

**THE RELATIONSHIPS BETWEEN LEARNING
OUTCOMES, PROJECT-BASED LEARNING,
ASSESSMENT STRATEGIES AND GRADUATE
COMPETENCE IN PUBLIC HIGHER
VOCATIONAL EDUCATION IN CHINA**

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VOCATIONAL EDUCATION IN CHINA**

by

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TABLE OF CONTENTS

ACKNOWLEDGEMENT	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	viii
LIST OF FIGURES	x
LIST OF ABBREVIATIONS	xi
LIST OF APPENDICES	xiii
ABSTRAK	xiv
ABSTRACT	xvi
CHAPTER 1 INTRODUCTION	1
1.1 Introduction	1
1.2 Background of the Study	1
1.2.1 The State of Outcome-based Education (OBE) in China's Higher Education	5
1.2.2 The State of Outcome-Based Education (OBE) in China's Public Higher Vocational Colleges (PHVCs)	7
1.3 Problem Statement	9
1.4 Aims of the Study	17
1.5 Objectives of the Study	19
1.6 Research Questions	19
1.7 Significance of the Study	20
1.8 Scope of the study	22
1.9 Limitations of the Study	24
1.10 Conceptual and Operational Definitions Terms of the Study	25
1.11 Thesis Organisation	27
1.12 Summary	28
CHAPTER 2 LITERATURE REVIEW	29

2.1	Introduction.....	29
2.2	Outcome-Based Education: Background and Rationale.....	29
2.2.1	OBE Implementation Around the World.....	30
2.2.2	OBE Implementation in China	42
2.2.3	Challenges and Barriers to Outcome-based Education Implementation.....	45
2.3	Outcome-based Education: Process and Practice	46
2.4	Graduate Competence	48
2.5	Identification of Graduate Competence for Cross-border E-commerce Program.....	51
2.5.1	Digital Communicative Capabilities	58
2.5.2	International Marketing Capabilities	60
2.5.3	The Quality Related to International E-commerce.....	61
2.6	Intended Learning Outcomes	62
2.6.1	Different Levels of Intended Learning Outcomes.....	63
2.6.2	Alignment of Learning Outcomes Across Three Levels	66
2.6.3	Defining Intended Learning Outcomes Through Bloom 's Taxonomy.....	67
2.6.4	Intended Learning Outcomes for Cross-border E-Commerce.....	70
2.7	Teaching and Learning Activities in Outcome-based Education.....	75
2.7.1	Project-based Learning	77
2.7.2	Justification for Adopting Project-based Learning in this Study.....	77
2.7.3	Models of Project-Based Learning in the Literature	79
2.7.4	Phases of Integrating Project-based Learning into Outcome- based Education.....	81
2.8	Assessment Strategies in Outcome-based Education.....	83
2.8.1	Designing Assessment Strategies Aligned with Intended Learning Outcomes.....	84

2.8.2	Critical Elements for Designing Assessment Strategies in Outcome-based Education	85
2.8.2(a)	Implementing Diverse Assessment Methods to Measure Learning Outcomes.....	85
2.8.2(b)	Applying Clear Criteria and Standards in Assessment	88
2.8.2(c)	Aligning Assessment Tasks with Intended Learning Outcomes	89
2.8.2(d)	Ensuring Alignment Among Learning, Teaching, and Assessment Activities.....	90
2.9	Theoretical Foundation of the Study.....	91
2.9.1	Two Primary Aspects of Constructive Alignment	92
2.9.2	Operating Components of Constructive Alignment	93
2.9.3	Theoretical Framework for OBE Implementation in the CBEC Program	95
2.10	Hypothesis Development	97
2.10.1	The Relationship between Intended Learning Outcomes and the Attainment of Graduate Competence	97
2.10.2	Project-based Learning as a Mediator between Intended Learning Outcomes and the Attainment of Graduate Competence	99
2.10.3	Assessment strategies as a Mediator between Intended Learning Outcomes and Assessment Strategies	102
2.11	Conceptual Framework of the Study	104
2.12	Summary	108
CHAPTER 3 METHODOLOGY		110
3.1	Introduction.....	110
3.2	Research Philosophy and Methods	110
3.3	Research Design.....	112
3.4	Population and Sample of the Study	115
3.4.1	Population of the Study	115
3.4.2	Sample and Sampling Technique	118

3.4.3	Sample Criteria	119
3.4.4	Sample Size of the study	120
3.5	Research Instrument.....	122
3.5.1	Instrument Development of the Study	123
3.5.2	Instrument Adaptation Process	130
3.6	Pilot Study.....	133
3.7	Data Collection	138
3.8	Data Analysis and Procedure	139
3.8.1	Preliminary Data Analysis.....	140
3.8.2	Structural Equation Modelling	141
3.9	Justifications for Using SEM in This Study	143
3.10	Ethical Consideration.....	144
3.11	Summary	146
CHAPTER 4 RESULTS.....		148
4.1	Introduction.....	148
4.2	Data Screening	148
4.2.1	Test of Normality.....	149
4.2.2	Common Method Bias.....	151
4.3	Characteristics of Sample.....	152
4.4	Analytical Strategy.....	155
4.4.1	Assessment of Measurement Model.....	156
4.4.1(a)	Convergent Validity	157
4.4.1(b)	Discriminant Validity	160
4.4.2	Assessment of Structural Model.....	162
4.4.3	Path Analysis	164
4.5	Hypotheses Tested	167
4.5.1	Results of the Direct-Effect Hypotheses Test.....	167

4.5.2	Mediating Roles of Project-based Learning and Assessment Strategies	170
4.5.2(a)	Project-based Learning as a Mediator	176
4.5.2(b)	Assessment Strategies as a Mediator.....	177
4.5.2(c)	Project-based Learning and Assessment Strategies as Chain Mediators.	178
4.6	Effect Sizes	179
4.6.1	Ratio Measures of Effect Sizes.....	182
4.6.2	Comparing Specific Indirect Effects	183
4.7	Summary	187
CHAPTER 5 DISCUSSION AND CONCLUSION.....		188
5.1	Introduction.....	188
5.2	Overview of Background, Procedures, and Results.....	188
5.3	Discussions Related to Research Questions	192
5.3.1	Discussion of Research Question 1	193
5.3.2	Discussion of Research Question 2	197
5.3.3	Discussion of Research Question 3	200
5.3.4	Discussion of Research Question 4	205
5.4	Implications of the Study	213
5.4.1	Theoretical Implications	214
5.4.2	Practical Implications	216
5.4.3	Managerial Implications	219
5.5	Limitations and Recommendations for Future Studies.....	221
5.6	Conclusion	224
REFERENCES.....		228
APPENDICES		
LIST OF PUBLICATIONS		

