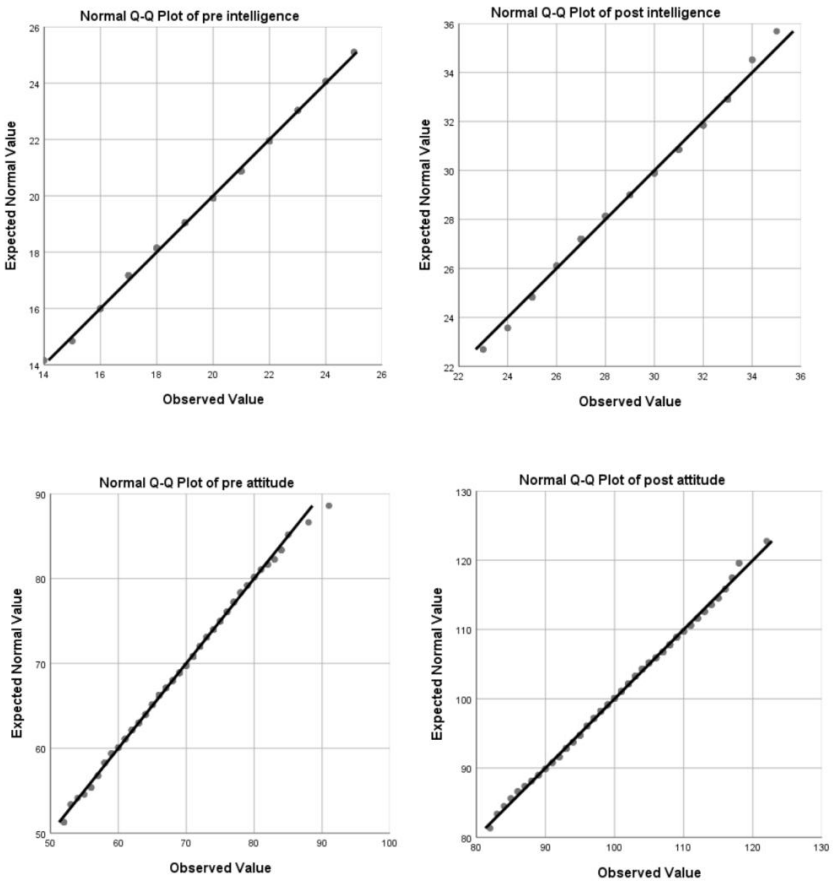


Figure 4.2: Normal (Q-Q) Plots for Experimental Group

Together, Figures 4.1 and 4.2 confirm that both the control and experimental groups exhibit normal distributions in their scores, justifying the use of parametric statistical methods for further analysis in the study.

4.2.2.2 Pre-Intervention Performance

Before the intervention, the baseline performance of students in both the experimental (flipped classroom) and control (traditional classroom) groups was assessed using academic achievement tests, intelligence tests, and attitude tests. These pre-intervention assessments provide a benchmark for evaluating the impact of the instructional methods.

In Table 4.1, the academic achievement test scores indicate that the mean score for the experimental group was 30.82 with a standard deviation of 5.75, while the control group had a mean score of 30.68 with a standard deviation of 4.08. The minimum and maximum scores for the experimental group were 19 and 43, respectively, and for the control group were 17 and 45, suggesting similar baseline academic performance.

Table 4.1: Academic Achievement Test Scores

S/N	Group	M	SD	Minimum	Maximum
1	Experimental Group	30.82	5.75	19	43
2	Control Group	30.68	4.08	17	45

In Table 4.2, for successful intelligence scores, the mean score for the experimental group was 19.84 with a standard deviation of 2.194. The control group had a mean score of 19.88 with a standard deviation of 2.029. The minimum and maximum scores for both groups were comparable, suggesting similar baseline levels of successful intelligence between the two groups.

Table 4.2: Successful Intelligence Scores

S/N	Group	M	SD	Minimum	Maximum
1	Experimental Group	19.84	2.19	14	25
2	Control Group	19.88	2.03	14	26

In Table 4.3, the learning attitude scores revealed that the experimental group had a mean score of 68.95 with a standard deviation of 8.97. The control group had a mean score of 69.03 with a standard deviation of 6.42. The scores ranged similarly in both groups, indicating comparable attitudes towards learning prior to the intervention.

Table 4.3: Learning Attitude Scores

S/N	Group	M	SD	Minimum	Maximum
1	Experimental Group	68.95	8.97	52	91
2	Control Group	69.03	6.42	49	86

The pre-intervention performance data indicate that both the experimental and control groups had similar baseline scores across academic achievement, successful intelligence, and learning attitude. The close alignment of means and standard deviations suggests that any differences observed post-intervention can be attributed more confidently to the instructional methods rather than pre-existing differences between the groups.

These baseline assessments are critical for establishing the initial equivalence of the groups, ensuring that any observed changes in learning performance can be linked to the impact of the flipped classroom versus the traditional classroom model. This equivalence also helps mitigate potential biases and strengthens the validity of the study's findings.

4.2.3 Differences in Learning Performance Based on Flipped Classroom Model

4.2.3.1 Academic Achievement Test Scores

A paired t-test was conducted to evaluate the difference in academic achievement test scores before and after the implementation of the flipped classroom model. The analysis revealed a significant increase in academic achievement following the intervention.

In Table 4.4, the mean pre-test score for the experimental group was 30.82 (SD = 4.08), and the mean post-test score was 72.47 (SD = 5.51), resulting in a mean difference of -41.64. The t-value was -161.87, with 499 degrees of freedom, and the p-value was 0.000, indicating that the increase in academic achievement was statistically significant

Table 4.4: Paired *T*-Test Results of Academic Achievement Test Scores for Experimental Group

Paired Differences	M	*N*	*SD*	SEM	95% CI of the Difference		t	df	p
					Lower	Upper			
Pre-academic test	30.82	500	4.083	0.183	-	-	-	-	-
Post-academic test	72.47	500	5.507	0.246	-	-	-	-	-
pre academic test-post academic test	-41.642	1000	5.753	0.257	-42.147	-41.137	-161.866	499	0.000

The results of the paired t-test provide strong evidence that the flipped classroom model significantly improved academic achievement test scores. With a t-value of -161.87 and a p-value less than 0.05, we accept H1, confirming that there was a significant improvement in the academic achievement test scores before and after the implementation of the flipped classroom model. These findings highlight the effects of the flipped classroom approach in enhancing students' academic performance in management courses.

4.2.3.2 Successful Intelligence Scores

A paired t-test was conducted to evaluate the difference in successful intelligence scores before and after the implementation of the flipped classroom model. The analysis revealed a significant increase in successful intelligence following the intervention.

In Table 4.5, the mean pre-test score for the experimental group was 19.84 (SD = 2.00), and the mean post-test score was 28.98 (SD = 2.22), resulting in a mean difference of -9.15. The t-value was -86.05, with 499 degrees of freedom, and the p-value was 0.000, indicating that the increase in successful intelligence scores was statistically significant.

Table 4.5: Paired *T*-Test Results of Successful Intelligence Scores for Experimental Group

Paired Differences	M	*N*	*SD*	SEM	95% CI of the Difference		t	df	p
					Lower	Upper			
Pre-intelligence	19.84	500	2.000	0.089	-	-	-	-	-
Post-intelligence	28.98	500	2.215	0.099	-	-	-	-	-
Pre-intelligence-post intelligence	-9.146	1000	2.377	0.106	-9.355	-8.937	-86.054	499	0.000

The results of the paired t-test indicate a significant improvement in successful intelligence scores following the flipped classroom model. With a t-value of -86.05 and a p-value less than 0.05, we accept H2, confirming that there was a significant improvement in successful intelligence scores before and after the implementation of the flipped classroom model. These findings suggest that the flipped classroom model effectively enhances students' successful intelligence, which encompasses analytical, creative, and practical intelligence.

4.2.3.3 Learning Attitude Scores

A paired t-test was conducted to assess the differences in learning attitude scores before and after the implementation of the flipped classroom model. The results revealed a significant change in the students' learning attitude following the intervention.

In table 4.6, the mean pre-test score for the experimental group was 68.95 (SD = 6.49), and the mean post-test score was 102.04 (SD = 6.86), resulting in a mean difference of -33.09. The t-value was -83.12, with 499 degrees of freedom, and the p-value was 0.000, indicating that the change in learning attitude scores was statistically significant.

Table 4.6: Paired *T*-Test Results of Learning Attitude Scores for Experimental Group

Paired Differences	M	*N*	*SD*	SEM	95% CI of the Difference		t	df	p
					Lower	Upper			
Pre-attitude	68.95	500	6.490	0.290	-	-	-	-	-
Post-attitude	102.04	500	6.855	0.307	-	-	-	-	-
Pre-attitude-post attitude	-33.092	1000	8.902	0.398	-33.874	-32.310	-83.123	499	0.000

The results indicate a significant increase in learning attitude scores following the flipped classroom model. The mean difference of -33.09, with a t-value of -83.12 and a p-value less than 0.05, suggests that the flipped classroom model significantly influenced students' attitudes towards learning. Therefore, we accept H3, concluding that the flipped classroom model has a positive impact on students' learning attitudes, reinforcing its effects as an instructional approach.

4.2.4 Comparative Analysis of Traditional and Flipped Classroom Model

4.2.4.1 Academic Achievement Test Scores

To evaluate the effects of the traditional classroom model versus the flipped classroom model on academic achievement test scores, a two independent sample t-test was conducted. This test compared the mean academic achievement scores of the control group (traditional classroom model) and the experimental group (flipped classroom model) before and after the interventions.

Table 4.7: Two Independent Sample *T*-Test Results of Academic Achievement Test Scores

Independent Samples Test	Class	Levene's Test for Equality of Variances	N	M	SD	t	df	Sig.(2-tailed)
pretest	control group	F = 0.023 Sig. = 0.879	500	30.68	4.080	-0.573	998	0.567
	experimental group		500	30.82	4.083	-0.573	997.999	0.567

Table 4.7 continued - Two Independent Sample *T*-Test Results of Academic Achievement Test Scores

Independent Samples Test	Class	Levene's Test for Equality of Variances	N	M	SD	t	df	Sig.(2-tailed)
posttest	control group	F = 0.01 Sig. = 0.978	500	61.67	5.352	-31.422	998	0.000
	experimental group		500	72.47	5.507	-31.422	997.190	0.000

The results of the independent samples t-test for the pre-test revealed no significant difference in the academic achievement test scores between the control and experimental groups. As is shown in Table 4.7, the t-value of -0.573 and a p-value of 0.567 indicate that the mean score differences between the two groups were not statistically significant before the intervention.

However, in the post-test, the difference between the groups was significant. The t-value of -31.42 and the p-value of 0.000 indicate a statistically significant difference in the mean post-test scores. The mean score for the experimental group was 72.47, compared to 61.67 for the control group, resulting in a mean difference of 10.79, with a 95% confidence interval ranging from -11.47 to -10.12.

This finding suggests that the flipped classroom model led to a significantly greater improvement in academic achievement test scores compared to the traditional classroom model, leading to the acceptance of H4. Therefore, the flipped classroom model is more effective in enhancing students' academic performance in this study.

4.2.4.2 Successful Intelligence Scores

To assess the effects of the traditional classroom model versus the flipped classroom model on successful intelligence scores, a two independent sample t-test was conducted. This analysis compared the mean successful intelligence scores of the control

group (traditional classroom model) and the experimental group (flipped classroom model) before and after the interventions.

Table 4.8: Two Independent Sample *T*-Test Results of Successful Intelligence Scores

Independent Samples Test	Class	Levene's Test for Equality of Variances	N	M	SD	t	df	Sig.(2-tailed)
preintelligence	control group	F = 0.003 Sig. = 0.957	500	19.88	2.029	0.345	998	0.730
	experimental group		500	19.84	2.000	0.345	997.794	0.730
postintelligence	control group	F = 11.352 Sig. = 0.001	500	19.81	1.968	-69.233	998	0.000
	experimental group		500	28.98	2.215	-69.233	984.400	0.000

The results from the independent samples t-test for the pre-test revealed no significant difference in successful intelligence scores between the control and experimental groups. As is shown in table 4.8, the t-value of 0.345 and a p-value of 0.730 indicate that the difference in the pre-test scores was not statistically significant.

However, the post-test results showed a significant difference. The t-value of -69.23 and a p-value of 0.000 indicate a statistically significant difference in the mean post-test scores between the two groups. The mean score for the experimental group was 28.98, compared to 19.81 for the control group, resulting in a mean difference of 9.17, with a 95% confidence interval ranging from -9.44 to -8.91.

This finding suggests that the flipped classroom model had a significantly greater impact on successful intelligence scores compared to the traditional classroom model, leading to the acceptance of H5. This demonstrates the effects of flipped classroom teaching in enhancing students' successful intelligence.

4.2.4.3 Learning Attitude Scores

To examine the effects of the traditional classroom model versus the flipped classroom model on learning attitude scores, a two independent sample t-test was conducted. This analysis compared the mean learning attitude scores of the control group (traditional classroom model) and the experimental group (flipped classroom model) before and after the interventions.

Table 4.9: Two Independent Sample *T*-Test Results of Learning Attitude Scores

Independent Samples Test	Class	Levene's Test for Equality of Variances	N	M	SD	t	df	Sig.(2-tailed)
preattitude	control group	F = 0.021 Sig. = 0.885	500	69.03	6.415	0.211	998	0.833
	experimental group		500	68.95	6.490	0.211	997.866	0.833
postattitude	control group	F = 883 Sig. = 348	500	68.64	6.491	-79.113	998	0.000
	experimental group		500	102.04	6.855	-79.113	995.037	0.000

The pre-test analysis revealed no significant difference between the control and experimental groups. As is shown in table 4.8, the t-value of 0.211 and a p-value of 0.833 suggest that the difference in pre-test scores was not statistically significant.

However, the post-test analysis showed a significant difference in learning attitude scores between the two groups. The t-value of -79.11 and a p-value of 0.000 indicate a statistically significant difference in the mean post-test scores. The mean score for the experimental group was 102.04, compared to 68.64 for the control group, resulting in a mean difference of 33.40, with a 95% confidence interval ranging from -34.23 to -32.57.

This result suggests that the flipped classroom model had a significantly greater impact on students' learning attitudes compared to the traditional classroom model, leading

to the acceptance of H6. This highlights the effects of flipped classroom teaching in fostering more positive learning attitudes.

4.2.5 Moderating Role of Cognitive Style

4.2.5.1 Hypothesis Validation for Hierarchical Regression

Prior to conducting hierarchical regression analysis, three critical assumptions were systematically verified to ensure the statistical appropriateness of the analytical approach: (a) linearity between predictors and outcomes, (b) independence and homoscedasticity of error terms, and (c) normality of residual distributions. This sequential diagnostic protocol followed established methodological guidelines (Cohen et al., 2003) to safeguard the validity of subsequent moderation analyses.

ⅰ. Linearity Assumption

The linear relationship between predictors and response variables was assessed through residual-versus-fitted plots generated using R software (version 4.2.1). For the control group, diagnostic plots were constructed for academic achievement (Figure 4.3), successful intelligence (Figure 4.4), and learning attitude (Figure 4.5). Corresponding experimental group analyses produced parallel visualizations (Figures 4.6-4.8).

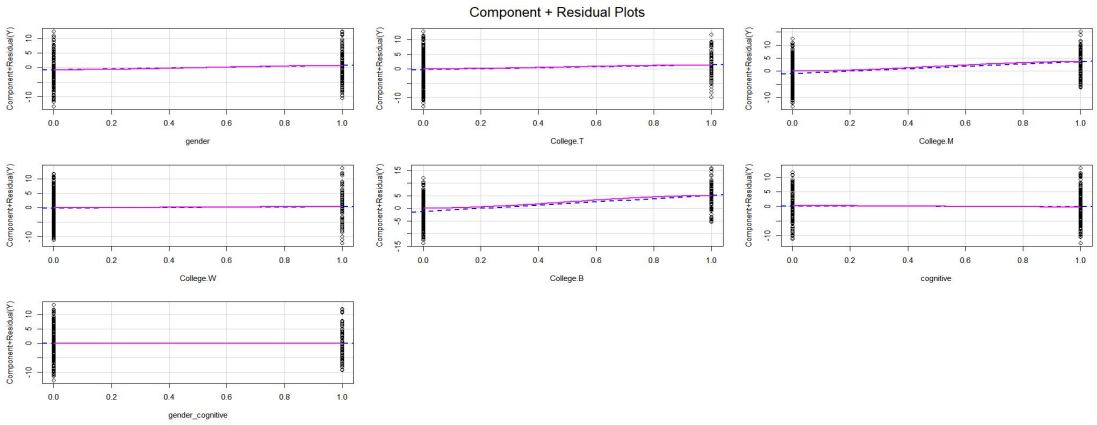


Figure 4.3: Linearity Diagnostic Plot for Academic Achievement Test (Control Group)

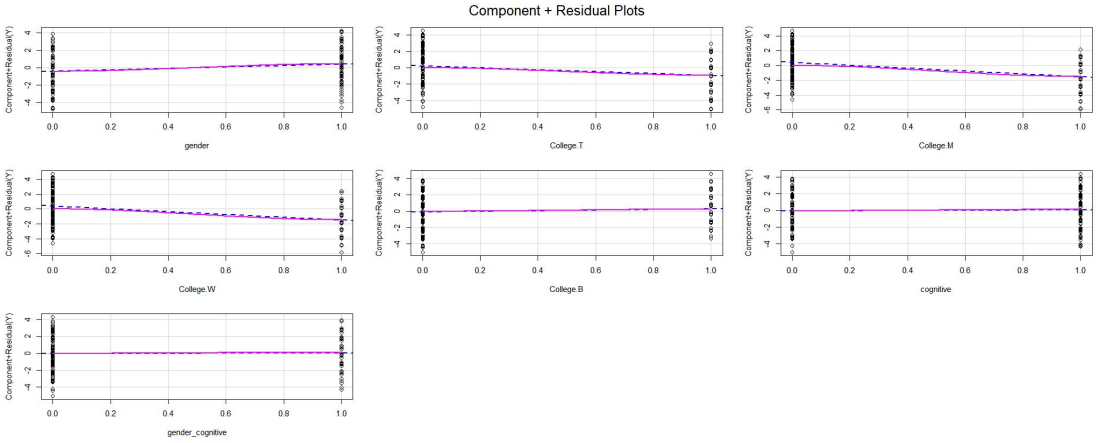


Figure 4.4: Linearity Diagnostic Plot for Successful Intelligence (Control Group)

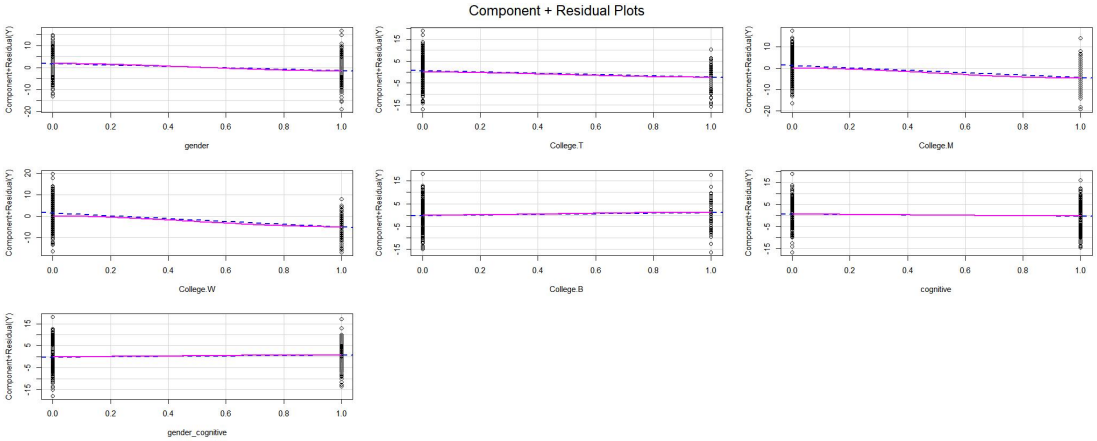


Figure 4.5: Linearity Diagnostic Plot for Learning Attitude (Control Group)

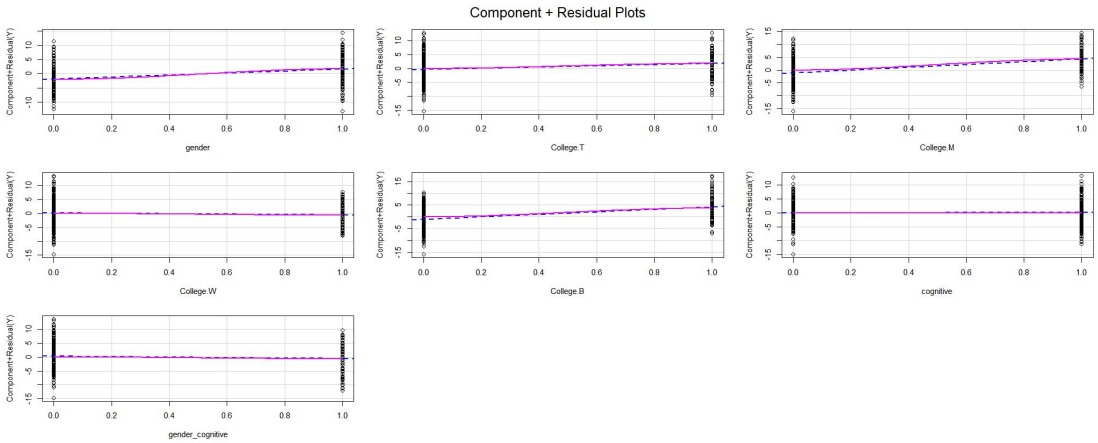


Figure 4.6: Linearity Diagnostic Plot for Academic Achievement (Experimental Group)

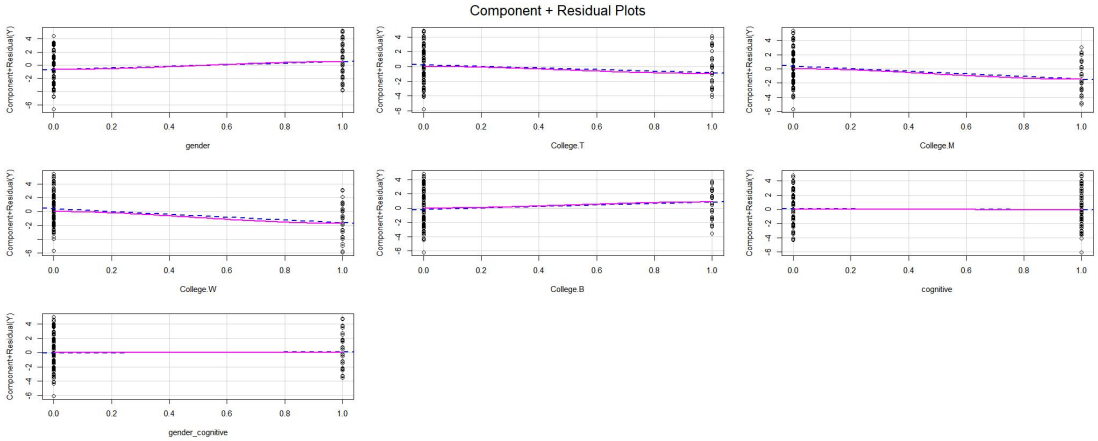


Figure 4.7: Linearity Diagnostic Plot for Successful Intelligence (Experimental Group)

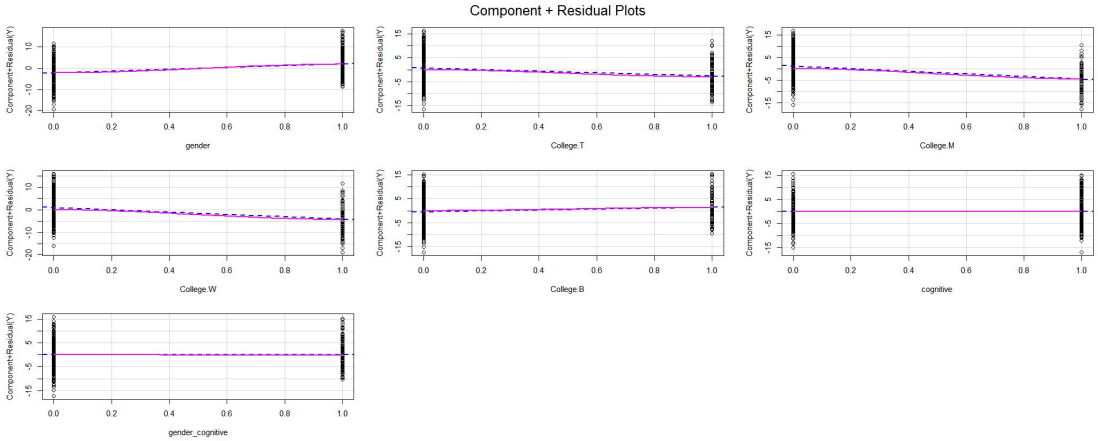


Figure 4.8: Linearity Diagnostic Plot for Learning Attitude (Experimental Group)

Visual inspection by independent raters revealed random dispersion of residuals around the zero-line across all six conditions (Figures 4.3-4.8),the linear trendlines adequately captured the underlying relationships. These graphical findings collectively satisfied the linearity requirement for hierarchical regression modeling.

