

Faculty of Cognitive Science and Human Development

A Mixed Methods Study on the Student Engagement in Online Ideological and Political Course within Higher Vocational Colleges in Anhui Province, China

Sun Chunxiu

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A Mixed Methods Study on the Student Engagement in Online Ideological and Political Course within Higher Vocational Colleges in Anhui Province, China

Sun Chunxiu

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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.

……

Signature 

Name: Sun Chun Xiu

Matric No.: 21010249

Faculty of Cognitive Sciences and Human Development

Universiti Malaysia Sarawak

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Deep in the rainforest, morning mist gently touches palm leaves as the wind disperses the moon's fading glow. On Borneo's lush landscape, every cicada's call seems to hint at distant journeys. Standing at Universiti Malaysia Sarawak (UNIMAS), I reflect on home and feel a deep respect for academia and education.

I once sparked a desire for knowledge in a Chinese middle school classroom, often gazing at the night sky and imagining broader horizons. Neither distance nor time has lessened my passion for truth or education. Four years of doctoral study have quickly passed, leaving treasured memories and strong aspirations.

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Humbly dedicated to everyone who offers light and love.

ABSTRACT

During the COVID-19 pandemic, ideological and political (I&P) courses in China's higher vocational colleges experienced an unprecedented and rapid shift from traditional face-to-face instruction to remote online teaching. These courses, which focus on value orientation and critical thinking, traditionally rely on interactive and dialogic teaching methods. The move to virtual environments significantly affected both how students engage and the depth of their engagement.

To fill the current research gap in this area, this study aims to explore how student engagement in online I&P courses is created, developed, and sustained during and after the pandemic. Guided by Activity Theory (AT), Social Interaction (SOI), and Critical Pedagogy (CP), the study systematically examines how technological tools, power dynamics, and teacher-student interactions influence student engagement.

A convergent parallel mixed-methods design was employed. Quantitatively, structured surveys were administered to 611 students from the 2019, 2020, and 2021 cohorts in higher vocational colleges in Anhui Province. Qualitatively, in-depth interviews were conducted with 30 representative students to explore their real-life experiences with online learning, platform usage, and value internalization.

Findings show no statistically significant differences in engagement levels across academic years. However, the qualitative data revealed several key factors affecting engagement, such as lack of interaction, emotional disconnection, and challenges with platform usability. The combined analysis indicates that clear instructional rules, peer collaboration mechanisms,

and contextually appropriate teaching strategies are essential to promote students' cognitive, emotional, and behavioral engagement.

Theoretically, this study advances by integrating AT, SOI, and CP into a comprehensive analytical framework for student engagement in ideologically focused education. Practically, it offers evidence-based recommendations for improving online I&P course design and promoting deep student engagement in higher vocational education in the post-pandemic era.

Keywords: COVID-19 pandemic, ideological and political courses, online learning, mixed-methods, student engagement, higher vocational colleges

Kajian Kaedah Bercampur mengenai Keterlibatan Pelajar dalam Kursus Ideologi dan Politik Secara Dalam Talian di Kolej Vokasional Tinggi di Wilayah Anhui, China

ABSTRAK

Semasa pandemik COVID-19, kursus ideologi dan politik (I&P) di kolej vokasional tinggi di China telah mengalami peralihan yang luar biasa dan pantas daripada kaedah pengajaran bersemuka tradisional kepada pengajaran jarak jauh secara dalam talian. Kursus-kursus ini, yang menumpukan kepada orientasi nilai dan pemikiran kritis, secara tradisinya bergantung pada kaedah pengajaran interaktif dan dialog. Peralihan kepada persekitaran maya telah memberi kesan yang ketara terhadap cara pelajar melibatkan diri dan tahap keterlibatan mereka.

Bagi mengisi jurang penyelidikan sedia ada dalam bidang ini, kajian ini bertujuan untuk meneroka bagaimana keterlibatan pelajar dalam kursus I&P dalam talian dibentuk, dibangunkan, dan dikekalkan semasa dan selepas pandemik. Berpandukan Teori Aktiviti (AT), Interaksi Sosial (SOI), dan Pedagogi Kritikal (CP), kajian ini meneliti secara sistematik bagaimana alat teknologi, dinamika kuasa, dan interaksi guru-pelajar mempengaruhi keterlibatan pelajar.