LIST OF TABLES

	Page
Table 1.1	ISCED coding of levels 1
Table 2.1	Main factors influencing students' attainment of graduate competence. 32
Table 2.2	Research on International E-commerce Competence 54
Table 2.3	Guidelines for defining the PEOs. 64
Table 2.4	Program Learning Outcomes for Cross-border E-commerce Program..... 72
Table 2.5	Course Outcomes for a Typical Course. 73
Table 2.6	CO-PLO Mapping..... 74
Table 2.7	Mapping Bloom's Taxonomy to the Assessment of Graduate Competence Development 87
Table 3.1	The number of CBEC Learners in the Four PHVCs..... 117
Table 3.2	Detailed Information of the Constructs..... 123
Table 3.3	Measurement Items of the Intended Learning Outcomes 124
Table 3.4	Measurement Items of Project-based Learning 126
Table 3.5	Measurement Items of Assessment Strategies 128
Table 3.6	Measurement Items of the Attainment of Graduate Competencies 129
Table 3.7	Expert information for the instrument validation 130
Table 3.8	The Cronbach's Alpha Values of the Key Constructs (Pilot Study)..... 134
Table 3.9	Results of KMO and Bartlett's Test of Sphericity for Latent Variables 135
Table 3.10	Factor Loadings for all the Measurement Items 136
Table 3.11	Summary of Measurement and Structural Indicators 142
Table 4.1	Results of the Normality Test 150

Table 4.2	Results of Harman' s Single Factor Test.....	152
Table 4.3	Demographic Characteristics of the Respondents	154
Table 4.4	Degree of Reliability Scale	157
Table 4.5	Reliability and Validity Results	159
Table 4.6	The Discriminatory Validity Test of Latent Variables	161
Table 4.7	Goodness of Fit Index of the Structural Model	164
Table 4.8	The Testing Results of Path Relationship.....	169
Table 4.9	Direct, Indirect, and Total Effects of the Hypothesised Model.	172
Table 4.10	Results of Mediation Analysis	175
Table 4.11	Direct, Indirect, and Total Effects in the Hypothesised Model.	186
Table 5.1	Summary of Findings Related to the Aim of the Study and Research Objective 1	197
Table 5.2	Summary of Findings Related to the Aim of the Study and Research Objective 2	200
Table 5.3	Summary of Findings Related to the Aim of the Study and Research Objective 3	204
Table 5.4	Summary of Findings Related to the Aim of the Study and Research Objective 4	208

LIST OF FIGURES

	Page
Figure 2.1 Constructive Alignment Framework in the CBEC Program	96
Figure 2.2 Conceptual Framework of the Study	105
Figure 3.1 Calculation of Minimum Required Sample Size	121
Figure 4.1 Research Model in AMOS.....	156
Figure 4.2 Path Diagram and Standardised Estimate.	167
Figure 4.3 The Path Diagram and Standardised Estimate of Project-based Learning	177
Figure 4.4 The Path Diagram and Standardised Estimate of Assessment Strategies.....	178
Figure 4.5 Illustration of Chain Mediation Model	181
Figure 5.1 An Innovative OBE Framework for CBEC Programs at China's Higher Vocational Colleges	211

LIST OF ABBREVIATIONS

AACSB	Association to Advanced Collegiate School of Business
CA	Constructive Alignment
AVE	Average Variance Extracted
CBEC	Cross-border E-commerce
CFA	Confirmatory Factor Analysis
CHVE	China's Higher Vocational Education
CI	Confidence Interval
CMB	Common Method Bias
COs	Course Outcomes
CQI	Continuous Quality Improvement
CR	Composite Reliability
(GoF)	Goodness-of-Fit
HEIs	Higher Education Institutions
HVE	Higher Vocational Education
HVCs	Higher Vocational Colleges
PHVCs	Public Higher Vocational Colleges
ISCED	International Standard Classification of Education
MLE	Maximum Likelihood Estimation
MoE	Ministry of Education
MoEC	Ministry of Education of China
OBE	Outcome-based Education
PLOs	Program Learning Outcomes
PEOs	Program Educational Objectives

SEM	Structural equation modelling
TE	Total Effect
TIE	Total Indirect Effect
TLAs	Teaching and Learning Activities

LIST OF APPENDICES

Appendix A	An Overview of the Methodology of the Study
Appendix B	Research Questionnaire
Appendix C	Questionnaire Information
Appendix D	Revised Research Questionnaire (English)
Appendix E	Revised Research Questionnaire (Chinese)
Appendix F	Consent Letter from the Human Research Ethic Committee, USM
Appendix G	Calculating CR and AVE
Appendix H	Sample Covariance

**HUBUNGAN ANTARA HASIL PEMBELAJARAN, PEMBELAJARAN
BERASASKAN PROJEK, STRATEGI PENILAIAN DAN KOMPETENSI
SISWAZAH DALAM PENDIDIKAN VOKASIONAL TINGGI AWAM
DI CHINA**

ABSTRAK

Menjembatani jurang kemahiran antara keperluan pasaran buruh dan kesiapsiagaan siswazah adalah penting bagi pembangunan mampan Pendidikan Vokasional Tinggi (PVT) di China. Pendidikan Berasaskan Hasil (OBE) telah muncul sebagai pendekatan yang menjanjikan, namun bukti empirikal mengenai bagaimana komponen terasnya - iaitu hasil pembelajaran, pembelajaran berasaskan projek, dan strategi penilaian - menyumbang kepada pembangunan kompetensi siswazah dalam program khusus seperti E-Dagang Rentas Sempadan (CBEC) masih terhad. Kajian ini meneliti hubungan antara hasil pembelajaran yang dimaksudkan, pembelajaran berasaskan projek, dan strategi penilaian serta kesan individu dan gabungannya terhadap kompetensi siswazah di kolej vokasional tinggi awam (PHVC) di China. Berlandaskan Teori Penjajaran Konstruktif, kajian ini membangunkan kerangka iOBE-CBEC yang menggambarkan bagaimana ketiga-tiga komponen OBE ini saling berkaitan dalam memupuk kompetensi siswazah. Reka bentuk kajian kuantitatif rentas seksyen digunakan, dan data dikumpul melalui soal selidik dalam talian pada April dan Mei 2024 daripada 350 pelajar CBEC di empat PHVC di Nanjing. Selepas saringan, sebanyak 301 respons sah dianalisis menggunakan Pemodelan Persamaan Struktur (SEM) menerusi SPSS 23.0 dan AMOS 24.0. Dapatan menunjukkan bahawa pembelajaran berasaskan projek dan strategi penilaian memberi kesan positif yang signifikan terhadap kompetensi siswazah. Walaupun hasil pembelajaran tidak