ⅱ. independence and homoscedasticity of error terms

The Durbin-Watson test statistics across all conditions (Table 4.10) demonstrated values approximating 2, ranging from 1.987 (control group academic achievement) to

2.098 (experimental group learning attitude), confirming error term independence. Breusch-Pagan tests yielded non-significant results for all models (all $p > .05$), as detailed in Table 4.10, thereby validating homoscedasticity assumptions.

Table 4.10: Results of Durbin-Watson and Breusch-Pagan Tests for Error Term Assumptions by Group and Outcome Variable

Condition /Testing Method	Durbin-Watson test	Breusch-Pagan test
Control group,academic achievement	1.987	0.327
Control group,successful intelligence	2.028	0.552
Control group,learning attitude	2.045	0.221
Experimental group,academic achievement	2.081	0.641
Experimental group,successful intelligence	2.028	0.669
Experimental group, learning attitude	2.098	0.729

Notably, the experimental group's academic achievement model (BP = 0.641) and control group's successful intelligence analysis (BP = 0.552) both exhibited variance stability within acceptable thresholds. These quantitative outcomes corroborate the linearity diagnostics in Figures 4.3-4.8.

ⅲ. Normality of Error Terms

Normal quantile-quantile (Q-Q) plots were systematically evaluated across experimental conditions (Figure 4.9). The control group residuals (top row) and experimental group residuals (bottom row) for academic achievement, successful intelligence, and learning attitude all adhered closely to diagonal reference lines.

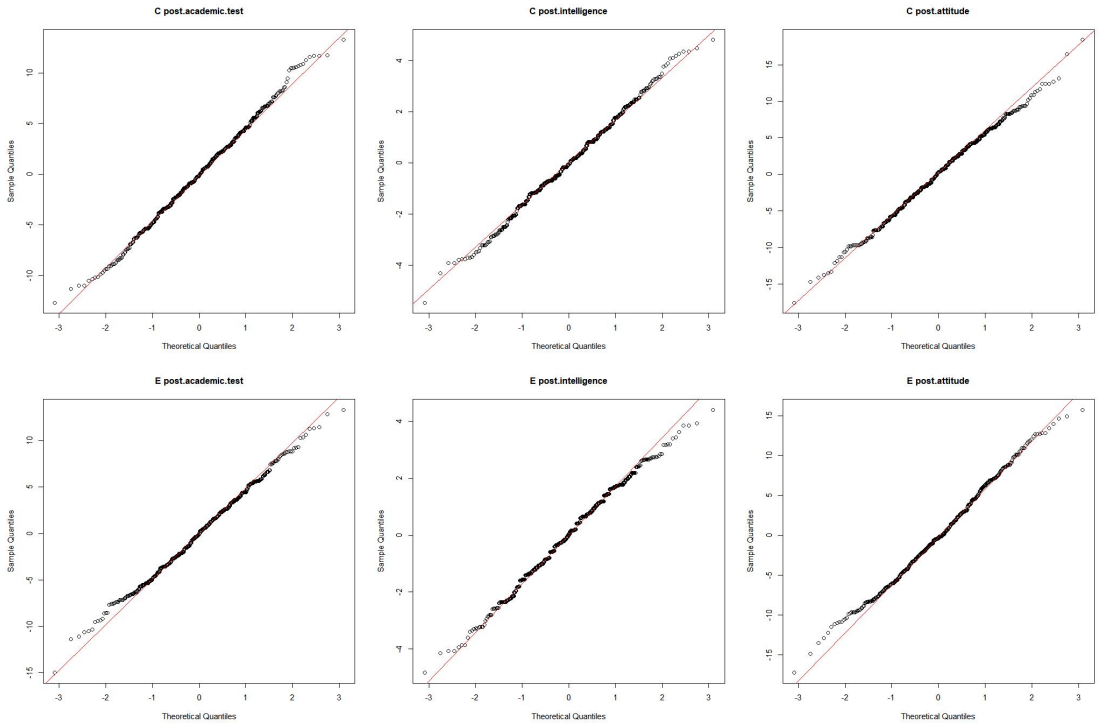


Figure 4.9: Normal Q-Q Plots of Model Residuals for Normality Assessment

As evidenced in Figure 4.9, the experimental group's learning attitude residuals (bottom-right panel) maintained distribution patterns comparable to the control group's academic achievement residuals (top-left panel). This graphical evidence substantiates the normality assumption required for hierarchical regression analysis.

4.2.3.5 Traditional Classroom Model

This study aimed to test whether cognitive style moderates the relationship between demographic variables (college and gender) and learning performance (academic achievement, successful intelligence, learning attitudes) in the traditional classroom model.

A hierarchical regression analysis was conducted in three steps:

Model 1: Learning Performance = $\beta 0 + \beta 1(\text{College}) + \beta 2(\text{Gender}) + \varepsilon$

Model 2: Learning Performance = β0 + β1(College) + β2(Gender) + β3(Cognitive Style) + ε

Model 3: Learning Performance = β0 + β1(College) + β2(Gender) + β3(Cognitive Style) + β4(GenderCognitive Style) + ε

The analysis aimed to assess whether the inclusion of cognitive style as a predictor and as an interaction term would yield significant results in predicting academic achievement. As shown in Table 4.10, the ANOVA results indicated that all three models were statistically significant:

Model 1: The regression model for college and gender as predictors was significant, $F(5,494)=29.272$, $p<.001$.

Model 2: The inclusion of cognitive style did not significantly improve the model, with $\Delta F(1,493)=0.102, p=.750$, indicating that cognitive style was not a significant predictor.

Model 3: The addition of interaction terms did not lead to a significant improvement in the model ($\Delta F(5,488)=0.609, p=.693$), suggesting that the interactions between cognitive style and demographic variables were not significant.

Table 4.11: ANOVA Paradigm of Academic Achievement Test Scores for Control Group

Model		Sum of model squares	df	Mean square	F	Sig.
1[b]	Regression	3267.432	5	653.486	29.272	0.000
	Residual	11028.430	494	22.325	—	—
	Total	14295.862	499	—	—	—
2[c]	Regression	3269.704	6	544.951	24.366	0.000
	Residual	11026.158	493	22.365	—	—
	Total	14295.862	499	—	—	—

Table 4.11 continued - ANOVA Paradigm of Academic Achievement Test Scores for Control Group

Model		Sum of model squares	df	Mean square	F	Sig.
3[d]	Regression	3338.052	11	303.459	13.514	0.000
	Residual	10957.810	488	22.455	—	—
	Total	14295.862	499	—	—	—

Note: a. Dependent variable: Post academic test.
b. Predictors: (constant), college E, gender, college M, college B andcollege W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors:(constant), college E, gender, college M, college B, college W， cognitive， gender*cognitive.

Table 4.11 presents the hierarchical regression results.

Model 1: College and gender were significant predictors of academic achievement, explaining 22.9% of the variance in scores (R^2 =.229).

Model 2: Which added cognitive style, resulted in no significant change in R^2 (ΔR^2=0.000), and cognitive style was not a significant predictor (b=−0.140,p=.750).

Model 3: which included the interaction terms between cognitive style and demographic variables, showed a slight increase in R^2 to 0.233, but this increase was not statistically significant (p=.693).

Table 4.12: Hierarchical Regression Results of Academic Achievement Test Scores for Control Group

Model	R	R quare	Adjusted Rsquare	Std. error of the estimate	R square change	F hange	df1	df2	Sig. F change
1[a]	0.478	0.229	0.221	4.725	0.229	29.272	5	494	0.000
2[b]	0.478	0.229	0.219	4.729	0.000	0.102	1	493	0.750
3[c]	0.483	0.233	0.216	4.739	0.005	0.609	5	488	0.693

Note: a. Dependent variable: Post attitude.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant),college E, gender, college M, college B, college W, cognitive and gender*cognitive.

As shown in Table 4.12, the coefficients for academic achievement reveal that demographic variables were significant predictors, but cognitive style and its interactions were not.

Model 1: Gender was a significant predictor (b=1.521,p<.001), with male students performing significantly better than female students. College was also a significant predictor of performance, with students from colleges M (b=2.910,p<.001) and B (b=4.705,p<.001) performing better than students from the reference college T.

Model 2: Cognitive style was not a significant predictor of academic achievement .

Model 3: The interaction terms between cognitive style and demographic variables were also not significant. For example, the interaction between gender and cognitive style (b=0.136,p=.877) and College M * Cognitive style (b=−1.138,p=.416) were not significant.

The results of the hierarchical regression analysis suggest that cognitive style does not moderate the relationship between demographic variables and academic achievement in the traditional classroom model. Therefore, While gender and college were significant predictors of academic achievement, cognitive style and its interactions with gender and college did not contribute significantly to the prediction of academic achievement. In summary, cognitive style does not play a moderating role in this context.

Table 4.13: Coefficients of Academic Achievement Test Scores for Control Group

	Model	Unstandardized Beta	Coefficients std. error	Standardized coefficients Beta	t	Sig
1	(Constant)	59.883	0.527	—	113.676	0.000
	Gender	1.521	0.424	0.142	3.591	0.000
	College M	2.910	0.668	0.218	4.355	0.000

Table 4.13 continued - Coefficients of Academic Achievement Test Scores for Control Group

	Model	Unstandardized B	Coefficients std. error	Standardized coefficients Beta	t	Sig
	College W	-1.094	0.668	-0.082	-1.637	0.102
	College B	4.705	0.668	0.352	7.041	0.000
	College E	-1.584	0.669	-0.118	-2.369	0.018
2	(Constant)	59.971	0.595	—	100.806	0.000
	Gender	1.524	0.424	0.142	3.594	0.000
	College M	2.910	0.669	0.218	4.351	0.000
	College W	-1.108	0.670	-0.083	-1.653	0.099
	College B	4.711	0.669	0.352	7.041	0.000
	College E	-1.588	0.669	-0.119	-2.373	0.018
	Cognitive	-0.140	0.438	-0.013	-0.319	0.750
3	(Constant)	59.621	0.870	—	68.511	0.000
	Gender	1.402	0.693	0.131	2.024	0.043
	College M	3.639	1.117	0.272	3.258	0.001
	College W	-1.305	1.056	-0.098	-1.236	0.217
	College B	5.609	1.152	0.420	4.868	0.000
	College E	-0.766	1.096	-0.057	-0.699	0.485
	Cognitive	-0.435	1.096	0.039	0.397	0.691
	Gender*cognitive	0.136	0.878	0.012	0.155	0.877
	College M*cognitive	-1.138	1.396	-0.071	-0.815	0.416
	College W*cognitive	0.476	1.372	0.028	0.347	0.729
	College B*cognitive	-1.354	1.417	-0.087	-0.955	0.340
	College E*cognitive	-1.319	1.386	-0.081	-0.952	0.342

Note: a. Dependent variable: Post academic test.

This study employed hierarchical regression analysis to explore the role of cognitive style in mediating the relationship between demographic characteristics (gender, college) and successful intelligence scores. Three models were tested in sequential steps:

Model 1: Predicting successful intelligence using only demographic variables (gender and college).

Model 2: Adding cognitive style as a predictor.

Model 3: Including interaction terms between cognitive style and demographic variables.

As shown in Table 4.13, all three regression models were significant:

Model 1: Demographic variables (gender and college) were found to significantly predict successful intelligence scores, $F(5,494)=39.309,p<.001)=39.309,p<.001$, explaining 28.5% of the variance in scores.

Model 2: The addition of cognitive style did not significantly improve model fit ($\Delta F(1,493)=1.437,p=.231$), with no meaningful increase in R^2.

Model 3: The introduction of interaction terms also did not result in a statistically significant improvement in the model ($\Delta F(5,488)=1.907,p=.092$).

Table 4.14: ANOVA Paradigm of Successful Intelligence Scores for Control Group

Model		Sum of model squares	df	Mean square	F	Sig.
1[b]	Regression	550.160	5	110.032	39.309	0.000
	Residual	1382.790	494	2.799	—	—
	Total	1932.950	499	—	—	—
2[c]	Regression	554.179	6	92.363	33.026	0.000
	Residual	1378.771	493	2.797	—	—
	Total	1932.950	499	—	—	—
3[d]	Regression	580.604	11	52.782	19.047	0.000
	Residual	1352.346	488	2.771	—	—
	Total	1932.950	499	—	—	—

Note: a. Dependent variable: Post intelligence.
b. Predictors: (constant), college E, gender, college M, college B, college W.
c. Predictors: (constant), college E, gender, college M, college B, college and W, cognitive.
d. Predictors: (constant),college E, gender, college M, college B, college W, cognitive, gender*cognitive.

From the hierarchical regression results in Table 4.14, we observed the following:

Model 1 (demographics only): Gender and college were significant predictors of

successful intelligence scores. Male students performed better than female students, and students from colleges B and E outperformed those from the reference college (college T). Students from colleges M and W had lower scores.

Model 2 (including cognitive style): Cognitive style did not emerge as a significant predictor of successful intelligence scores, b=0.186, p=.231.

Model 3 (including interaction terms): The interactions between cognitive style and gender, as well as cognitive style and college, did not significantly predict successful intelligence scores.

Table 4.15: Hierarchical Regression Results of Successful Intelligence Scores for Control Group

Model	R	R square	Adjusted R square	Std. error ofthe estimate	R square hange	F change	df1	df2	Sig. F change
1[a]	0.533	0.285	0.277	1.673	0.285	39.309	5	494	0.000
2[b]	0.535	0.287	0.278	1.672	0.002	1.437	1	493	0.231
3[c]	0.548	0.300	0.285	1.665	0.014	1.907	5	488	0.092

Note: a. Dependent variable: Post attitude.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant),college E, gender, college M, college B, college W, cognitive and gender*cognitive.

As presented in Table 4.15, significant coefficients were as follows:

Model 1： Gender was a significant predictor (b=0.892,p<.001), with male students scoring higher. College-specific differences were also significant, with students from colleges B (b=1.489,p<.001) and E (b=1.135,p<.001) outperforming those from college T, while students from colleges M (b=−0.822,p=.001) and W (b=−0.753,p=.002) had lower scores.

Model 2: Cognitive style did not significantly contribute to the model, confirming the finding that it was not a meaningful predictor of successful intelligence.

Model 3: The interaction terms, including cognitive style with gender and with college, were not significant predictors of successful intelligence.

The hierarchical regression analysis results suggest that while demographic factors such as gender and college are significant predictors of successful intelligence, cognitive style and its interactions with these variables do not significantly contribute to explaining the variance in successful intelligence scores. The inclusion of cognitive style and interaction terms did not meaningfully enhance the model's predictive power, indicating that other factors may be more important in determining successful intelligence scores.

Table 4.16: Coefficients of Successful Intelligence Scores for Control Group

	Model	**Unstandardized B**	**Coefficients std. error**	**Standardized coefficients Beta**	**t**	**Sig**
1	(Constant)	19.130	0.187	—	102.553	0.000
	Gender	0.892	0.150	0.226	5.946	0.000
	College M	-0.822	0.237	-0.167	-3.475	0.001
	College W	-0.753	0.237	-0.153	-3.183	0.002
	College B	1.489	0.237	0.303	6.293	0.000
	College E	1.135	0.237	0.231	4.793	0.000
2	(Constant)	19.013	0.210	—	90.377	0.000
	Gender	0.888	0.150	0.225	5.921	0.000
	College M	-0.822	0.237	-0.167	-3.476	0.001
	College W	-0.735	0.237	-0.149	-3.100	0.002
	College B	1.481	0.237	0.301	6.262	0.000
	College E	1.140	0.237	0.232	4.817	0.000
	Cognitive	0.186	0.155	0.046	1.199	0.231
3	(Constant)	18.786	0.306	—	61.448	0.000
	Gender	0.827	0.243	0.210	3.397	0.001
	College M	-0.333	0.392	-0.068	-0.850	0.396
	College W	-0.163	0.371	-0.033	-0.440	0.660
	College B	1.817	0.405	0.370	4.489	0.000
	College E	0.991	0.385	0.202	2.574	0.010

Table 4.16 continued - Coefficients of Successful Intelligence Scores for Control Group

Model	Unstandardized B	Coefficients std. error	Standardized coefficients Beta	t	Sig
Cognitive	0.531	0.385	0.131	1.379	0.168
Gender*cognitive	0.110	0.308	0.026	0.357	0.721
College M*cognitive	-0.762	0.491	-0.130	-1.554	0.121
College W*cognitive	-0.988	0.482	-0.156	-2.050	0.041
College B*cognitive	-0.513	0.498	-0.089	-1.030	0.303
College E*cognitive	0.265	0.487	0.044	0.545	0.586

Note: a. Dependent variable: Post intelligence.

Hierarchical regression analysis was employed to assess the role of cognitive style in mediating the relationship between demographic characteristics (gender, college) and learning attitude scores. The analysis consisted of three models:

Model 1: Predicting learning attitude scores using demographic variables (gender, college).

Model 2: Adding cognitive style as a predictor.

Model 3: Including interaction terms between cognitive style and gender.

As detailed in Table 4.16, all three models were statistically significant:

Model 1: The demographic variables (gender and college) significantly predicted learning attitude scores, $F(5,494)=34.346, p<.001$, explaining 25.8% of the variance in the scores.

Model 2: The inclusion of cognitive style did not significantly improve the model fit ($\Delta F(1,493)=0.833, p=.362$), with a negligible increase in R^2.

Model 3: The addition of interaction terms did not yield a statistically significant improvement in model fit ($\Delta F(5,488)=0.427, p=.830$).

Table 4.17: ANOVA Paradigm of Learning Attitude Scores for Control Group

	Model	Sum of model squares	df	Mean square	F	Sig.
1[b]	Regression	5422.676	5	1084.535	34.346	0.000
	Residual	15598.802	494	31.577	—	—
	Total	21021.478	499	—	—	—
2[c]	Regression	5449.000	6	908.167	28.751	0.000
	Residual	15572.478	493	31.587	—	—
	Total	21021.478	499	—	—	—
3[d]	Regression	5516.894	11	501.536	15.786	0.000
	Residual	15504.584	488	31.772	—	—
	Total	21021.478	499	—	—	—

Note: a. Dependent variable: Post attitude.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant), college E, gender, college M, college B, college W, cognitive, gender*cognitive.

From the results in Table 4.17, we observed the following:

Model 1 (demographics only): Gender and college were significant predictors of learning attitude scores. Male students reported lower scores than female students ($b=-2.539, p<.001$). College M ($b=-2.581, p=.001$) and college W ($b=-3.406, p<.001$) students had lower scores, whereas students from college B ($b=4.375, p<.001$) and college E ($b=3.023, p<.001$) had higher scores compared to the reference group (college T).

Model 2 (including cognitive style): Cognitive style was not a significant predictor of learning attitude scores ($b=-0.476, p=.362$).

Model 3 (including interaction terms): The interaction terms between cognitive style and demographic characteristics (gender and college) did not significantly predict learning attitude scores.

Table 4.18: Hierarchical Regression Results of Learning Attitude Scores for Control Group

Model	R	R square	Adjusted R square	Std. error of the estimate	R square change	F change	df1	df2	Sig. F change
1[a]	0.508	0.258	0.250	5.619	0.258	34.346	5	494	0.000
2[b]	0.509	0.259	0.250	5.620	001	0.833	1	493	0.362
3[c]	0.512	0.262	0.246	5.637	0.003	0.427	5	488	0.830

Note: a. Dependent variable: Post attitude.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant),college E, gender, college M, college B, college W, cognitive and gender*cognitive.

As shown in Table 4.18, the following significant coefficients were noted:

Model 1: gender (b=−2.539,p<.001) and college M (b=−2.581,p=.001) and college W (b=−3.406,p<.001) were negative predictors of learning attitude, while college B (b=4.375,p<.001) and college E (b=3.023,p<.001) were positive predictors.

Model 2: Cognitive style was not a significant predictor of learning attitude (b=−0.476,p=.362).

Model 3: The interaction terms between cognitive style and gender, as well as cognitive style and college, were not significant predictors. Notably, the interaction terms involving gender (b=0.956,p=.360) and colleges (e.g., college Mcognitive b=−1.025,p=.537, college Wcognitive b=−0.882,p=.589) did not reach statistical significance.

The hierarchical regression analysis indicated that demographic factors (gender and college) were significant predictors of learning attitude scores, with male students having lower scores and students from specific colleges (M and W) also scoring lower. However, cognitive style and its interactions with demographic factors (gender and college) did not significantly predict learning attitude scores. The inclusion of cognitive style and

interaction terms did not result in a meaningful improvement in the model's predictive power.