Reka bentuk kajian bercampur selari konvergen telah digunakan. Dari segi kuantitatif, tinjauan berstruktur telah dijalankan terhadap 611 pelajar daripada kohort tahun 2019, 2020, dan 2021 di kolej vokasional tinggi di Wilayah Anhui. Dari segi kualitatif, temu bual mendalam telah dilakukan dengan 30 pelajar wakil untuk meneroka pengalaman sebenar mereka dengan pembelajaran dalam talian, penggunaan platform, dan penghayatan nilai.

Dapatan menunjukkan tiada perbezaan yang signifikan secara statistik dalam tahap keterlibatan merentasi tahun akademik. Namun, data kualitatif mendedahkan beberapa faktor utama yang mempengaruhi keterlibatan, seperti kekurangan interaksi, keterasingan emosi, dan cabaran kebolehgunaan platform. Analisis gabungan menunjukkan bahawa peraturan pengajaran yang jelas, mekanisme kerjasama rakan sebaya, dan strategi pengajaran yang sesuai dengan konteks adalah penting untuk memupuk keterlibatan kognitif, emosi, dan tingkah laku pelajar.

Dari segi teori, kajian ini menyumbang dengan mengintegrasikan AT, SOI, dan CP ke dalam satu kerangka analisis yang menyeluruh bagi keterlibatan pelajar dalam pendidikan berfokus ideologi. Dari segi praktikal, ia menawarkan cadangan berasaskan bukti untuk meningkatkan reka bentuk kursus I&P dalam talian dan memupuk keterlibatan pelajar yang mendalam dalam pendidikan vokasional tinggi pada era pasca pandemik.

Kata kunci: *Pandemik COVID-19; kursus ideologi dan politik; pembelajaran dalam talian; kaedah bercampur, keterlibatan pelajar; kolej vokasional tinggi*

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LIST OF ABBREVIATIONS

AT	Activity Theory
AVE	Average Variance Extracted
AVTC	Anhui Vocational and Technical College
CDA	Critical Discourse Analysis
CFA	Confirmatory Factor Analysis
CI	Community of Inquiry
CIS	Community of Inquiry Scale
CITC	Correlated Item-total Correlation
COM	Communities
CP	Critical Pedagogy Theory
CR	Composite Reliability
CRC	Critical Consciousness
CVTC	Chuzhou Vocational and Technical College
DIV	Division Of Labor
EFA	Exploratory Factor Analysis
EMP	Empowerment
H	Hypotheses
HCI	Human-Computer Interaction
I&P	Ideological and Political
KMO	Kaiser-Meyer-Olkin
LMS	Learning Management Systems

MET	Mediating Tools
MOOC	Massive Open Online Courses
OBJ	Object
PBL	Problem Based Learning
PCA	Principal Component Analysis
POR	Power Relations
Q&A	Question and Answer
ROCES	Remote Online Community and Engagement Scale
ROL	Remote Online Learning
RUL	Rules
RQ	Research Question
SC	Social Constructivism
SE	Student Engagement
SEM	Structural Equation Modeling
SOI	Social Interaction
SOISC	Social Interaction Between Student-Content
SOISS	Social Interaction Between Student-Student
SOIST	Social Interaction Between Student-Teacher
SUB	Subject
VIF	Variance Inflation Factor
ZPD	Zone of Proximal Development

CHAPTER 1

INTRODUCTION

1.1 Introduction

The COVID-19 pandemic accelerated the shift to online and hybrid learning in higher education worldwide. In China, this transition was especially significant for Ideological and Political (I&P) courses in vocational colleges, which traditionally rely on face-to-face discussions to foster civic values and critical thinking. These courses now face unique challenges in sustaining student engagement (SE) in digital environments.

Vocational students—often career-focused and from diverse socioeconomic backgrounds—may perceive ideological content as less directly relevant to their professional aspirations. This highlights the need to design online I&P courses that are both pedagogically adaptable and socially engaging. However, strategies specifically aimed at maintaining cognitive, emotional, and behavioral engagement in this context remain underexplored.