menunjukkan kesan langsung yang signifikan, ia memberi pengaruh tidak langsung melalui peranan pengantara kedua-dua strategi penilaian dan pembelajaran berasaskan projek. Strategi penilaian didapati mempunyai kesan pengantaraan paling kuat, diikuti oleh pembelajaran berasaskan projek. Analisis pengantaraan berurutan mengesahkan bahawa hasil pembelajaran yang dimaksudkan meningkatkan kompetensi siswazah melalui laluan berantai yang melibatkan kedua-dua pengantara. Kajian ini menekankan pentingnya penjajaran antara aktiviti pengajaran dan penilaian dengan hasil pembelajaran yang jelas dalam memperkukuh pembangunan kompetensi yang relevan secara vokasional. Kerangka iOBE-CBEC yang dicadangkan menyediakan model berasaskan bukti yang menunjukkan bagaimana komponen OBE saling berinteraksi dalam konteks pendidikan CBEC. Kajian ini turut memberikan panduan bernilai kepada pendidik dan pembuat dasar untuk mengintegrasikan elemen OBE ke dalam program CBEC, sekali gus meningkatkan kompetensi siswazah dan membantu merapatkan jurang kemahiran dalam konteks pendidikan yang lebih luas.

**THE RELATIONSHIPS BETWEEN LEARNING OUTCOMES, PROJECT-
BASED LEARNING, ASSESSMENT STRATEGIES AND GRADUATE
COMPETENCE IN PUBLIC HIGHER VOCATIONAL EDUCATION IN
CHINA**

ABSTRACT

Bridging the skills gap between labour market demands and graduate preparedness is vital for the sustainable development of China's Higher Vocational Education. Outcome-Based Education (OBE) has emerged as a promising approach, yet empirical evidence remains limited on how its core components contribute to competence development in specialised programs such as Cross-Border E-Commerce (CBEC). This study examines the relationships among intended learning outcomes, project-based learning, and assessment strategies, and their individual and combined effects on graduate competence in public higher vocational colleges (PHVCs) in China. Grounded in Constructive Alignment theory, the study introduces the iOBE-CBEC framework, which conceptualises the interconnections among OBE components in fostering graduate competence. A cross-sectional quantitative research design was employed, with data collected via online questionnaires in April and May 2024 from 350 CBEC students across four PHVCs in Nanjing. After screening, 301 valid responses were analysed using Structural Equation Modelling (SEM) via SPSS 23.0 and AMOS 24.0. Results showed that both project-based learning and assessment strategies had significant positive effects on graduate competence. While intended learning outcomes did not directly affect competence, they exerted an indirect effect through the mediating roles of project-based learning and assessment strategies. Among these, assessment strategies had the strongest effect, followed by project-based

learning. Sequential mediation analysis confirmed that intended learning outcomes indirectly enhanced graduate competence through a combined pathway involving both mediators. These findings highlight the importance of aligning instructional activities and assessment with clearly defined learning outcomes to cultivate vocationally relevant competencies. The iOBE-CBEC framework offers an empirically validated model demonstrating how OBE elements interact to improve graduate preparedness in CBEC education. This study is among the first to demonstrate the sequential mediating roles of project-based learning and assessment strategies within an OBE framework in China's PHVCs. By identifying the most influential components of OBE, the study provides actionable insights for instructional design and the optimisation of OBE implementation. The findings also provide valuable guidance for educators and policymakers on integrating OBE elements into CBEC programs, ultimately enhancing graduate competence and helping to bridge the skills gap across broader educational contexts.

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter presents a comprehensive introduction to the study, beginning with an exploration of the landscape of China's Higher Vocational Education (HVE) and the current state of Outcome-Based Education (OBE) implementation in both higher education and HVE contexts. It then presents the study's problem statement, research objectives, and guiding research questions, offering a clear understanding of its purpose. Additionally, the chapter highlights the study's significance and scope, emphasising the urgency of addressing the skills gap in HVE, particularly in fields such as international e-commerce. The chapter concludes with operational definitions of primary constructs and an overview of the thesis structure.

1.2 Background of the Study

HVE system in China encompasses programs at the short-cycle college level, classified as ISCED level 5, aimed at equipping students with industry-relevant knowledge, skills, and competencies (Li et al., 2024; Xiong, 2011; UNESCO, 2011). Table 1.1 presents the ISCED coding of levels. Most programs at the HVE system last two to three years, with three-year programs being the most prevalent. Public Higher Vocational Colleges (PHVCs) are the primary HVE providers, representing about 75.4% of all HVCs in China (Shen & Ping, 2022). These institutions play a vital role in preparing graduates with the professional qualifications needed for intermediate- and lower-level positions within the labour market (Ministry of Education of China, 2010).

Table 1.1 ISCED coding of levels

ISCED-Programmes (ISCED-P)		ISCED-Attainment (ISCED-A)	
0	Early childhood education	0	Less than primary education
1	Primary education	1	Primary education
2	Lower secondary education	2	Lower secondary education
3	Upper secondary education	3	Upper secondary education
4	Post-secondary non-tertiary education	4	Post-secondary non-tertiary education
5	Short-cycle tertiary education	5	Short-cycle tertiary education
6	Bachelor's or equivalent level	6	Bachelor's or equivalent level
7	Master's or equivalent level	7	Master's or equivalent level
8	Doctoral or equivalent level	8	Doctoral or equivalent level
9	Not elsewhere classified	9	Not elsewhere classified

Source: Adapted from ISCED (2011)

Globally, HVE prioritises practical training to cultivate students' professional abilities through well-designed knowledge, structure, and training programs (Stewart, 2015). The aim is to enhance students' expertise in specific fields, aligning with career pathways that lead to proficiency in chosen occupations (Lerman et al., 2020). Through these vocational programs, HVC graduates are expected to earn relevant credentials and demonstrate proficiency in occupational roles within local job markets (Ministry of Education of China, 2010).