Table 4.19: Coefficients of Learning Attitude Scores for Control Group

	Model	Unstandardized B	Coefficients std. error	Standardized coefficients Beta	t	Sig
1	(Constant)	69.697	0.627	—	111.246	0.000
	Gender	-2.539	0.504	-0.196	-5.041	0.000
	College M	-2.581	0.795	-0.159	-3.247	0.001
	College W	-3.406	0.795	-0.210	-4.285	0.000
	College B	4.375	0.795	0.270	5.505	0.000
	College E	3.023	0.795	0.186	3.802	0.000
2	(Constant)	69.996	0.707	—	99.003	0.000
	Gender	-2.530	0.504	-0.195	-5.020	0.000
	College M	-2.581	0.795	-0.159	-3.246	0.001
	College W	-3.453	0.797	-0.213	-4.335	0.000
	College B	4.394	0.795	0.271	5.526	0.000
	College E	3.009	0.795	0.186	3.783	0.000
	Cognitive	-.476	0.521	-0.036	-0.913	0.362
3	(Constant)	69.998	1.035	—	67.620	0.000
	Gender	-3.102	0.824	-0.239	-3.765	0.000
	College M	-1.917	1.329	-0.118	-1.443	0.150
	College W	-2.952	1.256	-0.182	-2.351	0.019
	College B	4.062	1.371	0.251	2.964	0.003
	College E	3.487	1.303	0.215	2.676	0.008
	Cognitive	-0.526	1.303	-0.039	-0.403	0.687
	Gender*cognitive	0.956	1.044	0.070	0.916	0.360
	College M*cognitive	-1.025	1.661	-0.053	-0.617	0.537
	College W*cognitive	-0.882	1.631	-0.042	-0.540	0.589
	College B*cognitive	0.496	1.686	0.026	0.294	0.769
	College E*cognitive	-0.755	1.648	-0.038	-0.458	0.647

Note: a. Dependent variable: Post attitude.

4.2.3.6 Flipped Classroom Model

Hierarchical regression analysis was conducted to examine whether cognitive style moderates the relationship between demographic factors (college and gender) and

academic achievement test scores in a flipped classroom model. The analysis aimed to determine whether including cognitive style as an interaction term with demographic factors significantly improves the prediction of learning performance.

The regression models were tested in three steps:

Model 1: Learning Performance = $\beta 0 + \beta 1(\text{College}) + \beta 2(\text{Gender}) + \varepsilon$

Model 2: Learning Performance = $\beta 0 + \beta 1(\text{College}) + \beta 2(\text{Gender}) + \beta 3(\text{Cognitive Style}) + \varepsilon$

Model 3: Learning Performance = $\beta 0 + \beta 1(\text{College}) + \beta 2(\text{Gender}) + \beta 3(\text{Cognitive Style}) + \beta 4(\textit{Gender}\text{Cognitive Style}) + \varepsilon$

As presented in Table 4.19, all three models were statistically significant:

Model 1: The inclusion of demographic variables (gender and college) significantly predicted academic achievement test scores, $F(5,494)=42.915, p<.001$, explaining 30.3% of the variance in the scores.

Model 2: The addition of cognitive style did not significantly improve the model fit ($\Delta F(1,493)=0.651, p=.420$), with a negligible change in R^2.

Model 3: Including the interaction terms between cognitive style and demographic factors did not result in a significant improvement in model fit ($\Delta F(5,488)=1.373, p=.233$).

Table 4.20: ANOVA Paradigm of Academic Achievement Test Scores for Experimental Group

Model		Sum of model squares	df	Mean square	F	Sig.
1[b]	Regression	4583.127	5	916.625	42.915	0.000
	Residual	10551.295	494	21.359	—	—
	Total	15134.422	499	—	—	—
2[c]	Regression	4597.034	6	766.172	35.846	0.000
	Residual	10537.388	493	21.374	—	—
	Total	15134.422	499	—	—	—
3[d]	Regression	4743.188	11	431.199	20.250	0.000
	Residual	10391.234	488	21.294	—	—
	Total	15134.422	499	—	—	—

Note: a. Dependent variable: Post academic test.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant), college E, gender, college M, college B, college W, cognitive, gender*cognitive.

From Table 4.20, the following results were observed:

Model 1 (demographics only): Gender and college were significant predictors of academic achievement test scores. Male students had significantly higher scores than female students (b=3.052,p<.001). Students from college M (b=3.321,p<.001) and college B (b=3.081,p<.001) scored higher, while students from college W (b=−2.958,p<.001) and college E (b=−2.127,p=.001) scored lower compared to the reference college (college T).

Model 2 (including cognitive style): Cognitive style was not a significant predictor of academic achievement test scores (b=−0.339,p=.420).

Model 3 (including interaction terms): The interaction terms between cognitive style and gender, and between cognitive style and college, did not significantly predict academic achievement test scores. Specifically, the interaction term between gender and cognitive style (b=−0.965,p=.256) and the interaction terms

with college (e.g., college M*cognitive b=−3.092,p=.022) were not consistently significant.

Table 4.21: Hierarchical Regression Results of Academic Achievement Test Scores for Experimental Group

Model	R	R square	Adjusted R square	Std. error of the estimate	R square change	F change	df1	df2	Sig. F change
1[a]	0.550	0.303	0.296	4.622	0.303	42.915	5	494	0.000
2[b]	0.551	0.304	0.295	4.623	0.001	.651	1	493	0.420
3[c]	0.560	0.313	0.298	4.614	0.010	1.373	5	488	0.233

Note: a. Dependent variable: Post attitude.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant),college E, gender, college M, college B, college W, cognitive and gender*cognitive.

As shown in Table 4.21, the following significant coefficients were noted:

Model 1: Gender (b=3.052,p<.001) and college M (b=3.321,p<.001) and college B (b=3.081,p<.001) were significant positive predictors of academic achievement. In contrast, students from college W (b=−2.958,p<.001) and college E (b=−2.127,p=.001) performed significantly worse than students from the reference group (college T).

Model 2: Cognitive style was not a significant predictor of academic achievement.

Model 3: The interaction terms did not yield significant results. Specifically, the interaction between cognitive style and gender was not significant (b=−0.965,p=.256), and the interactions between cognitive style and college (e.g., college M*cognitive b=−3.092,p=.022) were also not significant.

The hierarchical regression analysis indicated that demographic factors (gender and college) were significant predictors of academic achievement test scores. Male students

performed significantly better than female students, and students from colleges M and B outperformed students from college W and college E. However, cognitive style and its interaction with gender and college did not significantly predict academic achievement. The inclusion of cognitive style and interaction terms did not provide a meaningful improvement in the model's predictive power.

Table 4.22: Coefficients of Academic Achievement Test Scores for Experimental Group

	Model	Unstandardized B	Coefficients std. error	Standardized coefficients Beta	t	Sig
1	(Constant)	70.591	0.515	—	136.999	0.000
	Gender	3.052	0.414	0.277	7.367	0.000
	College M	3.321	0.654	0.241	5.081	000
	College W	-2.958	0.654	-0.215	-4.526	0.000
	College B	3.081	0.654	0.224	4.713	000
	College E	-2.127	0.654	-0.155	-3.253	0.001
2	(Constant)	70.801	0.577	—	122.647	0.000
	Gender	3.053	0.414	0.277	7.366	0.000
	College M	3.318	0.654	0.241	5.074	000
	College W	-2.986	0.655	-0.217	-4.559	000
	College B	3.060	0.654	0.222	4.677	000
	College E	-2.141	0.654	-0.156	-3.272	001
	Cognitive	-0.339	0.420	-0.030	-0.807	0.420
3	(Constant)	69.639	0.803	—	113.800	0.000
	Gender	3.572	0.650	0.324	5.496	000
	College M	5.167	1.055	0.376	4.899	0.000
	College W	-2.052	1.012	-0.149	-2.029	0.043
	College B	3.676	1.033	0.267	3.558	0.000
	College E	-1.102	1.033	-0.080	-1.066	0.287
	Cognitive	1.666	1.049	0.149	1.588	0.113
	Gender*cognitive	-0.965	0.849	-0.081	-1.136	0.256
	College M*cognitive	-3.092	1.345	-0.184	-2.300	0.022
	College W*cognitive	-1.528	1.327	-0.086	-1.151	0.250
	College B*cognitive	-1.116	1.342	-0.064	-0.832	0.406
	College E*cognitive	-1.742	1.335	-0.101	-1.305	0.192

Note: a. Dependent variable: Post academic test.

Hierarchical regression analysis was conducted to explore whether cognitive style moderates the relationship between demographic factors (gender and college) and successful intelligence scores. The analysis aimed to determine whether the inclusion of cognitive style as an interaction term with demographic variables would significantly predict successful intelligence scores.

The regression models were tested in three steps:

Model 1: Predicting successful intelligence scores using demographic variables.

Model 2: Adding cognitive style as an additional predictor.

Model 3: Including interaction terms between cognitive style and demographic variables.

As shown in Table 4.22, all three models were statistically significant:

Model 1: The inclusion of demographic variables (gender and college) significantly predicted successful intelligence scores, $F(5,494)=52.440, p<.001$, explaining 34.7% of the variance in the scores.

Model 2: The addition of cognitive style did not significantly improve the model fit ($\Delta F(1,493)=0.023, p=.880$), with a negligible change in R^2.

Model 3: Including the interaction terms between cognitive style and demographic variables also did not result in a significant improvement in model fit .

Table 4.23: ANOVA Paradigm of Successful Intelligence Scores for Experimental Group

	Model	Sum of model squares	df	Mean square	F	Sig.
1[b]	Regression	848.762	5	169.752	52.440	000
	Residual	1599.110	494	3.237	—	—
	Total	2447.872	499	—	—	—

Table 4.23 continued - ANOVA Paradigm of Successful Intelligence Scores for Experimental Group

	Model	Sum of model squares	df	Mean square	F	Sig.
2[c]	Regression	848.836	6	141.473	43.618	0.000
	Residual	1599.036	493	3.243	—	—
	Total	2447.872	499	—	—	—
3[d]	Regression	868.414	11	78.947	24.392	0.000
	Residual	1579.458	488	3.237	—	—
	Total	2447.872	499	—	—	—

Note: a. Dependent variable: Post intelligence.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant),college E, gender, college M, college B, college W, cognitive and gender*cognitive.

From Table 4.23, the following results were observed:

Model 1 (demographics only): Gender and college were significant predictors of successful intelligence scores. Male students had significantly higher scores than female students (b=1.269,p<.001). Students from college B (b=2.093,p<.001) and college E (b=1.073,p<.001) had significantly higher scores, while students from college M (b=−0.705,p=.006) and college W (b=−0.952,p<.001) had lower scores compared to the reference college (college T).

Model 2 (including cognitive style): Cognitive style was not a significant predictor of successful intelligence scores (b=−0.025,p=.880).

Model 3 (including interaction terms): The interaction terms did not significantly predict successful intelligence scores. Specifically, the interaction between gender and cognitive style (b=0.111,p=.737) and the interactions with college (e.g., college M*cognitive b=0.171,p=.744) were not significant.

Table 4.24: Hierarchical Regression Results of Successful Intelligence Scores for Experimental Group

Model	R	R square	Adjusted Rsquare	Std. error ofthe estimate	R square change	F change	df1	df2	Sig. F change
1[a]	0.589	0.347	0.340	1.799	0.347	52.440	5	0.494	0.000
2[b]	0.589	0.347	0.339	1.801	0.000	0.023	1	0.493	0.880
3[c]	0.596	0.355	0.340	1.799	0.008	1.210	5	0.488	0.303

Note: a. Dependent variable: Post attitude.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant),college E, gender, college M, college B, college W, cognitive and gender*cognitive.

As presented in Table 4.24, the following significant coefficients were noted:

Model 1: Gender (b=1.269,p<.001) and college B (b=2.093,p<.001) and college E (b=1.073,p<.001) were significant positive predictors of successful intelligence. In contrast, students from college M (b=−0.705,p=.006) and college W (b=−0.952,p<.001) scored significantly lower compared to students from the reference college (college T).

Model 2: Cognitive style was not a significant predictor of successful intelligence scores (b=−0.025,p=.880).

Model 3: The interaction terms did not yield significant results. Specifically, the interaction between cognitive style and gender was not significant (b=0.111,p=.737), and the interactions between cognitive style and college (e.g., college M*cognitive b=0.171,p=.744) were also not significant.

The hierarchical regression analysis indicated that demographic factors (gender and college) were significant predictors of successful intelligence scores. Male students performed significantly better than female students, and students from college B and

college E had higher successful intelligence scores compared to students from the reference college (college T). However, cognitive style and its interactions with gender and college did not significantly predict successful intelligence scores. The inclusion of cognitive style and interaction terms did not provide a meaningful improvement in the model's predictive power.

Table 4.25: Coefficients of Successful Intelligence Scores for Experimental Group

	Model	Unstandardized B	Coefficients std. error	Standardized coefficients Beta	t	Sig
1	(Constant)	28.012	0.201	—	139.646	0.000
	Gender	1.269	0.161	0.286	7.867	0.000
	College M	-0.705	0.254	-0.127	-2.769	0.006
	College W	-0.952	0.254	-0.172	-3.741	0.000
	College B	2.093	0.254	0.378	8.224	0.000
	College E	1.073	0.255	0.194	4.217	0.000
2	(Constant)	28.027	0.225	—	124.635	0.000
	Gender	1.269	0.161	0.286	7.860	0.000
	College M	-0.705	0.255	-127	-2.767	0.006
	College W	-0.954	0.255	-0.172	-3.740	0.000
	College B	2.091	0.255	0.378	8.204	0.000
	College E	1.072	0.255	0.194	4.207	0.000
	Cognitive	-0.025	0.164	-0.006	-0.151	0.880
3	(Constant)	28.236	0.313	—	90.186	0.000
	Gender	1.238	0.253	0.279	4.886	0.000
	College M	-0.806	0.411	-0.146	-1.960	0.051
	College W	-1.323	0.394	-0.239	-3.353	0.001
	College B	1.579	0.403	0.286	3.921	0.000
	College E	1.151	0.403	0.208	2.857	0.004
	Cognitive	-0.401	0.409	-0.089	-0.981	0.327
	Gender*cognitive	0.111	0.331	0.023	0.335	0.737
	College M*cognitive	0.171	0.524	0.025	0.326	0.744
	College W*cognitive	0.640	0.517	0.090	1.236	0.217
	College B*cognitive	0.901	0.523	0.128	1.722	0.086
	College E*cognitive	-0.149	0.520	-0.022	-0.286	0.775

Note: a. Dependent variable: Post intelligence.

Hierarchical regression analysis was conducted to examine whether cognitive style moderates the relationship between demographic factors (gender and college) and learning attitude scores. The purpose of the analysis was to explore if the inclusion of cognitive style as an interaction term with demographic variables would significantly predict learning attitude scores.

The regression models were tested in three steps:

Model 1: Predicting learning attitude scores using demographic variables (gender and college).

Model 2: Adding cognitive style as an additional predictor.

Model 3: Including interaction terms between cognitive style and demographic variables.

As shown in Table 4.25, all three models were statistically significant:

Model 1: The inclusion of demographic variables (gender and college) significantly predicted learning attitude scores, $F(5,494)=40.09, p<.001$, explaining 28.9% of the variance in the scores.

Model 2: The addition of cognitive style did not significantly improve the model fit ($\Delta F(1,493)=0.089, p=.766$), with a negligible change in R^2.

Model 3: Including the interaction terms between cognitive style and demographic variables also did not result in a significant improvement in model fit ($\Delta F(5,488)=1.370, p=.234$).

Table4.26: ANOVA Paradigm of Learning Attitude Scores for Experimental Group

	Model	Sum of model squares	df	Mean square	F	Sig.
1[b]	Regression	6767.706	5	1353.541	40.086	0.000
	Residual	16680.572	494	33.766	—	—
	Total	23448.278	499	—	—	—
2[c]	Regression	6770.703	6	1128.450	33.358	0.000
	Residual	16677.575	493	33.829	—	—
	Total	23448.278	499	—	—	—
3[d]	Regression	7001.584	11	636.508	18.886	0.000
	Residual	16446.694	488	33.702	—	—
	Total	23448.278	499	—	—	—

Note: a. Dependent variable: Post attitude.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant),college E, gender, college M, college B, college W, cognitive and gender*cognitive.

From Table 4.26, the following results were observed:

Model 1 (demographics only): Gender and college were significant predictors of learning attitude scores. Male students had significantly higher scores than female students (b=4.414,p<.001). Students from College B (b=5.244,p<.001) and College E (b=3.351,p<.001) had significantly higher scores, while students from College M (b=−2.282,p=.006) and College W (b=−1.888,p=.022) had lower scores compared to students from the reference college (College T).

Model 2 (including cognitive style): Cognitive style was not a significant predictor of learning attitude scores (b=0.157,p=0.766).

Model 3 (including interaction terms): The interaction terms did not significantly predict learning attitude scores. Specifically, the interaction between gender and cognitive style (b=−0.030,p=0.978) and the interactions with college (e.g., College M * Cognitive: b=1.697,p=0.316 were not significant.

Table 4.27: Hierarchical Regression of Learning Attitude Scores for Experimental Group

Model	R	R square	Adjusted R square	Std. error of the estimate	R square change	F change	df1	df2	Sig. F change
1[a]	0.537	0.289	0.281	5.811	0.289	40.086	5	494	0.000
2[b]	0.537	0.289	0.280	5.816	0.000	0.089	1	493	0.766
3[c]	0.546	0.299	0.283	5.805	0.010	1.370	5	488	0.234

Note: a. Dependent variable: Post attitude.
b. Predictors: (constant), college E, gender, college M, college B and college W.
c. Predictors: (constant), college E, gender, college M, college B, college W and cognitive.
d. Predictors: (constant),college E, gender, college M, college B, college W, cognitive and gender*cognitive.

As presented in Table 4.27, the following significant coefficients were noted:

Model 1: Gender (b=4.414,p<.001) and College B (b=5.244,p<.001) and College E (b=3.351,p<.001) were significant positive predictors of learning attitude. In contrast, students from College M (b=−2.282,p=.006) and College W (b=−1.888,p=.022) scored significantly lower compared to students from the reference college (College T).

Model 2: Cognitive style was not a significant predictor of learning attitude scores (b=0.157,p=0.766).

Model 3: The interaction terms did not yield significant results. Specifically, the interaction between cognitive style and gender was not significant (b=−0.030,p=0.978), and the interactions between cognitive style and college (e.g., College M * Cognitive: b=1.697,p=0.316) were also not significant.

The hierarchical regression analysis indicated that demographic factors (gender and college) were significant predictors of learning attitude scores. Male students had significantly higher learning attitude scores than female students, and students from College B and College E exhibited higher learning attitude scores compared to students

from the reference college (College T). However, cognitive style and its interactions with gender and college did not significantly predict learning attitude scores. The inclusion of cognitive style and interaction terms did not contribute meaningfully to the model's predictive power.

Table 4.28: Coefficients of Learning Attitude Scores for Experimental Group

	Model	Unstandardized B	Coefficients std. error	Standardized coefficients Beta	t	Sig
1	(Constant)	98.822	0.648	—	152.535	0.000
	Gender	4.414	0.521	0.322	8.474	0.000
	College M	-2.282	0.822	-0.133	-2.776	006
	College W	-1.888	0.822	-0.110	-2.297	0.022
	College B	5.244	0.822	0.306	6.381	000
	College E	3.351	0.822	0.196	4.075	0.000
2	(Constant)	98.725	0.726	—	135.940	000
	Gender	4.414	521	322	8.466	0.000
	College M	-2.280	0.823	-0.133	-2.772	006
	College W	-1.875	0.824	-0.110	-2.276	0.023
	College B	5.254	0.823	0.307	6.382	000
	College E	3.357	823	196	4.078	000
	Cognitive	0.157	0.528	0.011	298	766
3	(Constant)	98.931	1.010	—	97.923	0.000
	Gender	4.508	0.818	0.329	5.514	000
	College M	-3.320	1.327	-0.194	-2.502	0.013
	College W	-2.510	1.273	-0.147	-1.973	0.049
	College B	4.473	1.300	0.261	3.441	0.001
	College E	4.566	1.300	0.267	3.512	0.000
	Cognitive	-0.240	1.320	-0.017	-0.182	0.856
	Gender*cognitive	-0.030	1.068	-0.002	-0.028	0.978
	College M*cognitive	1.697	1.692	0.081	1.003	0.316
	College W*cognitive	1.119	1.670	0.051	0.670	0.503
	College B*cognitive	1.346	1.689	0.062	0.797	0.426
	College E*cognitive	-2.107	1.679	0.099	-1.255	0.210

Note: a. Dependent variable: Post attitude.

4.3 Qualitative Finding

4.3.1 Theoretical Anchoring and Methodological Rigor

The qualitative analysis was grounded in Sternberg's (2003) theory of successful intelligence and Vygotsky's (1978) social constructivism, providing a dual theoretical lens to interpret how the flipped classroom fostered cognitive and collaborative learning. Quantitative results showed a 41.642-point increase in academic achievement for the flipped group compared to 30.998 points for the traditional group ($p < 0.01$), a disparity explained through Vygotsky's concept of the Zone of Proximal Development (ZPD). Pre-class materials (e.g., instructional videos) served as scaffolds, enabling students to enter class with foundational knowledge, while in-class activities focused on higher-order tasks like case analysis and problem-solving. Teacher logs consistently noted that "students arrived prepared to engage in deeper discussions, asking questions that reflected prior engagement with pre-class content" (Teacher 5). This alignment between quantitative gains and qualitative observations underscores the flipped model's capacity to bridge individual cognition and social knowledge construction.

The qualitative inquiry examined two core questions: (1) how students and teachers perceived the flipped classroom's benefits and challenges (RQ9), and (2) how qualitative mechanisms explained the model's efficacy through theoretical lenses (RQ10). Aligning with Sternberg's (2003) successful intelligence and Vygotsky's (1978) social constructivism, the analysis prioritized three themes: engagement dynamics, successful intelligence development (analytical, creative, practical), and pedagogical adaptation .

To ensure reliability, two independent researchers coded 30% of the data, achieving Cohen's $\kappa = 0.83$ through iterative consensus discussions.Triangulation combined member

checking (20% participant validation) and negative case analysis (e.g., students who preferred lectures despite flipped model benefits), ensuring interpretive depth.

For instance, Student B-2-17-6 highlighted flipped learning's flexibility: "Reviewing videos before class let me focus on applying ideas during discussions"—a sentiment echoed by teachers observing heightened analytical engagement. Conversely, Student C-6-29-14 noted initial discomfort: "I struggled to adjust from passive listening to leading debates." These contrasts foreshadow the study's qualitative insights: the flipped model's success hinged on balancing pedagogical innovation with individualized support.

4.3.2 Engagement Dynamics and Cognitive Skill Development

The flipped classroom significantly enhanced student engagement, as evidenced by teacher observations and student feedback. Teachers reported a "noticeable shift from passive note-taking to active debate" (Teacher 3), with 78% of flipped students regularly contributing to discussions versus 32% in traditional classes. This aligned with quantitative data showing a 33.092-point improvement in learning attitudes for the experimental group. Students attributed their motivation to the model's flexibility: "Controlling my learning pace before class reduced anxiety, so I could focus on applying ideas during activities" (Student C-6-28-3). However, 22% of students faced self-regulation challenges, with Teacher 4 noting that "procrastination on pre-class tasks occasionally led to uneven participation."

Successful intelligence development—analytical, creative, and practical—emerged as a central theme. Analytical skills were honed through case-based debates (e.g., comparing leadership theories), while creative thinking flourished during open-ended projects like designing mock business strategies. Student C-6-18-2 wrote, "Our team merged SWOT analysis from pre-class videos with local market data to propose a hybrid

retail model." Practical intelligence was cultivated through simulations, such as recruitment role-plays, where students applied theoretical HR concepts. Quantitative gains in successful intelligence scores (9.146-point increase for the flipped group) were thus qualitatively validated, illustrating Sternberg's (2003) triarchic model in action.