To address this gap, this study investigates SE in online I&P courses at Chinese vocational colleges. It adopts an integrated theoretical framework—combining Activity Theory (AT), Social Interaction (SOI), and Critical Pedagogy (CP)—to examine how engagement is created, influenced, and sustained. This chapter presents the research background, identifies key gaps, outlines the study's aims and methods, and defines the key terms that guide this investigation.

1.2 Study Background

The COVID-19 pandemic caused unprecedented societal upheaval worldwide, with higher education among the sectors most significantly affected. In February 2020, the Chinese government implemented emergency measures requiring all universities to shift entirely to online instruction to curb the spread of the virus (Han et al., 2021; Zhu, 2022a). This sudden and unplanned transition created substantial challenges, particularly for I&P courses in higher vocational colleges (Li, 2023).

Unlike general academic subjects, I&P courses carry the distinct responsibility of fostering students' moral, ethical, and civic values. They traditionally rely heavily on in-person Socratic dialogue, detailed group discussions, and the subtle dynamics of face-to-face interaction to achieve their core objectives. The abrupt shift to digital platforms risked undermining these unique pedagogical methods essential to effective I&P education.

This transition placed unprecedented demands on higher vocational institutions, which were already grappling with challenges related to technological infrastructure, faculty expertise, and adapting traditional teaching models. Many institutions quickly adopted online Learning Management Systems (LMS), such as Rain Classroom and Chao Xing Learning. However, the effective delivery of I&P content—requiring comprehensive and critical engagement—depended heavily on teachers' digital skills and their ability to adapt instructional approaches to the new environment (Amin & Sundari, 2020). These factors had a direct impact on SE.

As the pandemic persisted, most institutions experimented with a variety of online teaching strategies to preserve both educational quality and public health (Ahmed et al., 2020;

Pham & Ho, 2020; Ng, 2022; Yu et al., 2023). While these efforts created certain opportunities—such as extended online discussion forums and additional Question and Answer (Q&A) sessions for students facing academic challenges (Zhang et al., 2022)—they also introduced persistent obstacles. Chief among these were sustaining high levels of SE and maintaining classroom discipline in remote settings (Shanghai International Studies University, 2020).

Additionally, balancing the convenience of online platforms with the inherently political and moral objectives of I&P courses proved complex (Kaufmann & Vallade, 2022). The abstract nature of certain I&P concepts, coupled with the absence of physical presence, often hindered the deep critical reflection and collaborative value-building that define successful I&P pedagogy.

Addressing these critical challenges—particularly in terms of sustaining SE in online I&P environments—requires in-depth investigation and targeted practical guidance tailored to the vocational college context. Prior research has highlighted the strong connection between active student participation and improved learning outcomes, including higher-order thinking, reflective learning, and motivation (Buelow et al., 2018; Rennie et al., 2019). However, current understanding remains limited regarding the specific characteristics, dynamics, and influencing factors of online SE in I&P courses.

Existing studies frequently emphasize general online learning technologies, often overlooking the unique cultural, value-based, and social-interactive dimensions of I&P education (Shi et al., 2023). To address this gap, the present study adopts an integrated theoretical framework combining AT, SOI, and CP. This framework facilitates an understanding of the complex interplay between individual actions, social dynamics, and

critical reflection—elements that are fundamental to fostering effective engagement in I&P education, particularly when mediated by technology.

Through this approach, the study aims to provide targeted evidence and practical strategies to inform post-pandemic teaching reform and address the research gaps discussed in the following section.

1.3 Research Gaps in Online Learning for Vocational I&P Courses

The rapid transition to online learning prompted by the COVID-19 pandemic has profoundly reshaped higher education, including I&P courses. While the broader field of online learning has been widely studied, critical gaps remain in understanding SE within vocational college I&P education—a context with distinct challenges and demands. Addressing these gaps is not merely an academic exercise; it is essential for fostering values, critical thinking, and civic responsibility, which lie at the heart of I&P education. Neglecting these areas risks producing superficial understanding, fostering disengagement from key societal values, and failing to equip students with the moral and political literacy necessary for active citizenship.