Digital advancements have reshaped business practices and the role of marketing, impacting areas such as marketing communications, customer relationship management, and channel management (Kerr & Kelly, 2017; Quinn et al., 2016). These changes reflect the need for businesses to adapt to an evolving international e-commerce environment. One of the most significant transformations for business transactions is the transition of shopping platforms from traditional physical forms to modern online e-commerce (Alkhunaizan & Ali, 2022; Svatosova, 2020). Currently, Cross-border E-commerce (CBEC) has become a vital channel for promoting international trade driven by digitalisation, globalisation, and global internet access (Kim et al., 2017; Sinkovics & Sinkovics, 2020). A recent study by Juniper Research

(Purnell, 2023) predicts that by 2028, 33% of global e-commerce spending will be cross-border, driven by growth in developing markets. The global CBEC market is expected to reach 7.9 trillion U.S. dollars by 2030 (Lee et al., 2024).

With the rise of CBEC, there is a substantial demand in the e-commerce industry for professional employees equipped with a broad range of new competencies and a global perspective (Liu, 2024; Llopis-Albert et al., 2021; Xu et al., 2018). The labour market constantly evolves due to advancements in information technology and globalisation, necessitating business experts who can understand and apply these emerging technologies (Rakowska & de Juana-Espinosa, 2021). These professionals must possess strong technical backgrounds, innovative awareness, and the ability to learn continuously. This adaptability is crucial for fostering sustainable development and innovation within the industry (Liu, 2024).

In this circumstance, China's higher education has become an important bridge connecting industry demands and talent cultivation. To meet the growing need for skilled professionals in the global e-commerce sector, many universities and vocational colleges have integrated e-commerce and information technology into their curricula, establishing specialized majors like International Trade, Marketing, and Electronic Business (Guo et al., 2023; Kuyumdzhev, 2016). This disciplinary integration aims to prepare business professionals for the global e-commerce sector, thereby increasing the number of CBEC graduates entering the dynamic field (Guo et al., 2023; Kuyumdzhev, 2016).

Despite these efforts, a significant skills gap persists between the educational readiness of graduates and job market requirements (Tan et al., 2018; Yong & Ling, 2023). Employers have reported that many graduates need help to apply their academic

knowledge to practical job tasks, leading to difficulties in securing relevant employment (Andrews & Wooten, 2005; Gawrycka et al., 2020). The primary reason for the skills gap in the e-commerce labour market is the mismatch of knowledge and skills acquired in higher education and the actual needs of enterprises and employers (Abdullah et al., 2022; Guo et al., 2023; Mok & Jiang, 2018; Potter et al., 2011).

According to Ling et al. (2021) and Hu and Wang (2021), conventional teaching methods in China's higher education have been criticized for prioritising the delivery of theoretical knowledge and neglecting the cultivation of practical ability, leading to the situation where many students have rich theoretical knowledge but weak practical ability. As such, students have encountered difficulties in securing relevant jobs in the labour market. Many CBEC graduates chose to engage in other fields after graduation rather than seek careers related to their majors enrolled in HVE, which indicates there has been a relatively low rate of alignment between their education and career choices (Wang & Li, 2020). The mismatch highlights the need for reform in HVE in China to align teaching practices with the dynamic needs of the global job market.

One of the key reforms that have gained traction in recent years is Outcome-Based Education (OBE), an educational model that prioritizes competencies and practical skills over theoretical knowledge. As China's higher education seeks to address this misalignment, OBE offers a potential solution by emphasizing the development of tangible and measurable outcomes that align with the expectations of both students and employers.

1.2.1 The State of Outcome-based Education (OBE) in China's Higher Education

China's higher education reform has evolved substantially in recent decades, guided by a national commitment to building world-class universities and disciplines to enhance education quality, competitiveness, and alignment with global standards. The State Council's "Double First-Class" initiative, introduced in October 2015, marked a significant shift toward quality-driven education focused on global competitiveness and excellence (State Council, 2015). This initiative has stimulated a shift toward defining clear, high-quality learning outcomes aligned with both national development needs and the requirements of an increasingly globalised workforce.

In line with these strategic objectives, China has embraced the OBE model, a globally recognised approach prioritising specific competencies and student-centred learning (Zhao et al., 2023). Shifting away from the traditional teaching method, OBE prioritises practical skills and clearly defined outcomes, ensuring that students can meet industry demands effectively upon graduation. This shift aligns closely with broader global educational reforms focused on competency-based learning, with the Ministry of Education's (MoE) curriculum redesign further emphasizing the acquisition of practical skills across disciplines, enhancing clarity in educational outcomes. This statement marks a significant change in how educational outcomes are approached, reflecting a global trend toward competency-based education. Thus, the OBE educational system proposed by Spady (1994) has captured the increasing attention of China's higher education system.

China's MoE introduced OBE in 2014, emphasizing a student-centred and competence-based approach to teaching. Although the Washington Accord primarily applies to engineering programs, China's participation in the Accord in 2016 signalled

a broader national commitment to internationalizing higher education quality and accountability. The Washington Accord mandates mutual recognition of graduates from accredited programs, which requires universities and colleges to adopt OBE principles such as clearly defined learning outcomes, competency mapping, and continuous quality improvement (CQI) (Alam & Kootsookos, 2020; Ali et al., 2021; Akir et al., 2012).

While the Accord itself is discipline-specific, its influence extends beyond engineering. It serves as a benchmark for higher education reform, encouraging the adoption of OBE across various disciplines to align with global academic and accreditation standards. Consequently, many Chinese universities and vocational institutions have embraced OBE not only for engineering but also in emerging fields like CBEC programs, which demand interdisciplinary, skill-based training aligned with international industry expectations. The growing emphasis on learning outcomes, employability, and international comparability has led CBEC programs to adopt OBE principles, especially in institutions aspiring to earn or maintain global accreditations such as the Association to Advance Collegiate Schools of Business (AACSB), of which over 42 business schools in Mainland China are members.

Therefore, the Washington Accord lies in its symbolic and practical role in promoting an OBE-aligned quality assurance around the world. For CBEC programs, this means adhering to internationally recognized educational practices, shifting from teacher-centred instruction to student-centred learning, and emphasizing outcome alignment, industry readiness, and global competence (Ansari et al., 2024; Lu & Hao, 2022; Zhang et al., 2021). In this sense, the Washington Accord has served as a catalyst that indirectly fosters OBE adoption even in non-engineering fields, including business and e-commerce, as part of China's broader higher education modernization agenda.