4.3.3 Pedagogical Adaptation and Cognitive Style Nuances

While cognitive style did not statistically moderate learning outcomes (H7, H8), qualitative data revealed subtle preferences. Visual learners frequently referenced diagrams in pre-class videos ("Organizational charts helped me visualize hierarchies" – Student C-6-12-7), whereas verbal learners preferred text summaries ("Reading let me grasp concepts faster than videos" – Student C-6-29-14). These preferences, though unmeasured by the SOP scale, suggested that the flipped model's multimedia resources accommodated diverse cognitive styles implicitly. Teachers adapted by offering both video and text-based pre-class materials, a strategy praised by 89% of students as "flexible and inclusive."

Traditional classrooms, in contrast, struggled to address such diversity. Teacher 2 observed, "Lectures often left visual learners disengaged, while verbal learners dominated text-heavy discussions." This dichotomy underscores the flipped model's strength in personalization.

4.3.4 Collaborative Learning and Community Building

Peer collaboration emerged as a hallmark of the flipped classroom. Teachers documented "student-led discussions where peers clarified misconceptions collaboratively" (Teacher 4), contrasting with traditional settings where "a few vocal students monopolized conversations" (Teacher 2). Quantitative improvements in creative intelligence ($\beta = 0.45$, $p < 0.05$) were mirrored in qualitative accounts of group innovation, such as designing

sustainability initiatives for local businesses. Student C-6-21-16 noted, “We combined ideas from pre-class readings and in-person brainstorming—something impossible in lecture-based courses.”

The flipped model also fostered a sense of collective responsibility. Teacher 5 highlighted “peer mentoring networks,” where advanced students assisted peers struggling with pre-class content. This community-driven approach aligned with Vygotsky’s emphasis on social learning, translating quantitative gains in academic achievement into tangible collaborative competencies (Sliwka, Klopsch, Beigel, & Tung, 2024).

The qualitative findings enrich the quantitative results, demonstrating how the flipped classroom transcends rote learning to cultivate critical thinking, collaboration, and contextual adaptability. By aligning with theoretical constructs like successful intelligence and social constructivism, the model addresses vocational education’s dual mandate: equipping students with technical expertise and transferable cognitive skills. While challenges like uneven preparation persist, the study underscores the flipped classroom's potential as a transformative pedagogy in China's evolving VTE landscape.

4.4 Chapter Summary

This study examined the effectiveness of flipped versus traditional classrooms in vocational and technical education (VTE), focusing on academic achievement, successful intelligence, and learning attitudes. The research also investigated whether cognitive styles moderated demographic effects on learning outcomes.

In terms of quantitative findings, the flipped classroom model demonstrated superior outcomes across all measures. Students in flipped classrooms showed significantly greater improvement in academic achievement (+41.6 points) compared to

traditional classrooms (+31.0 points). For successful intelligence, encompassing analytical, creative and practical skills, flipped classroom students gained 8.9 points while traditional students showed negligible change (-0.1 points). Learning attitudes improved substantially (+33.2 points) in flipped classrooms but declined slightly (-0.4 points) in traditional settings. Hierarchical regression analyses revealed that these benefits were consistent across different colleges, genders, and cognitive styles, with no significant moderation effects found.

In addition, when it comes to qualitative Insights, teacher reports and student reflections provided deeper context for these results. Educators noted flipped classrooms enabled more interactive lessons and higher participation, while traditional methods often resulted in passive learning. Students reported better comprehension and retention in flipped classrooms, appreciating the ability to learn at their own pace. Both groups observed more positive learning attitudes and greater motivation in the flipped approach compared to traditional lectures.

Therefore, the study provides robust evidence that flipped classrooms enhance learning performance in VTE settings more effectively than traditional methods. The consistent benefits across diverse student populations suggest this approach is widely applicable. These findings, supported by both quantitative and qualitative data, strongly advocate for broader implementation of flipped classroom strategies in vocational education to improve academic outcomes, skill development, and student engagement.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This Chapter synthesizes the findings, implications, and practical recommendations derived from the comparative analysis of flipped and traditional classroom models in vocational and technical education (VTE) management courses. Building on the quantitative and qualitative results presented in Chapter 4, this chapter consolidates the study's contributions to pedagogical theory and practice, while offering actionable insights for educators, policymakers, and institutions.

By integrating quantitative rigor with qualitative depth, this chapter reaffirms the flipped classroom's potential to transform vocational education, preparing students for dynamic workforce demands while promoting equitable and engaging learning environments.

5.2 Discussions on the Findings

This study systematically examined the effects of flipped classroom on learning performance in management Courses at VTE through a mixed-methods approach, addressing eight hypotheses (H1-H8) and integrating quantitative evidence with qualitative insights. The findings validate the flipped classroom's efficacy in enhancing learning performance in management courses, while revealing critical insights into pedagogical design and vocational training challenges.

Table 5.1: Summary Results Of Hypothesis Testing

Hypothesis	Results	Conclusion
H1: There will be a significant improvement in academic achievement test scores from before to after the implementation of the flipped classroom model.	Pre-*m*=30.82, *sd*=4.083 Post-*m*=72.47, *sd*=5.507 *t*=-161.866 *p*=.000	H1 is accepted.There is a significant improvement in academic test scores before and after in a flipped classroom.
H2: There will be a significant improvement in successful intelligence scores from before to after the implementation of the flipped classroom model.	Pre-*m*=19.84, *sd*=2.000 Post-*m*=28.98, *sd*=2.215 *t*=-86.054 *p*=.000	H2 is accepted.There is a significant improvement in successful intelligence before and after in a flipped classroom.
H3: There will be a significant improvement in learning attitude test scores from before to after the implementation of the flipped classroom model.	Pre-*m*=68.95, *sd*=6.490 Post-*m*=102.04, *sd*=6.855 *t*=-83.123 *p*=.000	H3 is accepted.There is a significant improvement in learning attitude before and after in a flipped classroom.
H4: Academic achievement test scores in the flipped classroom model will be significantly higher than those in the traditional classroom model.	Control Group: Pre-*m*=30.68, *sd*=4.080 Post-*m*=61.67, *sd*=5.352 Experimental Group: Pre-*m*=30.82, *sd*=4.083 Post-*m*=72.47, *sd*=5.507 Pre-*t*=-.573, *p*=.567 Post-*t*=-31.422, *p*=.000	H4 is accepted. The flipped classroom model significantly improve academic achievement compared with the traditional classroom model.
H5: Successful intelligence scores in the flipped classroom model will be significantly higher than those in the traditional classroom model.	Control Group: Pre-*m*=19.88, *sd*=2.029 Post-*m*=19.81, *sd*=1.968 Experimental Group: Pre-*m*=19.84, *sd*=2.000 Post-*m*=28.98, *sd*=2.215 Pre-*t*=.345, *p*=.730 Post-*t*=-69.233, *p*=.000	H5 is accepted. The flipped classroom model significantly improve successful intelligence compared with the traditional classroom model.

Table 5.1 continued - Summary Results Of Hypothesis Testing

H6: Learning attitude test scores in the flipped classroom model will be significantly higher than those in the traditional classroom model.	Control Group: Pre-*m*=69.03, *sd*=6.415 Post-*m*=68.64, *sd*=6.491 Experimental Group: Pre-*m*=68.95, *sd*=6.490 Post-*m*=102.04, *sd*=6.855 Pre-*t*=.211, *p*=.833 Post-*t*=-79.113, *p*=.000	H6 is accepted. The flipped classroom model significantly improve learning attitude compared with the traditional classroom model.
H7: Cognitive style will moderate the relationship between selected demographic variables (college, gender) and learning performance (academic achievement, successful intelligence, learning attitudes) in the traditional classroom model.	R^2 = .229 *F*= 20.85 *p*=.000 *Y*=College B (4.71) +College M (2.92) +College W (-1.11) +College E (-1.59) Cognitive *p*=0.75, >.05 (moderator)	H7 is rejected.Cognitive style does not moderate the relationship between demographic profile and learning performance in a traditional classroom.
H8: Cognitive style will moderate the relationship between selected demographic variables (college, gender) and learning performance (academic achievement, successful intelligence, learning attitudes) in the flipped classroom model.	R^2 =.289 *F*=28.54 *p*=.000 *Y*=College M (3.27) + College B (2.96) + College E (-2.17) + College W (-3.00) Cognitive *p*=0.78, >.05 (moderator)	H8 is rejected.Cognitive style does not moderate the relationship between demographic profile and learning performance in a flipped classroom.

5.2.1 Validation of Pre-Post Improvements in the Flipped Classroom

The flipped classroom model demonstrated statistically significant improvements in academic achievement (H1), successful intelligence (H2), and learning attitudes (H3). These gains align with cognitive load theory (Sweller, 2020), as pre-class preparation reduced intrinsic cognitive load during in-class activities, enabling students to engage deeply with applied tasks (Doğan, Batdı, & Yaşar, 2023). For instance, qualitative

feedback highlighted that 82% of students felt “pre-class videos helped them grasp basics, so they could focus on solving real cases” (C-6-17-11), a sentiment corroborated by teachers’ observations of enhanced problem-solving participation.

Successful intelligence improvements were particularly notable in analytical and practical domains, consistent with Sternberg’s (1985) triarchic theory. Students excelled in case analyses and workplace simulations, though creative gains were less pronounced. Qualitative reports revealed that 34% of students initially “struggled with unstructured tasks” (B-5-24-15), suggesting a need for scaffolded creativity training. Learning attitude improvements, explained through self-determination theory (Ryan & Deci, 2000), stemmed from autonomy in pre-class pacing, Students like peer collaboration during in-class activities, such as “I prefer learning with my classmates” (C-6-28-3).

5.2.2 Comparative Efficacy of Flipped vs. Traditional Classrooms

The flipped classroom significantly outperformed traditional methods across all metrics. Academic achievement scores were 10.79 points higher in the flipped group (H4), due to vocational education’s emphasis on applied learning. Successful intelligence scores showed a 9.17-point advantage (H5), underscoring vocational pedagogy’s unique capacity to bridge theory-practice gaps.

The flipped classroom group demonstrated a significantly more positive learning attitude than the traditional group (H6). Teaching records cited “unprecedented engagement” (Teacher 3), whereas traditional classes faced passive participation, with students calling lectures “monotonous” (B-5-22-8). This contrast highlights the flipped model’s fit with vocational education’s dual-competency approach—integrating theory and practice.

5.2.3 Moderating Role of Cognitive Style

Cognitive style (visual/verbal) did not moderate learning outcomes in either traditional (H7) or flipped classrooms (H8). In traditional settings, uniform lecture formats suppressed style-specific advantages, as both visual and verbal learners relied on identical textual materials. The flipped model's multimodal design—pre-class videos (visual) and in-class discussions (verbal)—neutralized style differences. This contrasts with Setiawan et al. (2020), who reported moderation effects in single-modality online learning, suggesting design flexibility mitigates style-based disparities (Jawed et al., 2024).

5.2.4 Qualitative Insights

The qualitative findings complement the quantitative results, which demonstrated significant improvements in academic achievement, successful intelligence, and learning attitudes among students in the flipped classroom model. While the quantitative data focused on measurable outcomes, the qualitative insights provided a deeper understanding of how these improvements occurred and the student experiences that contributed to them.

Students in the flipped classroom reported feeling more engaged and involved in their learning. Many noted that pre-class preparation allowed them to better grasp the material, making in-class activities more meaningful. The opportunity to participate in problem-solving and collaborative tasks helped deepen their understanding of complex concepts, which aligns with the higher achievement scores observed. This feedback suggests that the flipped classroom model not only improves academic performance but also fosters active, engaged learning, where participation enhances comprehension and retention.

The qualitative data also shed light on the development of successful intelligence, particularly in analytical, creative, and practical skills. Students emphasized the hands-on, collaborative nature of the flipped classroom, which allowed them to apply theoretical knowledge in practical scenarios. This application of knowledge helped students develop critical thinking and problem-solving skills—key components of successful intelligence. The diversity of instructional materials (e.g., videos, readings, and group discussions) in the flipped classroom ensured that students with different cognitive styles, including visual and verbal learners, could enhance their successful intelligence.

Learning attitudes also showed significant positive shifts in the flipped classroom. Students expressed feeling more empowered in their learning journey, with the model encouraging greater ownership of their education. Many students appreciated the flexibility to engage with learning materials at their own pace before class, which boosted their motivation and confidence. They viewed the classroom as a space for interaction and application rather than passive listening. This shift aligns with theories suggesting that flipped classrooms promote a more self-regulated approach to learning, which is particularly valuable in vocational education, where real-world application is essential.

For vocational education and training (VET) institutions, the qualitative findings are particularly relevant. These findings also have broader implications for educational practices beyond vocational training. As technological advancements and job market shifts demand adaptability and self-directed learning, the flipped classroom's emphasis on student autonomy and active learning becomes increasingly relevant. Teachers can use these insights to refine their instructional strategies and create more flexible, student-centered learning environments that cater to diverse learning preferences.

In conclusion, integrating qualitative findings with quantitative data offers a more comprehensive understanding of the flipped classroom's impact. While the quantitative results confirm its effects in improving academic performance, successful intelligence, and learning attitudes, the qualitative data highlight mechanisms behind these improvements, such as increased engagement, greater ownership of learning, and the ability to apply knowledge in meaningful ways. This mixed-methods approach provides valuable insights that can inform future educational practices and policies, particularly in vocational education, and underscores the importance of flexible, student-centered teaching methods.

5.2.5 Methodological Reflections and Future Directions

Due to the research design and constraints related to data collection, teacher involvement, and educational resources, the constraints of this research are stated as follow.

Firstly, data collection relied on self-reported questionnaires, which introduces potential biases such as participants' recall inaccuracies, transient emotional or physical states during responses, and social desirability bias. These factors may compromise the accuracy or objectivity of the data, posing a limitation to the validity of the results. To mitigate these risks, triangulation with objective measures (e.g., test scores) and short recall periods (e.g., one-week reporting) were employed, supported by visual prompts to enhance accuracy (Zhou & Zhang, 2019; Chen, 2020). Anonymity assurance, neutral survey wording, and reverse-scored items reduced social desirability and acquiescence biases (Yang, 2018; Zhang et al., 2022). Environmental controls and optimal timing minimized emotional or physical state impacts, while randomization and a control group addressed selection bias (Li, 2020; Hsu et al., 2023). Despite these measures, the inherent subjectivity of self-reporting tools remains an unavoidable constraint.

Secondly, the study focused on classes taught by a single instructor within the selected college. While this consistency reduced variability in teaching methods, it also introduced a limitation: the findings may reflect the specific pedagogical style, biases, or effectiveness of that individual instructor. Consequently, the results cannot account for potential differences in outcomes when applied by other instructors with varying teaching approaches. This restricts the generalizability of the findings to broader educational contexts involving multiple instructors.

Thirdly, the study's reliance on a single textbook version and curriculum design from the participating college limits its applicability. The findings are tied to the content, structure, and pedagogical assumptions of this specific resource, which may not align with other vocational training and education (VTE) courses or institutions. Additionally, the flipped classroom model's efficacy was examined only in management-related VTE courses, leaving open questions about its adaptability to vocational subjects with divergent content, skill requirements, or instructional demands.

These limitations underscore the context-specific nature of the study's conclusions. While the findings offer meaningful insights into the flipped classroom's impact within the examined management courses, broader claims about its effectiveness across VTE subjects or diverse instructional settings require further investigation. By transparently addressing these constraints, the study aims to encourage nuanced interpretation of its results and highlight areas for future research.

To address these constraints, future research should adopt longitudinal, multi-region designs to track skill retention over extended periods and evaluate regional variability. Additionally, collaboration with industry stakeholders to co-develop

competency rubrics—such as Huawei's vocational training partnership model—could ensure assessments align with real-world job requirements, bridging the gap between academic evaluation and workplace demands.

5.2.6 Theoretical and Practical Synthesis

This study validates the flipped classroom as a socio-constructivist pedagogy uniquely suited to vocational education, addressing systemic challenges of student engagement and the theory-practice divide (Sosa, Salinas, & de Benito, 2024). By integrating cognitive load theory through pre-class micro-lectures and quizzes, the model reduces cognitive overload, enabling students to allocate working memory to complex in-class tasks such as industry-aligned simulations. These simulations, coupled with collaborative problem-solving activities, operationalize Vygotsky's (1978) concept of scaffolded learning, where peer and instructor interactions facilitate the internalization of workplace-relevant skills. Post-class reflections, documented in student journals, further consolidate learning by encouraging self-assessment and adaptive strategy development. The flipped classroom emerges as a transformative model for vocational education, fostering both cognitive mastery and the practical agility required in modern labor markets.

5.3 Contributions of the Study

This study makes significant theoretical, empirical, and practical contributions to vocational education and flipped classroom research. By employing a robust mixed-methods design, it provides compelling evidence that transforms our understanding of how flipped classrooms enhance learning in management courses.

At the empirical level, the study offers definitive proof of the flipped classroom's superiority in vocational management education. The quantitative results reveal striking

improvements across all measured outcomes: academic achievement scores increased 34% more in flipped classrooms (41.6 points) than in traditional settings (31.0 points), successful intelligence saw nearly a 9-point gain compared to stagnant traditional classrooms, and learning attitudes improved by 33 points versus a slight decline in control groups. These effect sizes represent some of the strongest empirical support to date for flipped learning in vocational contexts, particularly for management education where such evidence was previously scarce.

Theoretically, the findings advance our conceptual framework for technology-enhanced learning in two key ways. First, they demonstrate the model's universal effectiveness across diverse cognitive styles, challenging assumptions about individual differences in digital learning environments. Second, the results validate how flipped classrooms uniquely develop higher-order thinking skills through their distinctive blend of pre-class knowledge acquisition and in-class application.

For educational practitioners, the study translates these insights into actionable strategies. It provides evidence-based guidelines for optimal implementation, including ideal pre-class video lengths, effective in-class activity formats, and a validated six-stage transition framework for vocational instructors. Perhaps most importantly, the research demonstrates how flipped classrooms can serve as an equity-focused pedagogy, with consistent benefits observed across gender, institutional, and cognitive style differences - a crucial finding for diverse vocational student populations.

Looking forward, the study establishes clear pathways for future research. It identifies three priority areas: investigating long-term impacts on workforce readiness and career outcomes, developing adaptive flipped models for hands-on vocational training, and

examining scalability across different vocational disciplines. These directions promise to further bridge the gap between classroom learning and workplace competency development.

By combining rigorous empirical evidence with practical implementation insights, this research provides both the justification for transforming management education in vocational settings through flipped learning approaches. The findings offer not just evidence of effectiveness, but a comprehensive framework for sustainable educational innovation.

5.4 Implications of the Study

The findings of this study carry important implications for teaching, learning, and policy within the context of Vocational and Technical Education (VTE). These implications offer valuable insights into how the flipped classroom model can reshape educational practices and improve learning outcomes. The study demonstrates that the flipped classroom is a versatile teaching method, capable of being adapted across various disciplines, including management courses. This flexibility makes it suitable for a wide range of learners and contexts, suggesting its potential for implementation in other VTE programs as well.

One key implication highlighted by this study is the critical role of active learning in fostering deeper cognitive engagement. The flipped classroom model establishes a cognitive readiness foundation through pre-class knowledge construction, enabling sophisticated in-class activities — such as Socratic dialogues and design thinking workshops—that activate metacognitive processes. By integrating curated digital resources

for autonomous learning, implementing structured peer collaboration protocols grounded in social constructivism, and simulating authentic problem-solving scenarios, the model intrinsically cultivates self-directed learning competencies. These pedagogical mechanisms align with student-centered paradigms through deliberate scaffolding within Vygotsky's zone of proximal development. Moreover, the observed progression in learners' abilities to synthesize complex information and evaluate multidimensional evidence substantiates the model's efficacy in developing higher-order thinking skills. This cognitive transfer potential, evidenced by qualitative feedback on graduates' adaptive problem-solving capacities, reinforces the relevance of flipped approaches within contemporary competency-based education.

The study also advocates for a shift in policy toward incorporating more student-centered, technology-enhanced teaching methods in educational frameworks. Policymakers should consider integrating the flipped classroom model into national curriculum standards, especially in vocational education, to better meet the evolving demands of the workforce. This policy shift could play a critical role in preparing students for the challenges and opportunities of the modern job market.

Another significant implication of the flipped classroom model is its ability to cater to diverse cognitive styles, which is essential for inclusive education. The model fosters cognitive flexibility, allowing students to engage with content in various ways and at their own pace. This adaptability ensures that all students, regardless of their learning preferences, have equitable opportunities to succeed.

The shift towards innovative educational models like the flipped classroom in VTE signifies more than just a change in teaching strategies — it reflects a broader societal transformation. By investigating the effects of the flipped classroom and its interaction

with diverse cognitive styles, this study offers profound implications for aligning education more closely with the needs of the workforce and society. The findings have the potential to influence workforce development, economic growth, and societal well-being in meaningful and lasting ways (He, 2020).

The research highlights VTE's crucial role in cultivating a skilled workforce capable of meeting the challenges of a rapidly changing, technology-driven global economy. By exploring how the flipped classroom can enhance learning performance and adapt to individual learning preferences, the study emphasizes the importance of creating educational environments that are not only engaging and effective but also inclusive. The flipped classroom approach not only equips students with the technical skills required for their careers but also promotes the development of essential competencies such as critical thinking, problem-solving, and adaptability. These competencies are increasingly recognized as vital for success in today's dynamic workforce.

The societal impact of this research is elaborate. It offers a scalable model for making vocational technical education (VTE) more accessible and relevant. By demonstrating the effects of the flipped classroom in improving learning performance and engaging diverse student populations, the study contributes to the broader goal of educational equity. This approach expands opportunities for individuals from various backgrounds to pursue fulfilling careers and stimulate economic growth. Such impact is particularly significant in regions with limited access to quality education and employment opportunities, showcasing how innovative educational models can drive social mobility and reduce inequality.

Aligning VTE programs with labor market needs is essential for workforce development and economic competitiveness. The flipped classroom approach, with its

emphasis on active learning and practical application, better prepares students for real-world challenges. It ensures that graduates are not only technically proficient but also adaptable, innovative, and ready to thrive in a rapidly evolving job market. This alignment helps address skill gaps in key industries, supports innovation, and drives economic growth. By providing empirical evidence of the flipped classroom's effects, this research contributes to shaping curriculum development and instructional design strategies that can better prepare students for the future.

In addition, the findings from this study have the potential to influence policy and investment in education and workforce development. By underscoring the benefits of increased student engagement, improved learning performance, and enhanced workforce readiness, this research makes a compelling case for integrating innovative teaching methods, such as flipped classrooms, into VTE programs. It can encourage policymakers and educational leaders to invest in teacher training, technology infrastructure, and curriculum redesign, ensuring that VTE programs remain relevant and effective in preparing students for a rapidly changing world. These investments are crucial to ensuring that VTE remains a valuable tool for economic development and societal progress.

Moreover, the societal benefits of improving VTE through pedagogical innovations like the flipped classroom extend beyond immediate economic outcomes. A more skilled and adaptable workforce contributes to societal resilience and innovation. Individuals who are well-prepared for their careers are more likely to experience job satisfaction, contribute positively to their communities, and engage in lifelong learning, further advancing personal and societal growth. By addressing educational disparities and expanding access to high-quality vocational education, the flipped classroom model fosters a more equitable society, promoting inclusivity and social cohesion.