Achieving this accreditation necessitates substantial modifications in curricula, teaching and learning activities (TLAs), and assessment practices to meet the competencies demanded by this approach (Spady, 1994; Tam, 2014). Additionally, this shift highlights the importance of aligning business education with both international and local standards, reinforcing a trend toward globalised educational practices (Gunaratne et al., 2019). This practical, student-centred evaluation framework plays a crucial role in advancing educational reform, offering a structured pathway to cultivate a culture of quality within academic institutions (Liu, 2024).

1.2.2 The State of Outcome-Based Education (OBE) in China's Public Higher Vocational Colleges (PHVCs)

In China, PHVCs have increasingly adopted OBE to bridge the gap between workforce demands and graduates' preparedness. This approach focuses on equipping students with industry-relevant, practical skills through competency-based, student-centred teaching reforms. Additionally, to meet the needs of a dynamic workforce for high-quality talents, China's MoE launched the "Double High Plan" in 2019, which specifically targets the improvement of vocational education by ensuring curriculum alignment with industry standards and workforce requirements. Under this plan, PHVCs are tasked with establishing high teaching standards to prepare learners for the requirements of the contemporary workforce. By focusing on competencies that align directly with industry needs, PHVCs are beginning to implement student-centred teaching reforms, utilizing OBE principles across a range of disciplines to meet contemporary employment demands (Janetius et al., 2017; Tan et al., 2018).

In recent years, the OBE has rapidly spread among China's HVCs, leading them to initiate teaching reforms based on OBE principles. The first HVC in China to

pilot OBE was Heilongjiang Vocational College. In September 2013, Heilongjiang Vocational College launched its OBE teaching reform project, entering the practical phase in January 2014. By September 2015, it had developed pilot samples, and in September 2016, the reform was fully implemented across the college. Following this, PHVCs like Nanjing Vocational College of Information Technology and Jiangsu Maritime Institute adopted OBE principles in 2019 and 2020, respectively. They took the view that OBE can contribute to the development of student core competencies such as critical thinking, global awareness, entrepreneurship, and leadership. By the end of 2023, 75 higher vocational colleges had attended the inaugural meeting for the National Higher Vocational Colleges' OBE and Innovation-Integration Curriculum Development Centre, indicating either ongoing or upcoming OBE adoption efforts. These colleges are guided by the principle that education should focus on “what students need to know and be able to do upon graduation,” reshaping academic programs and assessment practices to align with industry competency requirements.

Recent literature shows that OBE has extended its adoption beyond engineering education, gradually impacting various disciplines, including arts and humanism education (Janetius et al., 2017), language education (Wei, 2011; Yasmin & Yasmeen, 2021), and nursing education (Tan et al., 2018; Alberti et al., 2021), tourism and hospitality education (Guo et al., 2023), etc. Moreover, OBE has gained worldwide recognition for better-preparing graduates with the competencies needed in modern society (Gurukkal, 2018; Yasmin & Yasmeen, 2021). Its adoption is growing globally, driven by its efficacy in reforming education policies to meet contemporary needs (Mutalib et al., 2012). OBE sets the standard and direction for HVE, prompting engineering education to embrace this system to ensure quality learning environments that align with societal demands.

Despite its rapid development and efficacy, assessing OBE's effectiveness in China's PHVCs remains challenging due to a lack of empirical studies (Jiao et al., 2023). Much of the current research in China's HVE remains at the initial stage and speculative stage, with only limited empirical evaluations based on robust evidence. Consequently, while OBE has generally been linked to educational improvements, there is limited insight into how specific pedagogical adjustments and assessment modifications introduced through OBE contribute to these outcomes (Hu & Wang, 2021; Tan et al., 2018). As Jiao et al. (2023) noted, the existing studies tend to attribute educational improvements to OBE alone, which ignores the cause-and-effect relationship and limits a better understanding of the actual impact of OBE implementation.

To address these research gaps, this study explores the relationships among key components of OBE - intended learning outcomes, project-based learning, and assessment strategies - and their association with graduate competence among students in CBEC programs at China's PHVCs. As CBEC develops as a critical industry in the global economy, aligning vocational education with its unique demands can provide graduates with the competitive skills essential for success. This study focuses on how the alignment among learning outcomes, instructional practices, and assessment strategies relates to the attainment of graduate competence, offering a comprehensive view of the internal coherence of OBE implementation in CBEC education.

1.3 Problem Statement

With deepening globalisation and the rapid expansion of the digital economy, demand for CBEC professionals with diverse skill sets has surged, especially since the COVID-19 pandemic highlighted the importance of digital trade and e-commerce

skills (Alkhunaizan & Ali, 2022; Liu, 2024; Wang et al., 2020). However, the competence required in a dynamic job market is quite challenging to attain as conventional learning has been playing a prevailing role where teachers are “transmitters of knowledge” while students act as “receptors of information” (Alorda et al., 2011; Mukti et al., 2020). Many academic programs still prioritise outdated, theory-heavy content, failing to integrate the practical skills and knowledge needed in today’s and tomorrow’s job markets (Wu et al., 2023). Consequently, students need assistance engaging deeply with educational practices, leading to superficial understanding and an inability to develop the professional competencies needed for international e-commerce.

As noted by Krupcala and Januszewski (2020), higher education institutions (HEIs) often emphasise theoretical knowledge in e-business, neglecting practical applications essential to understanding industry operations. This emphasis leads to a skills gap, where academic programs fall short of equipping future employees to meet the evolving demands and expectations of the e-commerce sector. Additionally, educational content often lags behind the rapid development in the CBEC industry, further widening the disconnect between academic programs and real-world requirements. To bridge this gap, HEIs must adopt innovative teaching approaches and restructure their curricula to better align with the dynamic nature of the global e-commerce landscape.

An increasing number of educators are advocating a “design-down” approach to curriculum development, tailoring learning outcomes to match the specific competencies required in students’ future careers (Guo et al., 2023). The OBE approach is entirely student-centred and emphasises developing real-world, practical skills essential for business (Dhawan, 2019; McHann, 2012). Unlike traditional

teaching methods where content is decided by the instructor, OBE primarily concentrates on the goals students should reach at the end of their educational path. This backward design method prioritises outcomes, aligning curriculum and teaching practices with desired competencies (Gunarathne et al., 2019). Implementing OBE can make students more adaptable (Mangali et al., 2019), enhance employability (Shi et al., 2019a), foster innovation (Rao, 2020), and help reduce achievement disparities among students (Mangali et al., 2019).

Successful OBE implementation relies on aligning specified learning outcomes with curriculum design, TLAs, and assessment methods (Gunarathne et al., 2019; Harden, 2009; Sharma, 2023; Tam, 2014; Treleaven & Voola, 2008). Despite its widespread recognition and acceptance for improving the quality of education (Akir et al., 2012; Smith, 2018), OBE adoption in CHVE is still at an early stage, focusing mainly on the level of theoretical cognition and discussion (Ling et al., 2021). While OBE implementation in China's business education is expected to enhance students' competence, empirical evidence on its impact on the attainment of graduate competencies is still debated (Wang & Li, 2020). Furthermore, implementing OBE in educational programs has proven problematic for lecturers in China's HVCs.

A key challenge in implementing OBE lies in the misalignment of learning outcomes across institutional, program, and course levels. OBE emphasizes clearly defined, measurable, and competency-based learning outcomes that guide the entire educational process, ensuring students are actively engaged in purposeful learning experiences (Tam, 2014). For OBE to be effective, these outcomes must align with the institution's vision and mission, industry needs, and societal expectations. However, in China's higher education system, issues such as poorly articulated training objectives, limited alignment with evolving industry demands, and disconnection

between practical components and real-world applications persist (Gan, 2023; Liu, 2024). These issues are often the result of inadequate stakeholder engagement and difficulties in developing hierarchical and career-relevant intended learning outcomes. To address them, it is essential to strengthen collaboration with industry stakeholders and apply established learning taxonomies to ensure that learning outcomes are clearly defined, professionally relevant, and supportive of graduate competence.

OBE requires that curriculum planners and educators integrate what they want and expect learners to be able to do before their teaching practice (Morrow, 2018; Ross, 2012). This requirement is based on the design-down principle proposed by Spady (1994), which suggests that curriculum design should start with what the lecturers want learners to end up with (Ross, 2012; Shi et al., 2019a; Spady, 1994). However, the extant literature has not explicitly defined e-commerce competency (Ho & Chen, 2023). Additionally, Song's (2021) research revealed that teachers in the classroom only depend on the existing course materials without adequately selecting, incorporating, reorganising, or optimizing the knowledge system to match students' pre-determined learning outcomes.

Learning outcomes must be facilitated by selecting teaching methods (Ansari et al., 2024). After establishing the intended learning outcomes, it is essential to incorporate TLAs that actively support students in achieving these outcomes (Wang, 2011). The specific types of TLAs employed in the implementation of OBE by some universities include school-enterprise partnerships, internships, and extracurricular activities. These approaches require teachers and students to concentrate on the application of the desired educational outcomes in the real-world workplace. School-enterprise cooperation is a prevalent mode of education to cultivate advanced skills and applied talents for enterprises (Hu et al., 2023; Sun et al., 2020). However, current

school-cooperation training models concentrate on imparting simulation knowledge but still neglect the cultivation of practical ability, resulting in limited chances for students to apply academic knowledge in real-world business settings, which prevents the development of essential hands-on skills (Fan et al., 2016; Li & Li, 2021; Liu et al., 2017).

While OBE emphasizes learner-centred, measurable, and career-relevant outcomes, many vocational institutions have difficulties in translating these outcomes into meaningful and practical learning experiences that reflect real-world professional demands. These challenges stem from limited integration of industry-informed practices into curriculum delivery, insufficient alignment of practical training components with targeted competencies, and inconsistent stakeholder involvement in outcome formulation and instructional planning (Tan et al., 2018). Consequently, the gap between what students are expected to learn and what is taught or practiced undermines the goal of producing job-ready graduates. Addressing this issue requires a more coherent application of the constructive alignment principle within the OBE framework, ensuring that TLAs and assessment strategies are purposefully designed to support the achievement of clearly defined, industry-aligned learning outcomes.

Additionally, there is a notable lack of research on competency assessment within higher education (Reddy et al., 2020; Zlatkin-Troitschanskaia et al., 2015), and appropriate assessment criteria and rubrics are often missing, making it difficult to accurately measure and evaluate the achievement of intended learning outcomes (Damit et al., 2021; Morcke et al., 2014). Moreover, the evaluation of talent training quality in HVCs primarily centres on establishing talent training standards and evaluation subjects, with little emphasis on developing a comprehensive and objective evaluation index system (Xin et al., 2022; Liang, 2022). Although teachers understand

the role assessment plays within the OBE framework, they face challenges in implementing it effectively (Alonzo et al., 2023). These challenges may reduce the reliability and validity of evaluation outcomes, thereby weakening the alignment between students' attainment of intended learning outcomes and the needs of the industry (Wang, 2018).

Accreditation is a critical mechanism for assessing the effectiveness of OBE implementation, particularly in evaluating whether teaching, learning, and assessment practices are coherently aligned with clearly defined learning outcomes and whether graduates achieve the industry-relevant competencies (Ademilokun & Taiwo, 2023). In China's HVCs, especially within CBEC programs, a persistent challenge lies in the lack of competency-based assessment systems that can rigorously and objectively measure students' acquisition of practical, workplace-relevant skills. Existing evaluation approaches often rely on credit accumulation and loosely structured practical assessments, which fall short of the standards required for outcome verification and CQI. This misalignment not only weakens the credibility of graduate competence but also limits the programs' ability to meet national and international accreditation standards. To address this, it is imperative to establish an innovative OBE framework that integrates performance-based assessments and industry-validated certification mechanisms. Such framework would ensure that assessment practices reflect real-world demands and support the continuous refinement of teaching and learning processes in line with OBE principles, thereby enhancing the overall quality and global competitiveness of vocational education.

Lastly, the existing literature has revealed several obstacles to implementing OBE within HVCs (Akhmadeeva et al., 2013; Damit et al., 2021; Polimetla et al., 2014; Rahate et al., 2020). OBE practices remain limited in some vocational colleges,

especially when it comes to defining the learning outcomes for specific vocational disciplines (Jiao et al., 2023). As such, vocational college practitioners often lack a comprehensive understanding of course outcomes (COs) and their connection to broader program learning outcomes (PLOs) (Ling et al., 2021). Assessments frequently prioritise course content and grades rather than aligning with the intended learning outcomes defined in each course (Erdem, 2019). Additionally, large-scale changes in entrenched teaching and learning practices pose challenges, as such changes require overcoming educator resistance, intensive training demands, and institutional limitations (Guzman et al., 2017). Research by Bakar et al. (2018), Erdem (2019), Evardo (2020), Guzman et al. (2017), and Rahate et al. (2020) highlights the issues that arise when educators do not fully grasp the principles of the OBE model. Therefore, ensuring that teachers having a thorough understanding of OBE's mandates is crucial for successful implementation in HVCs (Damit et al., 2021; Senaratne & Gunarathne, 2019).