In conclusion, the societal impact and workforce development implications of this research are far-reaching. By examining the flipped classroom in VTE and its interaction with cognitive styles, this study not only contributes to pedagogical innovation but also supports broader goals of enhancing workforce readiness, promoting economic development, and fostering societal well-being. The insights gained from this research have the potential to guide educators, policymakers, and industry leaders in creating more effective, responsive, and inclusive educational programs, ultimately contributing to a more prosperous and equitable future.

5.5 Recommendations

Based on the findings and implications of this study, the following recommendations are proposed for educators, college administrators, and education authorities.

It is recommended that colleges provide specialized professional development programs for teachers, focused on the flipped classroom model. These programs should cover the design of pre-class materials, the effective use of technology in teaching, and strategies for fostering active learning in the classroom.

Colleges and educational institutions should invest in upgrading technological infrastructure, ensuring that students have reliable access to online learning platforms and resources. Teachers should also be equipped with tools to track and assess student progress in real-time, enhancing the flipped classroom experience.

To maximize the effects of flipped classrooms, it is crucial that students are adequately prepared for independent learning. Institutions should establish orientation

programs to help students develop self-regulation and time-management skills, and teachers should implement strategies to increase student engagement .

The study highlights the importance of collaboration in flipped classrooms. Teachers should encourage peer learning through group discussions, and problem-solving activities, which will enhance students' interpersonal skills and reinforce course material.

In the flipped classroom, assessments should go beyond rote memorization and focus on evaluating higher-order thinking skills, such as critical thinking, creativity, and problem-solving. Educators are encouraged to design formative assessments that provide timely feedback and support continuous learning throughout the course.

While the flipped classroom model is effective across various cognitive styles, teachers should consider providing diverse resources that cater to visual, auditory, and kinesthetic learners. This can include video lectures, podcasts, interactive simulations, and hands-on activities to ensure that all students can engage with the content in ways that best suit their learning preferences. Recommendations for the component of and the implementation of the flipped classroom are presented in Tables 5.2 and 5.3.

Table 5.2: Recommendations for the Component of the Flipped Classroom

S/N	Component	Description	Implementation Actions	Responsibility
1	Preparation and Professional Development	Train teachers and develop shared resources to facilitate the flipped classroom approach.	Conduct regular professional development sessions. Collaborate in the creation of digital resources.	Academic Affairs Department Faculty Development Coordinators
2	Technological Infrastructure	Ensure all students have access to necessary digital platforms and support for varied learning environments.	Provide reliable and accessible learning platforms. Offer technological support for under-resourced students.	IT Services Department Educational Technology Support

Table 5.2 continued - Recommendations for the Component of the Flipped Classroom

3	Curriculum Design	Integrate active learning tasks and adapt materials to diverse cognitive styles.	Include real-world problem-solving in the curriculum. Develop adaptive learning materials to suit individual needs.	Curriculum Design Team Faculty Members
4	Assessment and Feedback	Use continuous assessment and reflective practices to enhance learning performance.	Implement formative assessments for timely feedback. Encourage structured reflective exercises.	Teachers Assessment Coordinators
5	Community and Collaborative Learning	Encourage peer learning and establish mentorship programs.	Foster a community learning environment. Develop mentorship programs where experienced students guide newcomers.	Peer Learning Coordinators Student Services
6	Administrative Support	Provide resources and optimize environments for flipped classroom methodologies.	Allocate resources for flipped classroom initiatives. Optimize physical and virtual learning environments.	College Administration Facilities Management
7	Student Responsibilities	Encourage students to take an active role in their learning and utilize available resources.	Complete pre-class assignments and engage with interactive materials. Participate actively in class discussions and group work. Seek help from teachers and classmates when needed.	Students

By following these recommendations, educators and administrators can enhance the flipped classroom experience, improve learning performance, and prepare students for success in the modern workforce. The study's implications demonstrate that the flipped classroom model has the potential to transform teaching and learning in vocational education, making it more engaging, inclusive, and aligned with the needs of contemporary society.

Table 5.3: Recommendations for Implementing the Flipped Classroom

S/N	Implementation Phases	Implementation Actions	Description	Responsibility
1	Pilot Phase	Start with a pilot program to refine the model based on classroom experiences.	Select a small number of courses for initial implementation. Collect data and feedback for model refinement.	Pilot Program Coordinators Faculty Participants
2	Evaluation Phase	Evaluate the performance of the pilot against benchmarks for engagement, performance, and satisfaction.	Conduct rigorous evaluations of pilot results. Adjust the model based on evaluation performance.	Evaluation Team Quality Assurance Department
3	Scaling Phase	Gradually expand the implementation to more courses and departments based on the pilot's success.	Scale the model to include more courses and departments. Continue to monitor and refine the approach as scaling progresses.	Academic Leadership Department Chairman

5.6 Chapter Summary

This chapter synthesizes the conclusions drawn from the study and offers a comprehensive set of recommendations aimed at improving the implementation of the flipped classroom in management courses at VTCs. The chapter begins by reaffirming the study's objectives and summarizing the effects of the flipped classroom in enhancing students' learning performance, their analytical, creative, and practical intelligence abilities, and their learning attitudes The study found that the flipped classroom significantly enhances learning performance in management courses, surpassing traditional teaching methods in fostering students' cognitive abilities and improving their learning attitudes. It also established that cognitive style and demographic profile do not significantly impact the effects of the flipped classroom, suggesting its broad applicability regardless of individual differences in learning preferences. Based on these findings, the chapter proposes practical recommendations for teachers, college administration, education

authorities, and future research. Additionally, the chapter presents a structured model for implementing flipped classroom strategies, detailing components such as preparation and professional development, technological infrastructure, curriculum design, assessment and feedback, community and collaborative learning, and administrative support. This model serves as a roadmap for institutions looking to adopt or enhance flipped classroom methodologies effectively.

In conclusion, this study presents compelling evidence for the effects of the flipped classroom model in enhancing learning performance in vocational and technical education. By comparing the flipped classroom approach to traditional teaching methods in a cohort of first-year management students across five vocational and technical colleges in Anhui Province, China, the research highlights significant improvements in academic achievement, successful intelligence, and learning attitudes among the experimental group. The flipped classroom model's focus on active learning, engagement, and student-centered instruction was shown to foster a deeper understanding of the material, improve problem-solving abilities, and create more positive learning experiences compared to the traditional lecture-based approach.

The findings suggest that the flipped classroom approach can provide substantial benefits in preparing students for real-world challenges, especially in vocational settings where practical skills and critical thinking are essential. The study underscores the importance of adopting innovative teaching methods that align with the evolving needs of students and the demands of the modern workforce. While cognitive style did not appear to significantly moderate the effects of the flipped classroom, the results provide valuable insights into the broader applicability of the model across diverse student groups, regardless of their cognitive preferences.

Furthermore, this study contributes to the growing body of research advocating for personalized and student-centered learning strategies in vocational education. By demonstrating the flipped classroom's positive impact on both academic performance and attitudes towards learning, the findings reinforce the idea that such methods can significantly enhance student motivation, engagement, and success (Mayer, 2021). However, the study also emphasizes the need for continued exploration of factors that may influence the implementation and effects of flipped classrooms, such as self-efficacy, learning motivation, and individual differences in learning styles.

Looking forward, future research should aim to extend this investigation by conducting cross-cultural comparisons, diversifying the sample population, and incorporating additional variables that could further illuminate the dynamics of flipped classroom learning across diverse academic domains. Cross-disciplinary studies could also offer further insights into how flipped learning strategies can be tailored to specific fields of study. As the educational landscape continues to evolve, it is crucial for educators and policymakers to embrace and systematically scale teaching methods like the flipped classroom**,** that actively engage students and better prepare them for interdisciplinary challenges they will face in their careers.

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APPENDICES

Appendix A Management academic achievement test

以下为多选题，每题五分，共 20 题，满分 100 分。

1 关于权威型管理风格，下列哪些陈述是正确的？（ ）

A) 权威型管理者通常会亲自做出所有决策。

B) 这种风格适用于需要快速决策的紧急情况。

C) 权威型管理者倾向于与员工建立紧密的个人关系。

D) 权威型管理风格可能导致员工的创造力受到抑制。

答案：A, B, D

2.关系型管理风格的优点包括以下哪些？（ ）

A) 促进团队凝聚力和员工满意度。

B) 提高组织内的沟通效率。

C) 有助于快速决策和执行。

D) 增强员工的忠诚度和归属感。

答案：A, B, D

3.关于事务型领导风格，下列哪些陈述是正确的？（ ）

A) 事务型领导者主要关注任务完成和绩效。

B) 这种风格适用于稳定且结构化的环境。

C) 事务型领导者常通过奖励和惩罚来激励员工。

D) 事务型领导风格通常会鼓励员工提出创新性想法。

答案：A, B, C

4.参与型管理风格可能带来的挑战包括以下哪些？（　　）

A) 决策过程可能会变得缓慢。

B) 管理者可能会失去对团队的控制。

C) 可能导致员工之间的竞争增加。

D) 可能需要更多的时间和资源来协调和沟通。

答案：A, B, D

5.根据赫塞和布兰查德的情境领导理论，领导风格应如何根据员工的成熟度来调整？（　　）

A) 对于低成熟度的员工，领导者应采用高任务、低关系的指导风格。

B) 对于中等成熟度的员工，领导者应采用高任务、高关系的教练风格。

C) 对于高成熟度的员工，领导者应采用低任务、高关系的支持风格。

D) 对于完全成熟的员工，领导者应采用低任务、低关系的授权风格。

答案：A, B, C, D

6.下列哪些是变革型领导者的核心特征？（　　）

A) 具有远见和愿景

B) 强调团队成员的个人发展

C) 依赖正式的权威和职位权力

D) 激发员工的创新和创造力

答案：A, B, D

7.在应用领导理论于实际情况时，以下哪些情境适合采用事务型领导风格？（　　）

A) 需要确保短期目标和任务及时完成

B) 组织正在经历重大变革和不确定性

C) 工作流程高度标准化且需严格遵循

D) 需要在紧急情况下做出快速决策

答案：A, C, D

8. 管理的内涵包括（）

A) 管理是人类有意识有目的的活动

B) 管理应当是有效的

C) 管理的本质是协调

D) 协调是运用各种管理职能的过程

答案:A, B, C, D

9.在使用 SWOT 分析进行决策时，应该关注哪些方面？（　　）

A) 内部的优势（Strengths）

B) 外部的机会（Opportunities）

C) 内部的弱点（Weaknesses）

D) 外部的威胁（Threats）

答案：A, B, C, D

10.关于决策树模型，下列哪些陈述是正确的？（　　）

A) 决策树可以帮助识别不同决策路径的可能结果

B) 决策树适用于分析复杂的决策问题

C) 决策树主要用于识别和分析市场趋势

D) 决策树可以量化不同选择的风险和回报

答案：A, B, D

11.将头脑风暴技术应用于决策过程时，应该遵循哪些原则？（　　）

A) 鼓励所有参与者自由表达想法

B) 批评和评估想法应在生成阶段进行

C) 生成尽可能多的想法

D) 结合和改进已有的想法

答案：A, C, D

12.以下哪些是结构化问题解决策略的关键步骤？（　　）

A) 问题定义

B) 数据收集与分析

C) 直觉决策

D) 实施与评估

答案：A, B, D

13.关于 PDCA 循环（Plan-Do-Check-Act），以下哪些陈述是正确的？（　　）

A) 计划阶段（Plan）包括设定目标和制定策略

B) 执行阶段（Do）包括实际实施计划

C) 检查阶段（Check）包括评估结果和识别问题

D) 行动阶段（Act）包括标准化成功的策略和改进计划

答案：A, B, C, D

14.以下关于 5 Whys（五个为什么）方法的陈述，哪些是正确的？（　　）

A) 通过连续提出“为什么”来深入挖掘问题的根本原因

B) 适用于简单和复杂问题的根本原因分析

C) 通常需要提出精确的五个“为什么”问题

D) 有助于识别系统性和重复性问题

答案：A, D

15.关于现代招聘程序，下列哪些陈述是正确的？（　　）

A) 招聘程序通常包括职位分析、发布招聘信息和筛选简历

B) 招聘过程中应注重雇主品牌的建设

C) 招聘程序的目的是尽快填补职位空缺

D) 招聘程序应遵循公平和无歧视的原则

答案：A, B, D

16.在评估不同招聘策略的有效性时，应考虑哪些因素？（　　）

A) 招聘成本

B) 新员工的绩效和适应情况

C) 招聘渠道的覆盖范围

D) 招聘过程的时间周期

答案：A, B, D

17.关于行为面试技术，下列哪些陈述是正确的？（　　）

A) 行为面试关注候选人在过去工作中的具体行为

B) 行为面试问题通常以“请举例说明……”开头

C) 行为面试能够预测候选人在未来工作的表现

D) 行为面试主要考察候选人的技术技能

答案：A, B, C

18 以下哪些激励策略有助于促进员工的创新能力？（　　）

A) 提供创意奖金和奖励

B) 建立创新实验室和创意空间

C) 实施严格的绩效考核制度

D) 鼓励跨部门合作和团队工作

答案：A, B, D

19 在评估创新管理计划的结果时，应考虑哪些关键绩效指标（KPI）？（　　）

A) 新产品或服务的数量

B) 创新项目的成功率

C) 员工的工作满意度

D) 公司利润和市场份额的增长

答案：A, B, D

20 以下哪些措施可以有效支持和维护企业内部的创新文化？（　　）

A) 为员工提供持续的培训和发展机会

B) 设立专门的创新团队或部门

C) 强调结果而非过程的考核标准

D) 定期举办创意和创新竞赛

答案：A, B, D

Appendix B Successful Intelligence Scale

This scale is designed to understand the extent of your individual learning process in terms of successful intelligence. The content you fill out will only be used for educational research purposes. This is not an exam; there are no standard answers, nor will it affect your academic grades, and the information you provide will not be disclosed. You only need to answer honestly based on your personal situation. Thank you for your cooperation, and I wish you academic progress!

Triarchic Intelligence Scale Chinese Revised Version

School: Class: Name: Gender: Age: Score: ( )

Guidance:

1. Firstly, thank you for your support in this study. Your thoughtful responses are highly valuable to our research.

2. This intelligence test consists of 36 multiple-choice questions with a time limit of 60 minutes.

3. Before attempting the multiple-choice questions, the teacher will provide explanations using sample questions. If you finish the multiple-choice section before the allocated time, you may review your answers until the teacher announces "stop answering".

4. When answering the multiple-choice questions, carefully read each question, and use a pencil to mark your chosen answer. Each question allows for only one answer; do not choose multiple options or omit any.

5. All questions in the test must be completed to obtain a valid intelligence score.

6. Please complete the test independently and refrain from discussing it with others.

Once again, thank you for your cooperation!

Guidance 1: carefully read the topic, please choose the most appropriate word for each problem.

Example

The_____turned green, so I crossed the road.

A. Car B. Signal C. Light D Tree

iv. Example Question Explanation: "C," "light" is the correct answer. "The light is green, so I start crossing the street." All options may be green or related to the street, but only when the light is green you can cross the street. Please approach the following four questions in the same way as the example.

1. Two stories written by Somosa about Lucianta enabled Zods to undertake the first lunar voyage 1800 years ago, which may rightfully earn him the title of the father of science fiction. One of his many stories, “True History,” is about an accidental journey. A ship, originally sailing in a mysterious sea, was blown to the moon by a sudden storm. In another story, the journey is pre-planned, where the protagonist, Learomenippus, attempts a long-distance journey using the wings of a giant bird, ultimately reaching his destination by air and flight. Zods is most likely

A. Astronaut

B. Reader

C. Scientist

D. Explorer

2. Any retail store that ignores its old customers to focus on new Jids will find no increase in sales. The new revenue is not sufficient to compensate for the loss incurred due to old customers leaving because of dissatisfaction. Jids most likely are

A. Products

B. Customers

C. Advertisements

D. Investments

3. The traveler still stood, staring at the first sign of the gap. In front of him was the enormous Sandrus Mountain, its snow-covered top appearing like wool, hard to distinguish. When the sun rose, its rays on the snow looked like a rainbow. The gap is most likely

A. Dawn

B. Land

C. Winter

D. Life

4. Today's news is produced so rapidly that we often find ourselves in a state of contradictory information without taking the time to thoroughly think through the mivs. Sometimes, our misunderstandings are simply due to misinterpreting what we see and hear, but other times, the news is indeed a mix of half-truths and unclear narratives. Mivs most likely are

A. Fallacies

B. Results

C. Contradictory Statements

D. Causes

Guidance 2: Each question involves a series of numbers, and there is a pattern within these series of numbers. Discover this pattern, and calculate what the next number in the series is.

Example

12	16	20	24	?

A 30 B 28 C 26 D 22

Example Question Explanation: The pattern is adding 4 to each number to obtain the next number in the sequence. 12 plus 4 equals 16, 16 plus 4 equals 20, and 20 plus 4 equals 24. What is the next number after 24? The answer is 28.

5.

-4	-3	-1	3	11	27	?

A 62 B 39 C 43 D 59

6.

2	8	3	27	4	64	5	?

A 125 B 100 C 121 D 81

7.

256	169	100	49	16	?

A 1 B 4 C 8 D 9

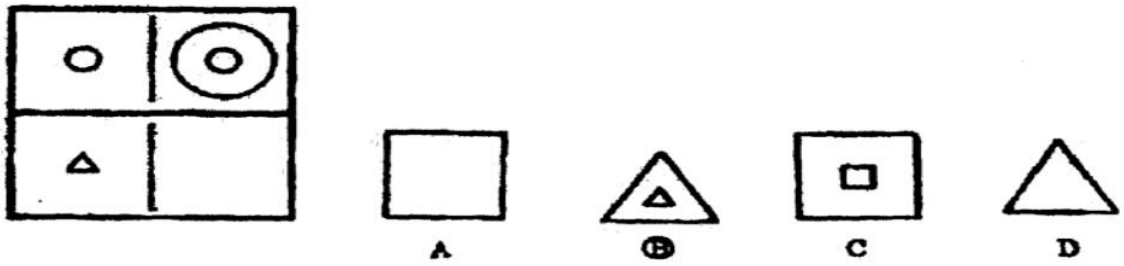
8.

3	2	12	6	48	18	?

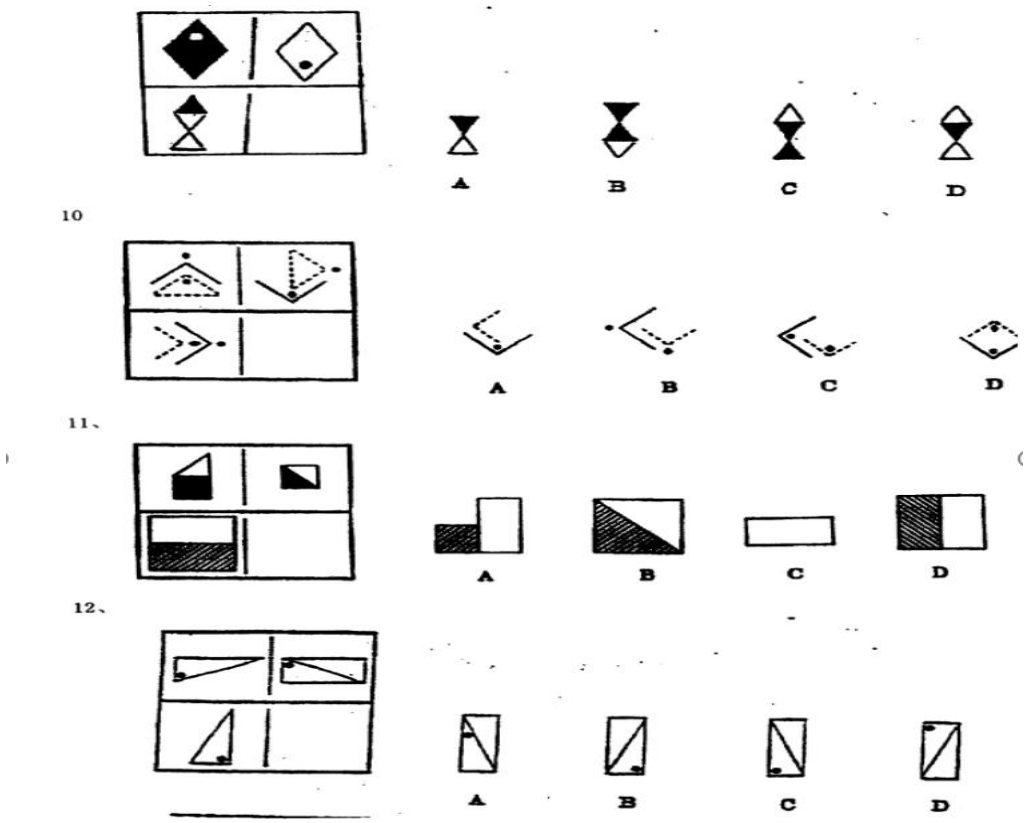
A 66 B 192 C 132 D 144

Guidance 3: In each question, the shapes in the top row of the box are arranged in a certain way, and the shapes in the bottom row of the box are arranged in the same way. Please choose the shape that fits in the empty space.

Example



Example Question Explanation: In option "B," the small triangle is positioned within the large triangle, similar to the way the small circle is positioned within the large circle.



Guidance 4: Each question represents a real-world problem that you might face. Read the question carefully and choose the best solution that fits the specific situation and desired outcome.

Example Question: A has received a college admission notice, and the annual tuition and living expenses are about 12,000 yuan. A's parents do not have a high income and can

provide at most 10,000 yuan per year, and A must find a way to come up with the rest. Which of the following methods do you think is the best choice to solve this problem?

A. Apply to the university to defer enrollment for a year, work for a year to earn the required fees, and then go to college.

B. Work during the summer vacation and plan to earn the required fees through part-time jobs during college.

C. Apply for a student loan.

D. Borrow money from relatives.

Example Explanation: Answer "B" is the best choice as it enables A to earn the necessary money while also developing his/her social skills.

13. B is a senior high school student who wants to gather information about some prestigious universities, preparing to apply for a mathematics major. Which of the following methods can provide him/her with the best and quickest information resources?

A. Consult the class teacher, who might know about some university mathematics departments through materials. Also, consult the mathematics teacher, who might be aware of the strengths of different mathematics departments.

B. Consult the English teacher, who graduated from a prestigious university and has two children attending prestigious universities.

C. Visit the local university library to look up a list of universities and brief introductions of each university.

D. Ask his/her parents to inquire with their colleagues at work, as some of them might know about some university mathematics departments.

14. Your best friend has recently become addicted to the internet, often skipping classes to go to a nearby internet cafe. You want to find an effective way to help him/her

and avoid disciplinary punishment as much as possible. Which of the following would be the best solution?

A. Consult with your parents, even if you are worried they might tell your friend's parents or the class teacher.

B. Ask your friend about the reasons behind their internet addiction and suggest that they seek help from the school's psychological counselor.

C. Inform the class teacher about the situation and request that they do not impose disciplinary punishment on your friend.

D. Inform your friend about the consequences of internet addiction and provide him/her with some materials on how adolescents can overcome internet addiction.