Additionally, compounding this problem is a limited understanding of students' perspectives - the very individuals for whom OBE is designed. Most empirical work has focused on educators' viewpoints, neglecting how students experience and respond to OBE practices (Wang & Li, 2020). This omission hinders a holistic evaluation of OBE's effectiveness. Moreover, the predominance of t-tests and regression analysis in existing studies has limited the depth of analysis. Few studies have employed more advanced techniques like Structural Equation Modelling (SEM) to explore the interconnected effects of intended learning outcomes, TLAs, and assessment strategies on graduate competence (Custodio et al., 2019; Felicen, 2021; Ortega & Cruz, 2016).

In light of these issues and gaps, there is a pressing need for empirical research that holistically investigates the implementation of OBE in HVCs, with a focus on the

CBEC domain. Specifically, research must explore how the alignment of intended learning outcomes, project-based learning, and assessments - grounded in the theory of CA - contributes to the development of graduate competence. Constructive Alignment (CA) supports OBE by aligning TLAs and assessment methods with desired outcomes, thereby fostering graduate competence (Biggs, 2014; Thian et al., 2018). This link is vital in ensuring that every aspect of OBE implementation contributes directly to the competencies students are expected to develop by graduation (Biggs, 2014; Thian et al., 2018).

This OBE approach highlights the importance of formulating clear and purposeful learning outcomes for the CBEC program. Bloom's Taxonomy divides learning goals into six levels: remembering, understanding, applying, analysing, evaluating, and creating. Each level has action verbs that help create specific, measurable outcomes that are linked to important graduate competence (Biggs & Tang, 2011). By using clear, action-oriented language, educators can more precisely define the skills and knowledge students are expected to do, ensuring that learning outcomes are both achievable and directly tied to the desired graduate attributes.

Project-based learning offers an effective means of integrating real-world tasks into the OBE framework, fostering active engagement, collaboration, self-directed learning, and inquiry (Buck Institute for Education, 2020). Aligned with OBE's focus on competency and relevance, it encourages students to take ownership of their learning (Mahedo & Bujez, 2014). In CBEC programs, such activities may include managing simulated online stores, launching digital marketing campaigns via platforms like AliExpress, Amazon, or TikTok, conducting sourcing simulations with overseas suppliers, and resolving bilingual customer disputes. Other projects involve analysing consumer data, planning logistics and customs processes, or preparing

business proposals for virtual trade expos. These project-based tasks help students integrate digital, linguistic, trade, and customer service skills essential for CBEC careers.

Similarly important is the ability of teachers to adapt assessment rubrics to specific assessment tasks, ensuring that the criteria and standards accurately reflect the skills outlined in the learning outcomes. Utilising clear and explicit criteria is beneficial for validating the assessment of student learning (Griffin, 2018). Hence, these criteria and standards are fundamental components of OBE implementation, as they contribute to the validity, reliability, and trustworthiness of teacher assessments.

Therefore, this study seeks to enhance OBE implementation within CBEC programs using CA as its guiding framework. Specifically, research must explore how intended learning outcomes, project-based learning, and assessments - grounded in the theory of CA - contributes to the development of graduate competence. This requires a more robust OBE framework that constructively align OBE aspects and integrates student-centred perspectives and advanced analytical methods such as SEM to validate the impact of OBE implementation. Such research will not only fill the current empirical void but also offer actionable insights for optimizing OBE implementation in Chinese HVCs, thereby producing graduates who are better equipped for the demands of global e-commerce.

1.4 Aims of the Study

This study has four primary aims. The first aim is to create an OBE framework specifically designed for the CBEC program in PHVCs. This framework will foster the connection of anticipated outcomes, TLAs, and assessments. By ensuring this alignment, the framework aims to equip graduates with the competencies needed to be

competitive and qualified in the fast-paced international e-commerce labour market. Additionally, it will provide a foundation for CQI, enabling the continuous enhancement of OBE practices while ensuring compliance with global academic standards and accreditation requirements.

The second aim is to evaluate the effectiveness of OBE implementation affecting graduate competence in HVE system. The evaluation will explore the interactions among intended learning outcomes, project-based learning, and assessment strategies, focusing on how these elements specifically contribute to preparing graduates for careers in international e-commerce. This objective will help identify the specific aspect in which OBE influences graduate readiness for the labour market.

The third aim is to examine the mediating roles of project-based learning and assessment strategies in the relationship between intended learning outcomes and the attainment of graduate competencies. This analysis will offer valuable insights into how these pedagogical strategies interact to enhance student engagement and learning outcomes. Understanding the mediating role of the learning process is essential for optimizing educational practices and fostering the development of competencies that align with industry needs.

Lastly, this study seeks to evaluate the effect sizes of primary components of OBE implementation - namely intended learning outcomes, project-based learning, and assessment strategies - on the attainment of graduate competence. By quantifying the impact of these elements, the study will contribute to the formulation of a robust, evidence-based model for CQI, ensuring that the framework is aligned with global

academic standards. These insights will be instrumental in determining the relative impacts of these elements in fostering graduate competence attainment.

1.5 Objectives of the Study

The following are the objectives of the study:

- i) To examine the relationship between intended learning outcomes and the attainment of graduate competence among CBEC learners.
- ii) To explore the mediating role of project-based learning in the relationship between intended learning outcomes and the attainment of graduate competence among CBEC learners.
- iii) To investigate the mediating roles of assessment strategies in the relationship between intended learning outcomes and the attainment of graduate competence among CBEC learners.
- iv) To analyse the direct and indirect effect sizes of intended learning outcomes, project-based learning, and assessment strategies on the attainment of graduate competence among CBEC learners.

1.6 Research Questions

This study strives to answer the following research questions:

- i) What is the relationship between intended learning outcomes and the attainment of graduate competence among CBEC learners?
- ii) To what extent does project-based learning mediate the relationship between intended learning outcomes and the attainment of graduate competence among CBEC learners?

- iii) To what extent do assessment strategies mediate the relationship between intended learning outcomes and the attainment of graduate competence among CBEC learners?
- iv) What are the direct and indirect effect sizes of intended learning outcomes, project-based learning, and assessment strategies on the attainment of graduate competence among CBEC learners?

1.7 Significance of the Study

This study holds substantial significance for enriching academic theory, advancing education practice, and guiding organizational management, particularly in the context of enhancing graduate competence through the implementation of OBE in CBEC programs within CHVE system. It provides theoretical, practical, managerial contributions that collectively enhance the quality of higher vocational quality and strengthen alignment between educational outcomes and industry demands.

Theoretically, this study enriches the discourse on OBE by integrating the theory of CA and Bloom's Taxonomy into the innovative OBE framework tailored for CBEC programs. It advances scholarly understanding by exploring how the alignment among intended learning outcomes, project-based learning, and assessment strategies collectively foster graduate competence among the CBEC learners. Through the application of a mediating and chain-mediating model, the study offers a nuanced theoretical explanation of how specific TLAs in project-based learning influence competence development. This not only enriches the existing discourse on competence-based education but also extends CA and Bloom's frameworks into underexplored vocational domains, laying a foundation for future empirical, cross-contextual, and comparative research on OBE implementation.

From a practical standpoint, this study provides actionable insights for CBEC educators and practitioners implementing or considering OBE, offering concrete guidance on clearly identifying intended learning outcomes and designing aligned project-based learning and assessment strategies to enhance graduate competence. By addressing persistent challenges in harmonizing TLAs with defined learning goals, the study underscores the importance of designing project-based learning activities that are deliberately and systematically aligned with intended learning outcomes. This alignment enables educators to maintain a clear focus on graduate outcomes while delivering targeted, competency-based support. Furthermore, the study contributes to vocational education by highlighting the critical role of assessment strategies - particularly the use of structured criteria and rubrics - in accurately evaluating the attainment of graduate competence. These tools ensure assessments reflect both academic objectives and real-world professional demands, thereby supporting the development of robust, outcome-oriented evaluation frameworks.

Methodologically, the study employs a rigorous empirical approach using path analysis and SEM analysis to examine the mediating and chain-mediating effects of project-based learning and assessment strategies on graduate competence. This quantitative evidence equips OBE practitioners with strategic insights to prioritize the most influential elements of instructional design, optimize OBE implementation, and enhance graduate competence development. This study not only supports the optimization of OBE implementation in vocational education but also serves as a strategic roadmap for broader application in other sectors of higher education, including universities seeking to adopt or refine OBE frameworks.

At the institutional and policy levels, this study presents a structured OBE implementation framework that aligns with national and international accreditation

standards, such as those set by the Washington Accord and the National Board of Accreditation (NBA). This framework ensures compliance with OBE guidelines and facilitates academic equivalency on both national and international levels. Additionally, the study identifies the core competencies required for success in the evolving international e-commerce landscape, thereby supporting the dynamic renewal of occupational standards in line with e-commerce industry transformation. The ongoing competence framework is essential for maintaining the CQI of CBEC programs. Finally, the study highlights the importance of strategic resource allocation by college administrators to foster effective learning environments and support faculty in transitioning from traditional, teacher-centred models to competency-driven, learner-centred approaches advocated by OBE.

1.8 Scope of the study

This study focuses on OBE implementation within the CBEC program at PHVCs in Nanjing, China. Nanjing is a strategic choice for this research due to its dual significance as an educational hub and a dynamic centre for e-commerce. The city hosts a range of PHVCs that are crucial for equipping students with the necessary competencies to meet the growing demands of the evolving industries. By limiting the study to PHVCs that have been implementing OBE for at least two years, the research guarantees the validity and reliability of the data. This time frame allows for a more accurate assessment of how OBE implementation influences student development and its overall efficacy in preparing graduates for the labour market.

The term “competence” varies in meaning depending on the analytical approach and the specific context of the organisation or industry. Different researchers have provided different definitions over the years, leading to some confusion in the

literature regarding the concept and its dimensions (Bassellier et al., 2001; Skulmoski & Hartman, 2010). However, in this study, competence only represents a set of skills and knowledge that the organisations expect graduates to know and do upon completion of the CBEC program. The emphasis is placed on graduate competencies related to employability, particularly skills that are directly relevant to performance in the international e-marketing sector. This focus ensures that the study addresses the gap between educational outcomes and industry demands, highlighting the essential capabilities needed for success in global e-commerce markets.

The implementation of OBE is conceptualised as a three-stage process: defining intended learning outcomes, designing the curriculum, and delivering the educational program (Wang, 2011; Rao, 2013a). While the significance of curriculum design in shaping student learning is acknowledged, this study does not explore an extensive analysis of curriculum content. Previous research has highlighted that an outcomes-based approach to curriculum design is effective in promoting the acquisition of subject-specific knowledge, skills, and attitudes (Mohayidin et al., 2008). Instead, this study will focus on OBE practices regarding the identification of intended learning outcomes and the design of TLAs and assessment strategies. This approach aligns with the principles of CA, which stresses the interconnectedness of educational objectives, teaching methods, and assessment practices, thereby fostering the development of competencies within the CBEC program.

Rooted in the CA principles, this study assesses how effectively OBE practices contribute to the development of graduate competencies in international e-marketing. By concentrating on PHVCs with the well-established OBE framework, the study seeks to evaluate whether the framework - comprising intended learning outcomes, project-based learning, and assessment strategies - facilitates the cultivation of

industry-relevant skills and knowledge, thus preparing graduates to align with the dynamic needs of the workplace.

1.9 Limitations of the Study

This study has several limitations that may potentially affect the generalisation of its findings:

- i) The findings of this study may have limited generalisability to other HEIs, as the questionnaire survey was conducted exclusively with students from public high-level vocational colleges in Nanjing, China, due to a lot of factors, such as time constraint, cost consideration, and geographical location.
- ii) The study specifically examines the impact of OBE implementation in the CBEC program in China's HVE. Hence, the study's findings may provide valuable insight into the impact of OBE on graduate competence in this specialized program. However, these results may not be applicable to students enrolled in other vocational college programs or disciplines within China HVE or other HEIs.
- iii) Although the study acknowledges the importance of curriculum design in OBE implementation, it excludes an in-depth exploration of curriculum content. By concentrating exclusively on intended learning outcomes, project-based learning, and assessment strategies in a sequential manner, the study may not fully address how curriculum design as a whole contributes to the development of student