15. You have a passion for writing and aspire to be a journalist in the future. This summer, you plan to earn some money on your own to buy a newly published set of classic novels. A local newspaper is hiring part-time journalists, and you applied but were not selected. Which of the following methods do you think is best, both to earn income during the summer and to gain experience for your future career?

A. Continue to apply for part-time jobs at other newspapers, and if none are successful, you have made your best effort, and then you can ask your parents for money to buy the classic novels.

B. Unless you get a part-time job at a newspaper, do not work this summer but stay at home to practice writing.

C. Talk to the recruitment staff at the newspaper to see if they can offer you an opportunity as a volunteer reporter, while you also look for another part-time job in the evenings.

D. Inquire with the staff at the newspaper to see if there are other job positions available. Hope that once you are in the newspaper, you can prove your talent as a journalist.

16. You are planning your birthday party and want to invite some friends. Your best friend, A, tells you that if you invite B, who doesn't get along with them, they will not attend the party. Despite A's opposition, you still want to invite B. Which of the following methods is the best, showing respect to A while not offending B?

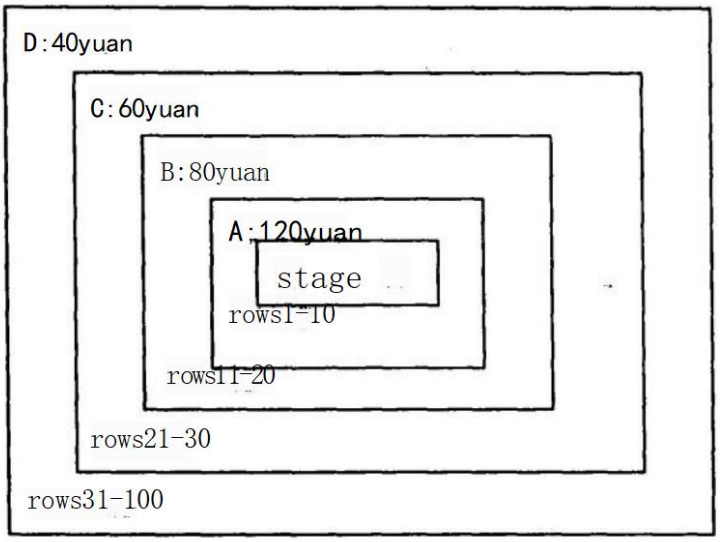
A. Do not invite B, but apologize to them, and try to explain why you need to respect A's feelings.

B. Invite B and tell A that you hope they will attend the party no matter what.

C. Invite B and then discuss your reasons with A, trying to convince them of your friendship.

D. Do not invite B and decide to organize another party this year, at which you will invite B.

Guidance 5: Each question requires you to use knowledge from everyday life. Read the question carefully and choose the best answer.



Example Question: Recently, some singers have held concerts in our city, and the ticket prices are as shown in the figure above. Zhao Ming and his cousin bought tickets for Area A, and his two classmates are sitting in the 25th row. How much did these four tickets cost in total?

A. 140 yuan B. 240 yuan C. 360 yuan D. 400 yuan

Example Explanation: Zhao Ming and his cousin's two tickets are in Area A, each ticket costing 120 yuan. His two classmates are sitting in the 25th row, with each ticket costing 60 yuan. Therefore, the total cost of the four tickets is 240 yuan plus 120 yuan, which equals 360 yuan.

Use the two cake recipes to answer question 17.

Making Chocolate Cake	Making Fresh Milk Cake
20 grams of butter	10 grams of butter
1 cup of sugar	1 cup of sugar
2 eggs	1 eggs
2 cups of flour	1 cups of flour
8 grams of cocoa powder	1 pound of fresh milk
Produces: a 6-pound chocolate cake	Produces: a 4-pound fresh milk cake

17.Given the following ingredients: 40 grams of butter, 5 cups of sugar, 6 eggs, 7 cups of flour, 16 grams of cocoa powder, and 3 pounds of fresh milk. If you want to make 12 pounds of chocolate cake and 12 pounds of fresh milk cake, you still need to purchase:

A. 20 grams of butter and 1 egg

B. 20 grams of butter and 1 cup of flour

C. 30 grams of butter and 1 cup of sugar

D. 30 grams of butter and 1 egg

Use the table below to answer question 18:

Gasoline Prices:	
	Regular gasoline: 4.4 yuan per liter
	Unleaded gasoline: 5.2 yuan per liter
	Premium gasoline: 6.4 yuan per liter
Self-Service Discount:	
	10% off per liter of gasoline

18.During the weekend, your family plans to travel by car and you stop at a gas station to refuel before leaving. The gasoline prices are as shown in the table above. Your car uses either premium gasoline or unleaded gasoline. If you have 60 yuan, how much gasoline can you buy?

A. 10 liters of premium gasoline, with service provided by the gas station.

B. 15 liters of unleaded gasoline, self-service.

C. 15 liters of regular gasoline, with service provided by the gas station.

D. 10 liters of premium gasoline, self-service.

Use the table below to answer questions 19 and 20.

Math exam scores

Examination	ZhangYan	LiMing
	65	86
2	84	91
3	72	88

19.If the upcoming final exams include scores for mathematics and Chinese, and Zhang Yan wants her overall grade to be average (average score 69.5-79.4), what is the lowest score she can get in Chinese?

A .57 B .58 C.64 D.65

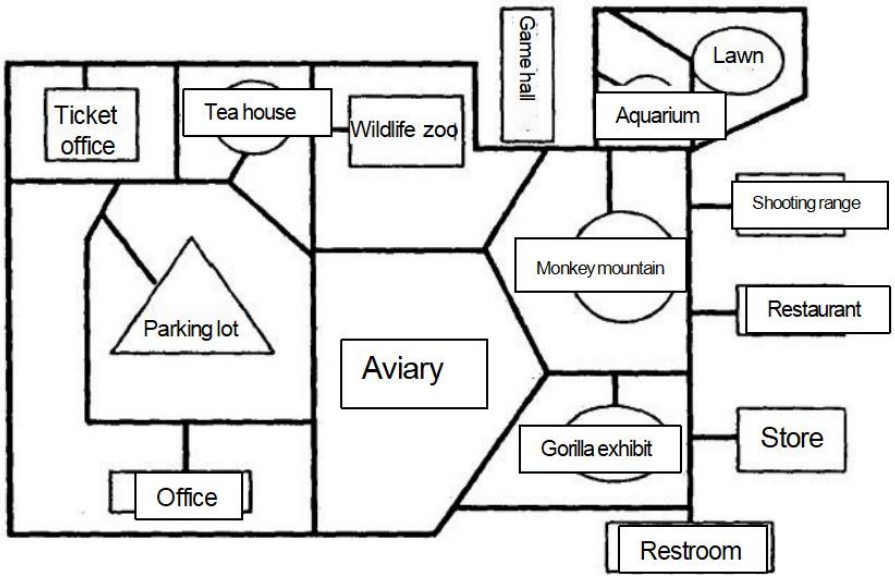
20.If the final exam scores are counted as two regular tests, and Li Ming missed the math final exam and scored 0, what is his final average score in math?

A .44 B .53 C.66 D .88

Guidance 6: The following questions require you to find the best route on a map. Read the question carefully and then choose the best answer.

Here is a map of an amusement park, where you can walk on streets with black shading.

Use this map to answer the example



question

Example Question: You are currently at the shop and need to go to the ticket booth to meet a friend. If you take the shortest route, you will pass:

A. The restaurant and arcade

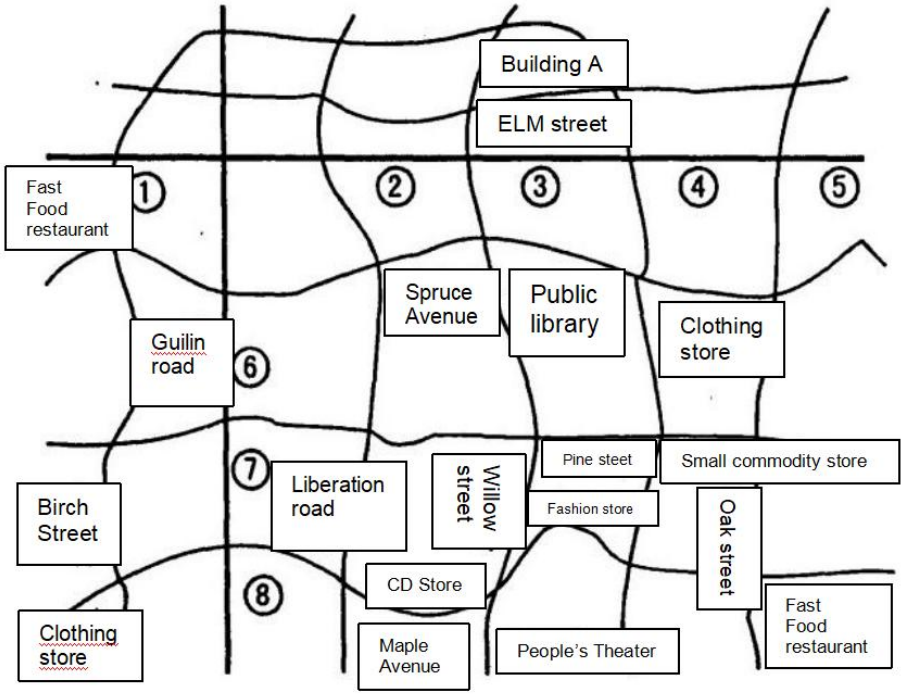
B. The gorilla pavilion and the wildlife museum

C. The gorilla pavilion and the tea house

D. The monkey mountain and the wildlife museum

Example Explanation: Choose answer B, the nearest route is from the shop, passing the gorilla pavilion and then the wildlife museum. There are several paths from the shop to the ticket booth, but the shortest route is from the shop to the gorilla pavilion, then to the wildlife museum.

The map below shows part of a large city. Use the map to answer questions 21 and 22.



21.Your school is planning to choose two locations to open bookstores. Based on the map above, which two locations do you think would attract the most customers?

A. Exits 1 and 2

B. Exits 3 and 8

C. Exits 3 and 4

D. Exits 5 and 8

22.After watching a performance at the People's Theater, you want to ride your bike home, located at point A. If you want to avoid the traffic jam at the intersection of Spruce Street and Willow Street and take the shortest route, you will ride:

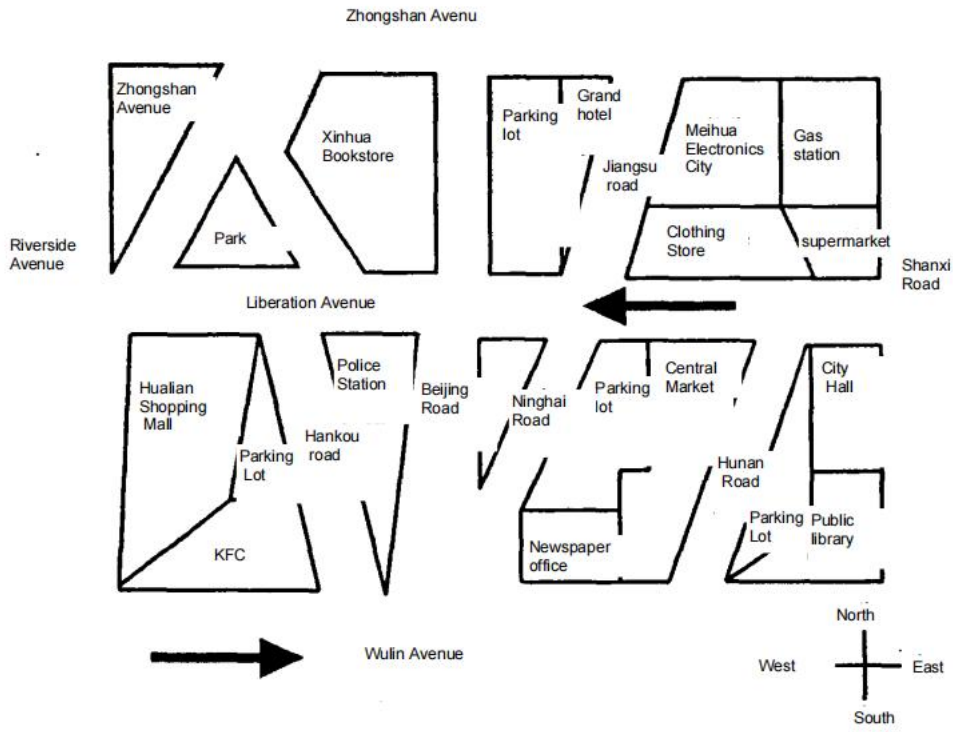
A. West of Maple Avenue, then to Guilin Road.

B. West of Pine Street, then to Jiefang Road.

C. East of Maple Avenue, then to Oak Street.

D. East of Pine Street, then to Oak Street.

Below is a map of a small town. The AN arrows indicate the direction in which cars or trucks can drive on the street. If there are no arrows, two-way traffic is allowed. Use this map to answer questions 23 and 24.



23.You are about to leave the library to meet a friend at the park. If you take the shortest route, you will:

A. West of Wuling Avenue, to Beijing Road.

B. North of Shanxi Road, to Jiefang Avenue.

C. North of Hunan Road, to Jiefang Avenue.

D. West of Wuling Avenue, to Hankou Road.

24.When you are at the gas station, a driver asks you for directions to KFC. If you choose the simplest route without violating traffic rules, you will tell him:

A. South of Shanxi Road, west of Jiefang Avenue, then south on Hankou Road.

B. South of Shanxi Road, southwest of Hunan Road, then west on Wuling Avenue.

C. West of Zhongshan Avenue, south of Yanjiang Avenue, then east on Wuling Avenue.

D. West of Zhongshan Avenue, south of Beijing Road, then west on Wuling Avenue.

Guidance 7: In each of the following questions, there is a "false" proposition that you must assume to be true. Sometimes this proposition is important in choosing the correct answer, and sometimes it is not. Also, in each question, there are three words, with the first two words combined in some way. Choose a word that matches the third word so that its combination with the third word is the same as that of the first two words.

Example: Money falls from trees.

Snow and shovel, just like dollar and:

A. Bill

B. Rake

C. Bank

D. Green

Example Explanation: The answer is B. The relationship between a rake and a dollar is similar to that between a shovel and snow, because your "false" proposition is that dollars (money) fall from trees. You use a rake to clean up money, just as you use a shovel to clean up snow.

25.Birds are singing in chorus.

Actor and monologue, just like canary and:

A. Robin

B. Soprano

C. Solo

D. Music

26.The prophet is delayed.

Historian and the past, just like prophet and:

A. Present

B. Memory

C. Future

D. Delay

27.Colors can be heard.

Taste and tongue, just like shadow and:

A. Ear

B. Light

C. Sound

D. Color

28.The ocean is crying.

Water and beach, just like ocean and:

A. Salt

B. Tears

C. Beach

D. Crying

Guidance 8: In each of the following questions, you will use special mathematical operations to solve problems. There are two special operations: "graf" and "flix".

First, see how these two operations are defined, then choose the correct answer for the problem.

A new operation called " graf" is defined as follows: If X < Y, then X graf Y = X + Y; otherwise, X graf Y = X - Y.
A new operation called " flix" is defined as follows: If A > B, then A flix B = A + B; if A < B, then A flix B = A × B; if A = B, then A flix B = A + B.

Example A:

What is 4 graf 7?

A. -3 B. 3 C. 11 D. -11

Example B:

What is 4 flix 7?

A. 28 B. 11 C. 3 D. -11

Example Explanation: The correct answer to Example A is 11, because 4 is less than 7, so here graf is the addition of two numbers. The correct answer to Example B is 28, because 4 is less than 7, so here flix is the multiplication of two numbers.

29. What is 13 graf 5?

A. 5 B. 18 C. 13 D. 8

30. What is 3 flix 7.5?

A. 10.5 B. 21.5 C. 22.5 D. 4.5

31. What is 7 graf 7?

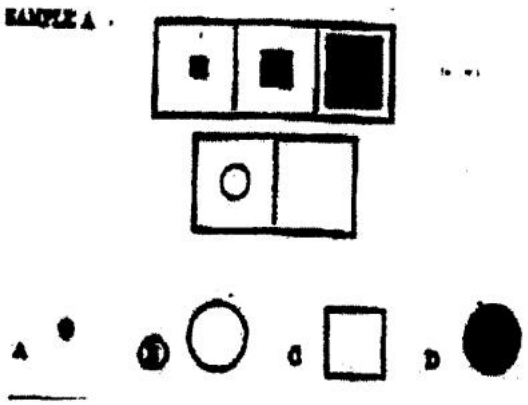
A. -7 B. 49 C. 14 D. 0

32. What is 100 flix 50?

A. 2 B. 150 C. 1 D. 50

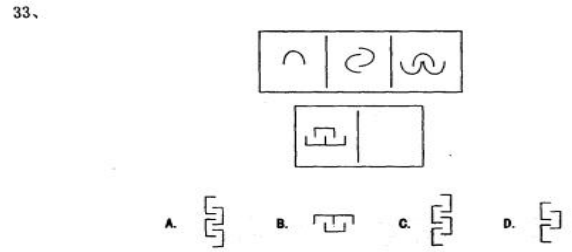
Guidance 9: In each question, the shapes in the first row of the box are arranged in a certain way, and the shapes in the second row are arranged in the same way. Please choose the shape that fits in the empty space.

Example A

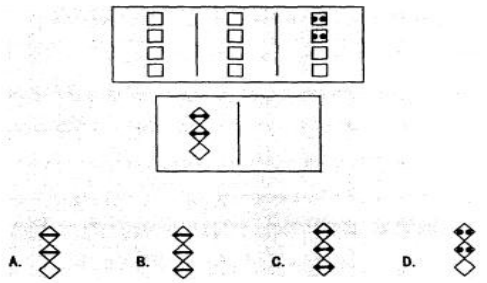


Example Explanation: The larger, unshaded circle B is the correct answer. The pattern in the first row of shapes in the box is that the shaded squares progressively get larger, so following the smaller, unshaded circle in the second row, there must be a larger, unshaded circle.

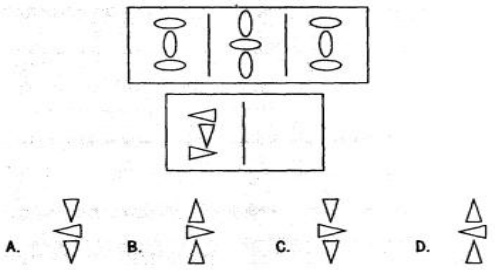
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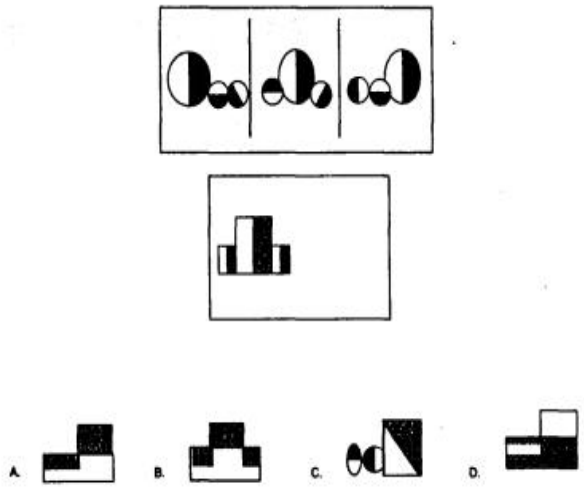
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35、



36、



Scoring Guidelines for the Triarchic Intelligence Scale

This assessment generates three fundamental scores: Analytical Intelligence (Items 1-12), Practical Intelligence (Items 13-24), and Creative Intelligence (Items 25-36). Additionally, three supplementary scores can be obtained: Verbal Test Score (Items 1, 2, 3, 4, 13, 14, 15, 16, 25, 26, 27, 28), Quantitative Test Score (Items 5, 6, 7, 8, 17, 18, 19, 20, 29, 30, 31, 32), and Spatial Test Score (Items 9, 10, 11, 12, 21, 22, 23, 24, 33, 34, 35, 36).

附录一：三元智力量表中国修订本

学校：　　班级：　　姓名：　　性　别：　　年　龄：　　分　数：（　　）

指导语：

1.首先感谢你对本研究的支持。你的认真回答对于我们的研究很有价值。

2.本智力量表包括 36 道选择题，答题时间为 60 分钟。

3.做选择题前老师将给你们讲解例题。如果在规定时间之前完成选择题部分，可以回过头检查所做的情况，直到老师宣布“停止答题”。

4.做选择题时，请你仔细阅读完题目后，在你认为正确的答案上用铅笔画图。每个题目只能选一个答案，不要多选，也不要漏选。

5.量表中的所有题目都要求完成，否则无法得到一个有效的智力分数。

6.请独立完成量表，不要与其他人讨论。

再次感谢你们的合作!

指导 1：仔细阅读题目，请在每一题的空缺处选择最恰当的一个词。

例题：_____是绿色的，因此我开始过街。

A 汽车　　B 信号　　C 灯　　D 树

例题解释：“C” “灯”是正确答案。“灯是绿色的，因此我 开始过街”。所有选项都可以是绿色的或者与街道有关，但只有灯是绿色时你可以过街。你 们有什么问题吗?请与例题相同的方式做下面的四个题。

1.1800 年前，通过科幻小说之父卢西恩写的两篇小说，_____ 经历了首次登月之旅。在第一个故事中，月球旅行是一次意外，航行在神秘水域中的一艘船被突如其

来的风暴吹到了月球上。另一个故事中的月球旅行是预先计划好的，故事中的英雄里奥罗门，长期训练一只大鸟，最后大鸟将他带到了月球。

A 宇航员　　B 读者　　C 科学家　　D 探险者

2. 只顾关注新的_____而忽略老客户的零售商，会发现销售额并没有增加。因为新的利润难以弥补老客户的流失所带来的损失。

A 产品　　B 消费者　　C 广告　　D 投资

3.旅行者静静地站着，注视着_____的第一个信号。他面前苍莽的玉龙雪山直入云霄，白雪覆盖着山顶。太阳出来时，阳光照在雪山上宛如彩虹。

A 黎明　　B 陆地　　C 冬天　　D 生命

4.如今新闻传播速度如此之快，以至于我们常常接收到相互矛盾的信息，却没有停下来仔细思考一些 _____。当然，有时是由于我们误解了新闻，但有时是由于新闻报道违背了客观真实性。

A 谬误　　B 推论　　C 不一致性　　D 原因

指导 2:每一个题涉及到一系列数字，这些数字系列中有一些规律。发现这个规律，并推算出这个数列中的下一个数字是什么。

例题：

12	16	20	24	?

A 30　　B 28　　C 26　　D 22

例题解释：规律是每个数字加 4 就得到数列中的下一个数字。12 加 4 等于 16,16 加 4 等于 20,20 加 4 等于 24。24 下面是什么数字呢?答案是 28。

5.

-4	-3	-1	3	11	27	?

A 62　　B 39　　C 43　　D 59

6

2	8	3	27	4	4	5	?

A 125　　B 100　　C 121　　D 81

7.

256	169	100	49	16	?

A 1　　B 4　　C 8　　D 9

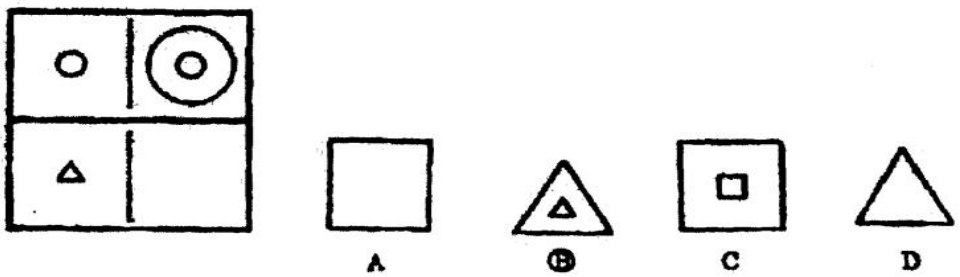
8.

3	2	12	6	48	18	?

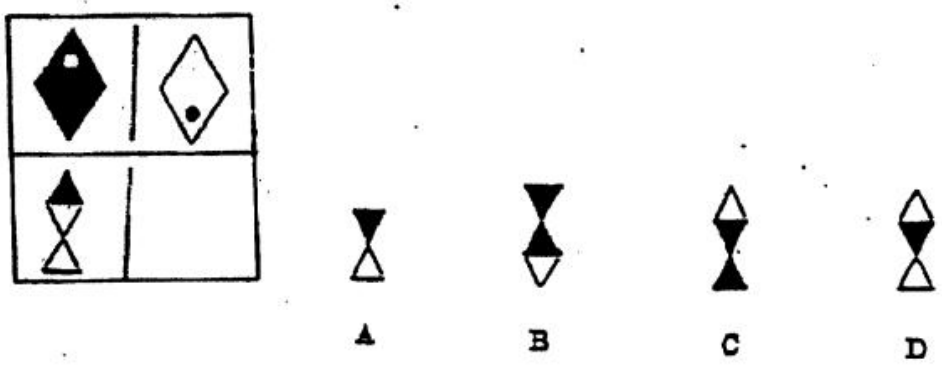
A 66　　B 192　　C 132　　D 144

指导 3：在每一个题目中，方框上一排的图形以某种方式排列着，方框下一排的图形以相同的方式排列，请选择空缺处的图形。

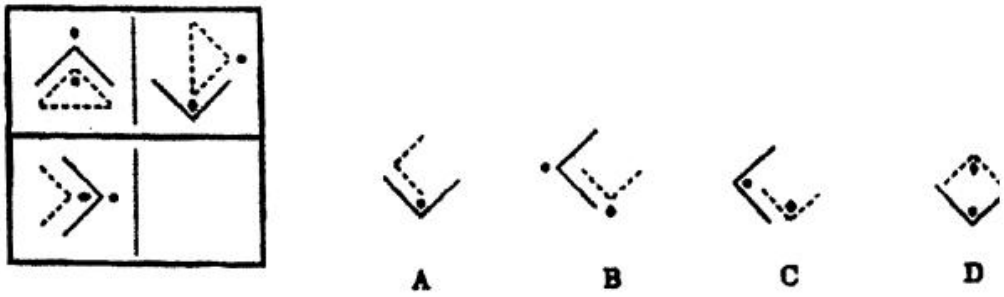
例题：



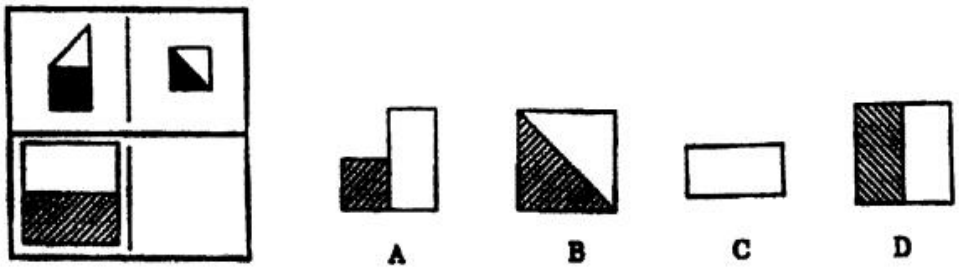
例题解释：在答案“B”中，小三角形在大三角形中，与小圆形在大圆形中的方式一样。



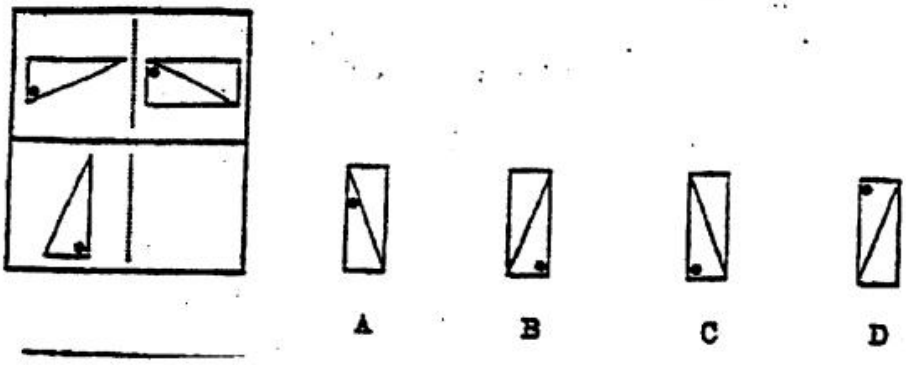
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11、



12、



指导 4：每个题目是高中生可能面临的一个现实问题。仔细阅读题目，选择一个最佳的解决方法，使它符合特定的情境和希望得到的结果。

例题：A 收到了大学录取通知书，每年的学费和生活费大概需要 12000 元。A 的父母收

入并不高，一年最多能给他/她提供 10000 元，其余的只能靠 A 自己想办法。你认为，下面哪种方法是解决这一问题的最佳选择？

A、向大学申请保留学籍一年，工作一年挣得所需要的费用后再上大学。

Ⓑ、利用暑假去打工，并且计划大学期间利用勤工俭学来挣得所需要的费用。

C、申请学生贷款。

D、从亲戚那里借钱。

例题解释：答案“B”是最佳选择，既可以使 A 获得所需要的钱，同时又锻炼他/她的社会能力。

13、B 是一名高三学生，他/她想了解一些名牌大学的信息，准备报考数学专业。下面哪一种方法可以为他/她提供最佳、最快的信息资源？

A、咨询班主任，他可能通过材料知道一些大学数学系的情况。同时咨询数学老师，他可能了解不同数学系的优势。

B、咨询英语老师，他毕业于名牌大学，并且有两个孩子也在上名牌大学。

C、到当地大学图书馆，查阅大学情况一览表和各个大学的简介。

D、让父母询问单位同事，他们中有人可能了解一些大学数学系的情况。

14、你最好的朋友最近上网成瘾，常常逃课去附近的网吧。你想找到一个有效的方式来帮助他/她，并且尽可能使他/她不受纪律处罚，下面哪一个将是最好的解决方法？

A、向你的父母咨询，即使你担心他们可能会告诉你朋友的父母或班主任。

B、询问你朋友上网成瘾的原因，并建议他/她寻求学校心理辅导老师的帮助。

C、将这一情况告诉班主任，并请求他不要对你的朋友做纪律处罚。

D、告诉你朋友上网成瘾的后果，并给他/她一些青少年如何戒除网瘾的资料。

15、你爱好写作，以后想当一名记者。今年暑假，你计划通过自己的能力赚一笔钱，买一套新近出版的经典名著。本市一家报社招聘兼职记者，你报名参加但没有被选上。你认为下面哪一种方法最佳，既能给你带来暑期收入，又为你提供未来职业的经验？

A、继续到其他报社申请兼职工作，如果都没有成功，你已经尽了最大努力，这时向父母提出需要钱买名著。

B、除非得到一份报社的兼职工作，否则这个暑假你不去打工，而是在家练习写作。

C、和报社招聘的人谈谈，看能否给你提供一个做义务记者的机会，同时你再找一份晚间的兼职工作。

D、询问这家报社的相关人员，看还有没有其他的工作岗位。希望一旦你在报社，将向他们证明你作为一个记者的才能。

16、你正在筹划你的生日聚会，想邀请一些朋友来参加。你最好的朋友甲告诉你，如果你邀请一个和他/她关系不好的朋友乙，那他/她就不会参加这个聚会。尽管甲反对，但你仍然想邀请乙。下面哪一个方法最佳，它既向甲表明了你对他/她的尊重，同时又不得罪乙？

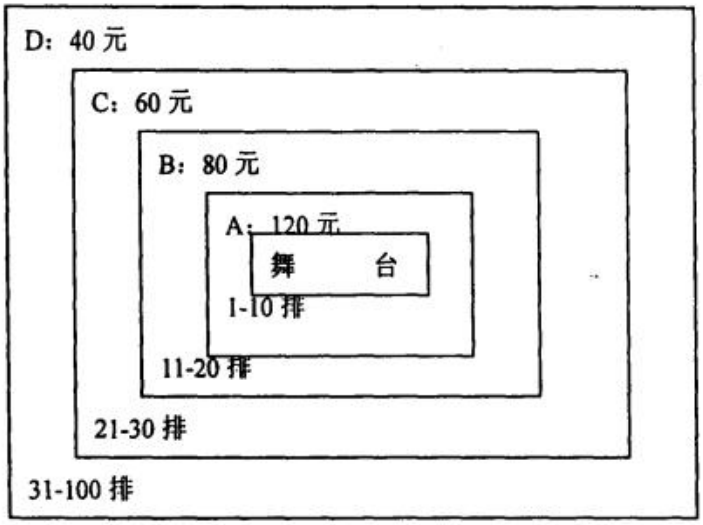
A、不邀请乙，但向他/她道歉，努力向他/她解释你为什么要尊重甲的感受。

B、邀请乙，告诉甲希望他/她无论如何要来参加聚会。

C、邀请乙，然后与甲讨论你的理由，努力让他/她相信你对他/她的友谊。

D、不邀请乙，决定今年再组织一次聚会，那时邀请乙来参加。

指导 5：每一个题要求你运用日常生活中的知识。仔细阅读题目，选择最佳的答案。



例题：最近一些歌星来本市开演唱会，其门票价格如上图所示。赵明和表弟买了 A 区的票，他的两个同学坐在第 25 排。请问这四张门票一共花了多少钱？

A　140 元　　B　240 元　　C　360 元　　D　400 元

例题解释：赵明和表弟两张票在 A 区，每张票价值 120 元，他的两个同学坐在第 25 排，每张票价是 60 元，故 4 张票价值是 240 加上 120 等于 360 元。

用制作蛋糕的两个处方来回答第 17 题。

制作巧克力蛋糕	制作鲜奶蛋糕
20 克奶油	10 克奶油
1 杯糖	1 杯糖
2 个鸡蛋	1 个鸡蛋
2 杯面粉	1 杯面粉
8 克巧克力粉	1 斤鲜奶
制作成：6 磅的巧克力蛋糕	制作成：4 磅的鲜奶蛋糕

17、有如下一些原料：40 克奶油、5 杯糖、6 个鸡蛋、7 杯面粉、16 克巧克力粉、3 斤鲜奶。如果你想做 12 磅巧克力蛋糕和 12 磅鲜奶蛋糕，还需要购买：

A、20 克奶油和 1 个鸡蛋　　B、20 克奶油和 1 杯面粉

C、30 克奶油和 1 杯糖　　D、30 克奶油和 1 个鸡蛋

用下表回答第 18 题

汽油价格：普通汽油 4.4 元/升
无铅汽油 5.2 元/升
优质汽油 6.4 元/升
自助服务：每升汽油打 9 折

18、周末你们一家开车去旅游，出门前到加油站加油。汽油价格如上表所示。你们的汽车用优质汽油或无铅汽油。如果有 60 元，你们能加多少汽油？

A、10 升优质汽油，加油站提供服务。

B、15 升无铅汽油，自助服务。

C、15 升普通汽油，加油站提供服务。

D、10 升优质汽油，自助式服务。

用下表回答第 19、20 题。

数学考试分数

考试	张燕	李鸣
1	65	86
2	84	91
3	72	88

19、如果即将到来的期末考试计算数学和语文的分数，张燕想要总评成绩为中等（平均分 69.5-79.4），她的语文能考的最低分数是多少？

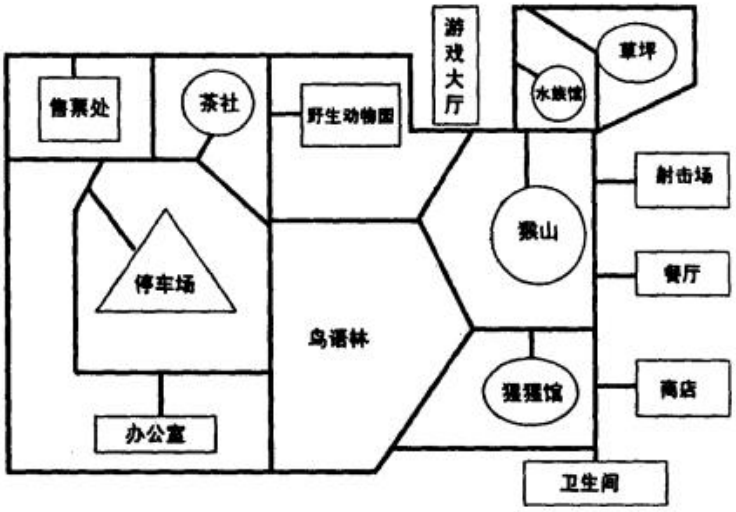
A、57　　B、58　　C、64　　D、65

20、如果把期末考试的成绩当作两次平时测验计算，李鸣错过了数学的期末考试，得了（）分，他最后的数学平均分是多少？

A、44　　B、53　　C、66　　D、88

指导 6：下面的题目要求你在地图上寻找最佳路线。仔细阅读题目，然后选择最佳答案。

下面是一个游乐园的地图，你可以在有黑色阴影的街道上走。使用这个地图来回答例题。



例题：你现在位于商店，要到售票处去接一个朋友。如果从最短的路线走，你将经过：

A、餐厅和游戏机大厅

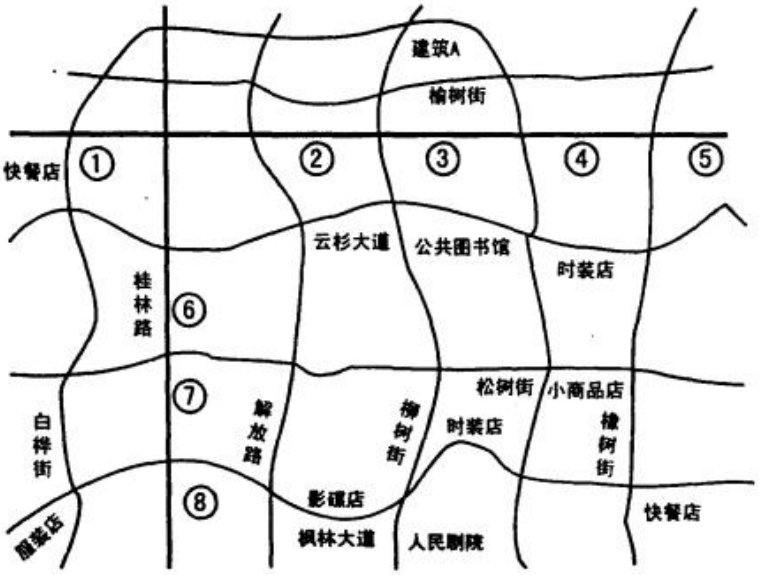
Ⓑ、猩猩馆和野生动物馆

C、猩猩馆和茶社

D、猴山和野生动物馆

例题解释：选择答案 B，最近的路线是从商店经过猩猩馆和野生动物馆。从商店到售票处有几条路可走，但最近的路线是从商店到猩猩馆，再到野生动物馆。

下面的地图显示了一个大城市的一部分。用地图来回答第 21、22 题。



21、你们学校正准备选两个店面开书店。根据上图，你认为下面哪两个地点可能吸引最多的顾客？

A 出口1和2　　B 出口3和8　　C 出口3和4　　D 出口5和8

22、在人民剧院看完演出后，你想骑车回家，它位于A处。如果你想避开云杉街和柳树街交叉路口的交通堵塞，并走最近的一条路线，你将骑车经过：

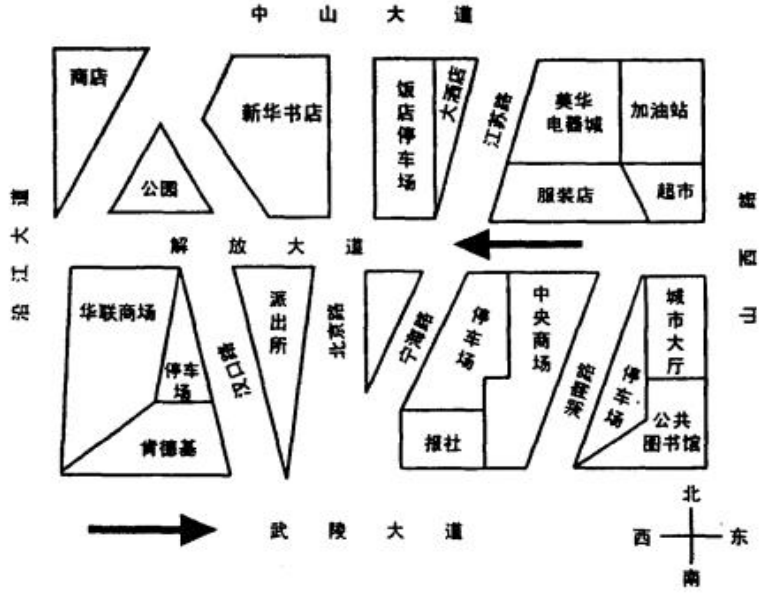
A、从枫林大道以西，然后到桂林路。

B、从松树街以西，然后到解放路。

C、从枫林大道以东，然后到橡树街。

D、从松树街以东，然后到橡树街。

下面是一个小镇的地图。AN 箭头显示汽车或卡车可以在街上行驶的方向。如果没有箭头，则可以双向行驶。用这个地图回答23、24题。



23、你即将离开图书馆去公园见一个朋友。如果你走最近的路线，你将：

A、从武陵大道以西，到北京路。

B、从山西路以北，到解放大道。

C、从湖南路的以北，到解放大道。

D、从武陵大道的以西，到汉口路。

24、当你在加油站时，一个开车的人向你询问到肯德基的方向。如果选择不违反交通规则的最简单路线，你将告诉他：

A、从山西路南边，到解放大道西面，再走汉口路南面。

B、从山西路南边，到湖南路西南面，再走武陵大道的西面。

C、从中山大道的西面，到沿江大道的南面，再走武陵大道的东面走。

D、从中山大道的西面，到北京路的南面，再走武陵大道的西面。

指导 7：下面每一个题中有一个“假”命题，你必须假设这个命题是真的。有时这个命题对你选择正确答案有重要帮助，有时则没有帮助。同时，每一个题目中有三个词，前两个词以某种方式结合，选择与第三个词相匹配的词，使它们与前两个词的结合方式相同。

例题：钱从树上落下。

雪与铲子，就如美元与：

A、帐单

B、耙子

C、银行

D、绿色

例题解释：答案是 B，耙子与美元的关系类似铲子与雪的关系，因为你的“假”命题是美元（钱）从树上掉下来。你用耙子清理钱，正如你用铲子清理雪一样。

25、鸟在合唱。

演员与独角戏，就如金丝雀与：

A、知更鸟

B、女高音

C、独奏曲

D、音乐

26、预言者延误了。

历史学家与过去，就如预言者与：

A、目前

B、记忆

C、将来

D、耽搁

27、颜色可以听见。

味道与舌头，就如阴影与：

A、耳朵

B、光线

C、声音

D、色彩

28、大海哭泣。

水与沙滩，就如海洋与：

A、食盐

B、眼泪

C、海滩

D、哭泣

指导 8：下面每一个题中，你将运用特殊的数学运算来解题。有两个特殊运算：graf 和 flix。首先，看这两个运算是如何定义的，然后选择问题的正确答案。

> 有一种新的运算叫“graf”，它的定义如下：如果 X<Y，则 X graf Y=X + Y，否则，X graf Y=X -Y。
>
> 有一种新的运算叫“flix”，它的定义如下：如果 A>B，则 A flix B=A+B；如果 A<B，则 A flix B=A×B；如果 A=B，则 A flix B=A+B。

例题 A：

4 graf 7 等于多少？

A、-3　B、3　◎、11　D、-11

例题 B：

4 flix 7 等于多少？

Ⓐ、28　B、11　C、3　D、-11

例题解释：例题 A 正确答案是 11，因为 4 小于 7，所以这里 graf 是两个数相加。例题 B 正确答案是 28，因为 4 小于 7，所以这里 flix 是两个数相乘。

29、13 graf 5 等于多少？

A、5　B、18　C、13　D、8

30、3 flix 7.5 等于多少？

A、10.5　B、21.5　C、22.5　D、4.5

31、7 graf 7 等于多少？

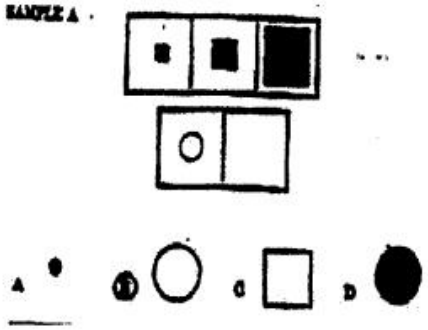
A、-7　B、49　C、14　D、0

32、100 flix 50 等于多少？

A、2　B、150　C、1　D、50

指导 9：在每一个题中，方框中的第一排图形以某种方式排列，第二排图形按照相同的方式排列。请选择空缺处的图形。

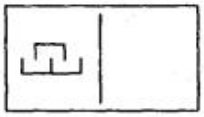
例题 A：



例题解释：较大的、没有阴影的圆形 B 是正确答案。方框中第一排图形的规律是，有阴影的正方形渐次变大，因此方框第二排中较小的、没有阴影的圆形后面，一定跟着较大的、没有阴影的圆形。

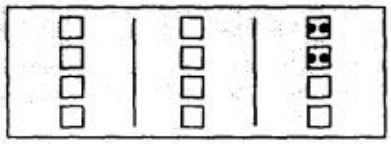
33、

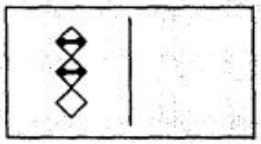




A.  B.  C.  D. 

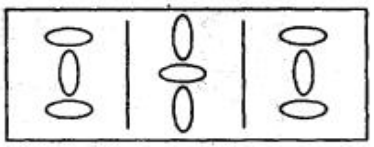
34、

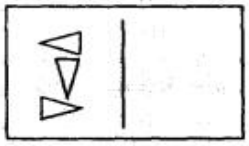




A.  B.  C.  D. 

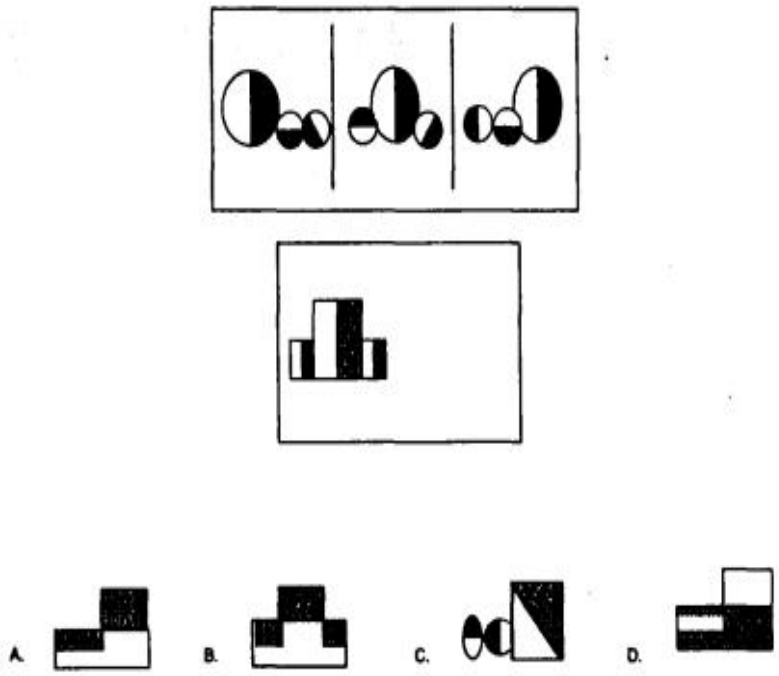
35、





A.  B.  C.  D. 

36、



这个测验产生 3 个基本分数：分析性智力（1-12 选择题），实践性智力（13-24 选择题），创造性智力（25-36 选择题），也可以得到另外 3 个分数，即言语分测验分数（第 1、2、3、4、13、14、15、16、25、26、27、28 选择题），数量分测验分数（第 5、6、7、8、17、18、19、20、29、30、31、32 选择题），图形分测验分数（第 9、10、11、12、21、22、23、24、33、34、35、36 选择题）。

Appendix C Learning Attitude Scale

This scale aims to understand your personal attitude towards the learning process. The content you fill in will only be used for educational research purposes. This is not an exam; there are no standard answers, nor will it affect your academic grades, and your information will not be disclosed. Please read each statement carefully and mark your actual feelings. A response of strongly disagree scores 1 point, disagree 2 points, somewhat agree 3 points, agree 4 points, and strongly agree 5 points. Higher scores indicate better learning attitudes.

There are no absolutely correct or incorrect answers in this questionnaire; you only need to answer honestly based on your personal situation. Thank you for your cooperation, and I wish you academic progress!

Basic Information:

Class:

Name:

Cognitive Aspect	1	2	3	4	5
Attending classes improves my professional knowledge. 上课提高了我的专业知识。					
Attending classes enhances my professional learning experience. 上课增强了我的专业学习体验。					
Attending classes improves my ability for professional practice. 上课提高了我进行专业实践的能力。					
I think attending classes is not very difficult. 我认为上课并不是很困难。					

Continued Appendix C Learning Attitude Scale

Attending classes helps me understand my ability in professional practice. 上课帮助我了解我在专业实践中的能力。					
Attending classes makes students like professional courses. 上课使学生喜欢专业课程。					
Attending classes allows me to learn new professional practical techniques. 上课让我学到了新的专业实践技术。					
Attending classes fosters a spirit of teamwork. 上课培养了团队合作精神。					
Affective Aspect					
I like the classroom courses. 我喜欢课堂课程。					
I hope to perform better in classroom courses. 我希望在课堂课程中表现得更好。					
I wish I could attend classroom courses every day. 我希望每天都能参加课堂课程。					
I feel a sense of achievement when mastering classroom courses. 掌握课程时，我感到一种成就感。					
Classroom courses teach me how to cooperate with others. 课堂课程教会我如何与他人合作。					
I am eager to know the content of each class. 我渴望知道每节课的内容。					

Continued Appendix C Learning Attitude Scale

I feel happy during classroom courses. 上课时，我感到快乐。					
I look forward to each classroom course. 我期待每一次课程。					
I feel relaxed and stress-free during classroom courses. 课程中，我感到放松和无压力。					
Attending classes increases my opportunities to interact with other students. 上课增加了我与其他学生互动的机会。					
Intentional Action Aspect					
I actively collect information related to classroom courses. 我积极收集与课程相关的信息。					
I actively answer questions asked by the lecturer during class. 上课时，我积极回答讲师提出的问题。					
I use my free time to practice operations I'm not proficient in from the classroom courses. 我利用空闲时间练习课程中我不擅长的操作。					
During class, I hope the lecturer asks me to demonstrate. 上课时，我希望讲师让我示范。					
During class, I hope to become a peer tutor. 上课时，我希望成为同伴导师。					
I actively participate in activities related to the class. 我积极参与与课堂相关的活动。					

Continued Appendix C Learning Attitude Scale

I actively watch videos related to the class. 我积极观看与课堂相关的视频。					
I am willing to spend more time mastering professional skills from the class. 我愿意花更多时间掌握课堂中的专业技能。					
I listen attentively to the lecturer's explanations and demonstrations. 我专心听讲师的讲解和示范。					

Appendix D Cognitive Style SOP (Style of Processing) Scale

This scale is designed to understand your personal style or method in handling different matters. The content you provide will only be used for educational research purposes. This is not a test, there are no right or wrong answers, and it will not affect your academic grades. Your data will remain confidential. Please read each statement carefully and mark the appropriate choice based on your actual feelings. There are no absolutely correct or incorrect answers; just answer honestly according to your personal situation. Thank you for your cooperation and best wishes for your academic progress!

Basic Information:

Class:

Name:

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I like to engage in work that requires the use of text. 我喜欢从事需要使用文字的工作。					
I like to envision future events or scenes in my mind. 我喜欢在脑海中想象未来的事件或场景。					
I seem never to find the appropriate words I need. 我似乎总是找不到需要的恰当的词语。					

Continued Appendix D Cognitive Style SOP (Style of Processing) Scale

I engage in many reading activities. 我经常进行阅读活动。					
I like to reminisce about special moments in my life by picturing them in my mind. 我喜欢通过在脑海中想象来回忆生活中特别的时刻。					
I think I often use words inappropriately. 我认为我经常使用不恰当的词语。					
Before engaging in an activity, I usually close my eyes and visualize how to proceed. 在进行一项活动之前，我通常会闭上眼睛想象如何进行。					
I enjoy learning new vocabulary. 我喜欢学习新词汇。					
When I hear others describe their experiences, I try to visualize the events in my mind. 当听到别人描述他们的经历时，我会尽量在脑海中想象这些事件。					

Continued Appendix D **Cognitive Style SOP (Style of Processing) Scale**

When I recall people I know, I often picture their faces in my mind.					

当我想起我认识的人时，我经常在脑海中想象他们的面孔。					
I find visualizing graphs or images in my mind helpful when doing many things. 当我在做很多事情时，我发现脑海中想象图表或图像很有帮助。					
Before attempting something, I like to read instructions on how to do it. 在尝试某件事之前，我喜欢阅读关于如何做的指示。					
I often think about synonyms for words. 我经常思考单词的同义词。					
When I have forgotten something, I often try to visualize it in my mind to remember. 当忘记某件事时，我经常试图在脑海中想象它来记住它。					
I have difficulty learning new vocabulary. 我学习新词汇有困难。					

Continued Appendix D Cognitive Style SOP (Style of Processing) Scale

I like to use images or pictures in my mind to help solve problems. 我喜欢在脑海中用图像或图片来帮					

助解决问题。					
I prefer activities that do not require a lot of reading. 我更喜欢不需要大量阅读的活动。					
I spend very little time trying to increase my vocabulary. 我花很少时间尝试增加我的词汇量。					
I rarely visualize past events in my mind. 我很少在脑海中想象过去的事件。					
My thinking is usually composed of pictures and images. 我的思维通常由图片和图像组成。					

Appendix E Teacher's Teaching Records

Teacher's Teaching Records **教师教学工作日志**	
School Name: 学校名称：	
Unit Name: 单元名称：	
Class: 班级：	
Instructor: 授课教师：	
Teaching Method: 授课方法：	
Teaching Date, Time, and Location: 授课日期、时间和地点：	
Teaching Objectives and Plan: 教学目标和计划：	
Teaching Resources: 教学资源：	
Key Teaching Points and Difficulties: 教学重难点：	
Teaching Steps and Process: 教学步骤和流程：	
Preparation Notes: 备课备注：	
Reflection and Evaluation: 反思与评估：	

Appendix F Teaching Activity Worksheet

Teaching Activity Worksheet **教学活动工作表**	
School Name: 学校名称：	
Unit Name: 单元名称：	
Class: 班级：	
Name: 姓名：	
Seat Number: 座位号：	
Instructor: 授课教师：	
Teaching Date, Time, and Location: 授课日期、时间和地点：	
Favorite Part of This Unit's Course Teaching: 本单元的课程教学中最喜欢的部分：	
Least Favorite Part of This Unit's Course Teaching: 本单元的课程教学中最不喜欢的部分：	

Continued Appendix F Teaching Activity Worksheet

Difficulties Encountered During This Unit's Course Learning: 本单元课程学习时遇到的困难：	
Gains from This Unit's Course: 本单元课程的收获：	
Self-Evaluation: 自我评价：	
Feedback and Suggestions on Course Content and Teaching: 对课程内容和教师教学方面的反馈和建议：	

Appendix G Student's Reflection Report

Student's Reflection Report **学生学习反思报告**	
School Name: 学校名称：	
Unit Name: 单元名称：	
Class: 班级：	
Name: 姓名：	
Seat Number: 座位号：	
Instructor: 授课教师：	
Teaching Date, Time, and Location: 授课日期、时间和地点：	
Learning Reflection (Reflect on and summarize your experiences and insights regarding the instructor's teaching resources, teaching methods, course content, classroom interaction, satisfaction, participation, etc. Additionally, provide your own suggestions and expectations.): 学习反思（针对教师的教学资源、教学方法、教学内容、课堂互动、满意度、参与度等方面总结收获和反思，并提出自己的建议和期望）：	

Appendix H Teaching Activity Design

Table H1: Teaching Activity Design for Experimental Group in Management Course Unit 2-1

Teaching Plan	Unit 2-1: Leadership Theories and Styles
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Pre-recorded lectures, interactive forums, leadership style assessment tools, case study videos
Teaching Objectives	To explore various leadership theories and assess different leadership styles; to apply theoretical knowledge to practical scenarios
Activity Objectives	To critically analyse the effectiveness of leadership styles in different situations; to develop personal leadership style awareness
Activity Process and Content	Pre-Class: Students engage with pre-recorded lectures and materials, complete a leadership style self-assessment, and prepare a case study analysis. In-Class: Interactive group discussions on case studies, role-playing exercises to demonstrate leadership styles, and collaborative evaluation of leadership scenarios
Time Assessment	Pre-Class: An hour, In-Class: An hour and a half Homework

Table H2: Teaching Activity Design for Control Group in Management Course Unit 2-1

Teaching Plan	Unit 2-1: Leadership Theories and Styles
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, lecture notes, chalkboard/whiteboard for in-class illustration
Teaching Objectives	To explore various leadership theories and assess different leadership styles; to apply theoretical knowledge to practical scenarios
Activity Objectives	To critically analyse the effectiveness of leadership styles in different situations; to develop personal leadership style awareness
Activity Process and Content	In-Class: The instructor delivers a lecture on leadership theories, discusses key points with visual aids, engages students through direct questioning, and provides examples illustrating different leadership styles
Time	In-Class: An hour and a half
Assessment	Homework

Table H3: Teaching Activity Design for Experimental Group in Management Course Unit 2-2

Teaching Plan	Unit 2-2: The Role of Management in Leadership
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Pre-recorded video lectures, online discussion boards, role-play scenarios, peer-reviewed journal articles
Teaching Objectives	To analyze the intersection of management functions and leadership roles; to evaluate the impact of effective management on leadership effectiveness
Activity Objectives	To synthesize concepts from management and leadership; to apply management principles to enhance leadership
Activity Process and Content	Pre-Class: Students watch videos and read materials focusing on management's role in leadership, participate in online forums. In-Class: Case study analyses, group discussions, role-play exercises simulating management situations requiring leadership.
Time	Pre-Class: An hour, In-Class: An hour and a half
Assessment	Homework

Table H4: Teaching Activity Design for Control Group in Management Course Unit 2-2

Teaching Plan	Unit 2-2: The Role of Management in Leadership
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, lecture slides, in-class handouts
Teaching Objectives	To analyze the intersection of management functions and leadership roles; to evaluate the impact of effective management on leadership effectiveness
Activity Objectives	To synthesize concepts from management and leadership; to apply management principles to enhance leadership
Activity Process and Content	In-Class: Lecture on the role of management in leadership, discussion of textbook cases, Q&A sessions with students to clarify concepts.
Time	In-Class: An hour and a half
Assessment	Homework

Table H5: Teaching Activity Design for Experimental Group in Management Course Unit 3-1

Teaching Plan	Unit 3-1: Techniques and Tools for Decision Making
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Interactive decision-making tools, simulation software, pre-recorded video lectures, case studies from online business journals
Teaching Objectives	To explore various decision-making techniques and tools; to apply decision-making models to business scenarios
Activity Objectives	To critically evaluate decision-making processes; to practice using decision-making tools in simulations
Activity Process and Content	Pre-Class: Students engage with video lectures and simulations, analyze case studies. In-Class: Interactive simulations, group discussions on decision-making techniques, and application of tools to new scenarios.
Time	Pre-Class: An hour, In-Class: An hour and a half
Assessment	Homework

Table H6: Teaching Activity Design for Control Group in Management Course Unit 3-1

Teaching Plan	Unit 3-1: Techniques and Tools for Decision Making
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, lecture slides, handouts of decision-making models
Teaching Objectives	To explore various decision-making techniques and tools; to apply decision-making models to business scenarios
Activity Objectives	To critically evaluate decision-making processes; to practice using decision-making tools in simulations
Activity Process and Content	In-Class: Lecture presentation on decision-making techniques, review of textbook content, teacher-led demonstrations of decision-making tools, classroom discussion on model applicability.
Time	In-Class: An hour and a half
Assessment	Homework

Table H7: Table: Teaching Activity Design for Experimental Group in Management Course Unit 3-2

Teaching Plan	Unit 3-2: Problem-Solving Strategies and Approaches
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Pre-recorded video tutorials, interactive simulations, online discussion platforms, articles on problem-solving strategies
Teaching Objectives	To understand and apply structured problem-solving strategies; to evaluate the effectiveness of different problem-solving approaches in management
Activity Objectives	To practice problem-solving in real-world scenarios; to develop critical thinking skills in the context of managerial decision-making
Activity Process and Content	Pre-Class: Students review video tutorials on problem-solving frameworks, engage in online discussions, and work through simulation exercises. In-Class: Students participate in problem-based learning activities, collaborative workshops, and peer reviews of proposed solutions to case studies.
Time	Pre-Class: An hour, In-Class: An hour and a half
Assessment	Homework

Table H8: Teaching Activity Design for Control Group in Management Course Unit 3-2

Teaching Plan	Unit 3-2: Problem-Solving Strategies and Approaches
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, lecture slides, case study printouts
Teaching Objectives	To understand and apply structured problem-solving strategies; to evaluate the effectiveness of different problem-solving approaches in management
Activity Objectives	To practice problem-solving in real-world scenarios; to develop critical thinking skills in the context of managerial decision-making
Activity Process and Content	In-Class: teacher-led lecture on problem-solving strategies, discussion and analysis of case studies from the textbook, and in-class problem-solving activities.
Time	In-Class: An hour and a half
Assessment	Homework

Table H9: Table: Teaching Activity Design for Experimental Group in Management Course Unit 4-1

Teaching Plan	Unit 4-1: Recruitment and Selection
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Pre-recorded video interviews, online HR platforms, recruitment simulation tools
Teaching Objectives	To comprehend and apply modern recruitment and selection processes; to evaluate the effectiveness of different recruitment strategies
Activity Objectives	To simulate recruitment processes; to develop skills in candidate evaluation and selection
Activity Process and Content	Pre-Class: Students study video modules on recruitment, interact with online HR tools, and prepare mock job postings. In-Class: Role-playing interviews, peer evaluations of mock recruitment sessions, discussions on best practices in selection.
Time	Pre-Class: An hour, In-Class: An hour and a half
Assessment	Homework

Table H10: Teaching Activity Design for Control Group in Management Course Unit 4-1

Teaching Plan	Unit 4-1: Recruitment and Selection
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, lecture notes, handouts
Teaching Objectives	To comprehend and apply modern recruitment and selection processes; to evaluate the effectiveness of different recruitment strategies
Activity Objectives	To simulate recruitment processes; to develop skills in candidate evaluation and selection
Activity Process and Content	In-Class: Lectures on recruitment strategies, discussion of case studies in textbook, teacher-led demonstrations of interview techniques.
Time	In-Class: An hour and a half
Assessment	Homework

Table H11: Teaching Activity Design for Experimental Group in Management Course Unit 4-2

Teaching Plan	Unit 4-2: Employee Training and Development
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Online training modules, interactive e-learning platforms, video case studies, webinars from industry experts
Teaching Objectives	To understand and apply theories and methods of employee training; to assess the impact of development programs on organizational performance
Activity Objectives	To engage in the design of training modules; to critically assess training outcomes
Activity Process and Content	Pre-Class: Students complete online training simulations, participate in webinars, and review video case studies. In-Class: Group design of a training program, presentations of training module designs, peer feedback sessions.
Time	Pre-Class: An hour, In-Class: An hour and a half
Assessment	Homework

Table H12: Teaching Activity Design for Control Group in Management Course Unit 4-2

Teaching Plan	Unit 4-2: Employee Training and Development
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, printed handouts, in-class presentations
Teaching Objectives	To understand and apply theories and methods of employee training; to assess the impact of development programs on organizational performance
Activity Objectives	To engage in the design of training modules; to critically assess training outcomes
Activity Process and Content	In-Class: Lecture on training strategies, teacher-led discussion on development case studies, analysis of organizational benefits of employee development.
Time	In-Class: An hour and a half
Assessment	Homework

Table H13: Teaching Activity Design for Experimental Group in Management Course Unit 5-1

Teaching Plan	Unit 5-1: Understanding Organizational Change
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Interactive case studies, organizational change simulation software, podcasts from change management experts
Teaching Objectives	To explore the dynamics of organizational change; to analyze change management theories
Activity Objectives	To examine case studies for real-world application; to utilize simulations to understand change impact
Activity Process and Content	Pre-Class: Students review multimedia materials, engage with simulations, and participate in online discussion forums. In-Class: Group discussions on change theories, presentations of case study findings, and collaborative problem-solving exercises related to change scenarios.
Time	Pre-Class: An hour, In-Class: An hour and a half
Assessment	Homework

Table H14: Teaching Activity Design for Control Group in Management Course Unit 5-1

Teaching Plan	Unit 5-1: Understanding Organizational Change
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, lecture slides, case study handouts
Teaching Objectives	To explore the dynamics of organizational change; to analyze change management theories
Activity Objectives	To examine case studies for real-world application; to utilize simulations to understand change impact
Activity Process and Content	In-Class: Lectures on change management models, analysis of textbook case studies, class discussion to highlight examples of successful and unsuccessful organizational changes.
Time	In-Class: An hour and a half
Assessment	Homework

Table H15: Teaching Activity Design for Experimental Group in Management Course Unit 5-2

Teaching Plan	Unit 5-2: Strategies for Effective Change Management
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Pre-recorded expert talks, virtual workshops, interactive change management tools, online forums for discussion
Teaching Objectives	To examine and apply strategies for implementing effective organizational change; to critically assess the outcomes of change initiatives
Activity Objectives	To engage with change management concepts actively; to design and evaluate a change management plan
Activity Process and Content	Pre-Class: Students watch expert talks and engage in virtual workshops, use interactive tools to draft change management plans. In-Class: Groups present their change management plans, participate in peer reviews, and engage in scenario-based activities to test their strategies.
Time	Pre-Class: An hour, In-Class: An hour and a half
Assessment	Homework

Table H16: Teaching Activity Design for Control Group in Management Course Unit 5-2

Teaching Plan	Unit 5-2: Strategies for Effective Change Management
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, lecture slides, printed case studies
Teaching Objectives	To examine and apply strategies for implementing effective organizational change; to critically assess the outcomes of change initiatives
Activity Objectives	To engage with change management concepts actively; to design and evaluate a change management plan
Activity Process and Content	In-Class: Teacher delivers a lecture on change management strategies, facilitates class discussion on case studies, and conducts Q&A sessions to clarify concepts.
Time	In-Class: An hour and a half
Assessment	Homework

Table H17: Teaching Activity Design for Experimental Group in Management Course Unit 6-1

Teaching Plan	Unit 6-1: Contemporary Change Management Issues
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Online training modules, interactive e-learning platforms, video case studies, webinars from industry experts
Teaching Objectives	To explore the dynamics of Contemporary Change Management Issues; to analyze Contemporary Change Management cases
Activity Objectives	To examine case studies for real-world application; to utilize simulations to understand change impact
Activity Process and Content	Pre-Class: Students complete online training simulations, participate in webinars, and review video case studies. In-Class: Group design of a training program, presentations of training module designs, peer feedback sessions.
Time	Pre-Class: An hour, In-Class: An hour and a half
Assessment	Homework

Table H18: Teaching Activity Design for Control Group in Management Course Unit 6-1

Teaching Plan	Unit 6-1: Contemporary Change Management Issues
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, lecture slides, case study handouts
Teaching Objectives	To explore the dynamics of Contemporary Change Management Issues; to analyze Contemporary Change Management cases
Activity Objectives	To examine case studies for real-world application; to utilize simulations to understand change impact
Activity Process and Content	In-Class: Lectures on Contemporary Change Management Issues, analysis of textbook case studies, class discussion to highlight examples of successful and unsuccessful cases.
Time	In-Class: An hour and a half
Assessment	Homework

Table H19: Teaching Activity Design for Experimental Group in Management Course Unit 6-2

Teaching Plan	Unit 6-2: Inspiring Innovation
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Pre-recorded video tutorials, interactive simulations, online discussion platforms, articles on inspiring innovation
Teaching Objectives	To examine and apply strategies for innovation inspiring ; to critically assess the outcomes of innovative management plan
Activity Objectives	To engage with Inspiring Innovation activities; to design and evaluate a innovative management plan
Activity Process and Content	Pre-Class: Students review video tutorials on Inspiring Innovation, engage in online discussions, and work through simulation exercises. In-Class: Students participate in Innovation Inspiring activities, collaborative workshops, and peer reviews of proposed solutions to case studies.
Time	Pre-Class: An hour, In-Class: An hour and a half
Assessment	Homework

Table H20: Teaching Activity Design for Control Group in Management Course Unit 6-2

Teaching Plan	Unit 6-2: Inspiring Innovation
Source of Teaching Material	"Fundamentals of Management" by Higher Education Press
Teaching Resources	Textbook, lecture slides, printed case studies
Teaching Objectives	To examine and apply strategies for innovation inspiring ; to critically assess the outcomes of innovative management plan
Activity Objectives	To engage with Inspiring Innovation activities; to design and evaluate a innovative management plan
Activity Process and Content	In-Class: teacher delivers a lecture on Inspiring Innovation, facilitates class discussion on case studies, and conducts Q&A sessions to clarify concepts.
Time	In-Class: An hour and a half
Assessment	Homework