A major gap stems from the lack of research focused explicitly on online I&P learning in vocational colleges (Guo, 2021; Xu & Tsai, 2021; Zhang & Wei, 2021; Li & Mao, 2022). Most existing studies examine general higher education institutions or university-level political science programs, overlooking the unique characteristics of vocational students—often career-focused, from diverse socio-economic backgrounds, and approaching education with a practical mindset. These students may prioritize skills directly applicable to employment, perceiving abstract ideological concepts as less immediately

relevant. This highlights the need for pedagogical designs that make I&P learning interactive, relatable, and connected to students' real-life experiences and professional aspirations. Relevant strategies include industry-specific ethical case studies, virtual debates on current societal issues, and reflective journals linking personal values to civic responsibilities. Without such contextual adaptation, online I&P courses risk misalignment with learner needs, resulting in passive participation, shallow value internalization, and weak civic preparedness.

Another gap lies in how engagement is measured. Current online learning research often relies on surface-level indicators—such as login frequency or the number of discussion posts (Dixson, 2015)—which fail to capture the cognitive, emotional, and behavioral depth that defines meaningful engagement in I&P courses. This lack of detailed measurement leaves unanswered questions about how students interact with sensitive political and ethical content, why they engage deeply or disengage from value discussions, and whether ideological concepts are truly internalized. Without these insights, efforts to enhance online I&P pedagogy risk being based on incomplete data, potentially resulting in ineffective strategies that fail to develop critical thinking, moral judgment, and civic literacy.

Finally, while the short-term effects of the pandemic-driven shift to online instruction have been examined, little is known about the long-term implications for SE—particularly as institutions move toward hybrid or fully online models in the post-pandemic era. Designing effective flexible learning models for I&P courses requires balancing asynchronous reflective activities with synchronous, facilitated discussions that sustain engagement and promote value internalization over time. The absence of clear research on these evolving needs leaves educators without adequate guidance, increasing the risk of

implementing pedagogies that fail to meet changing student expectations and weakening the long-term impact of I&P education.

By addressing these contextual, methodological, and pedagogical gaps, this study aims to generate evidence-based insights and practical strategies for strengthening online I&P engagement in vocational colleges, thereby ensuring that these courses continue to fulfill their critical role in shaping informed, ethical, and responsible citizens.

1.3.1 Bridging Gaps with Theoretical Frameworks: Active Theory (AT), Social Interaction (SOI), and Critical Pedagogy (CP)

This study addresses the identified research gaps through a robust, integrated theoretical framework combining AT, SOI, and CP. This multifaceted approach offers a comprehensive lens for examining SE in online I&P courses within vocational colleges.

AT provides a way to situate online I&P engagement within its broader context. By analyzing the "activity systems" of these courses—including rules (curriculum and policies), subjects (students), objects (learning goals such as value internalization), division of labor (roles of students and instructors), community (peers and educators), and mediating tools (e.g., LMS platforms, discussion forums)—AT allows for an in-depth exploration of how vocational students' pragmatic orientations and diverse backgrounds shape their interactions and motivations. This perspective goes beyond surface metrics to uncover the underlying factors that influence engagement or disengagement with ideological and political content online.

SOI directly supports the need for more detailed engagement measurement. It emphasizes the interplay between student–teacher, student–student, and student–content

interactions as drivers of meaningful learning. This framework guides qualitative analysis of behaviors such as critical thinking about complex ethical issues and active participation in discussions on societal topics. By assessing the quality and frequency of these interactions, SOI helps evaluate cognitive depth, value internalization, and collaborative meaning-making—moving far beyond simple participation counts. It also provides a clear lens for understanding how dialogue and shared inquiry contribute to engagement in a mixed-methods research design.

CP is essential for evaluating engagement holistically and addressing evolving pedagogical needs. It focuses on empowering learners to critically examine power structures, question assumptions, and engage in transformative action. Applied to I&P education, CP sheds light on how students respond to content, analyze social issues, challenge dominant narratives, and develop a sense of agency. It shifts the focus from mere participation to the depth of critical reflection and the extent to which online learning fosters independent thinking and civic responsibility in the post-pandemic era.

By explicitly aligning these frameworks with the identified research gaps, this study not only justifies its methodological choices but also highlights its potential to advance both scholarly understanding and practical improvement in online I&P education within vocational contexts.

1.3.2 Bridging the Gap Between Quantitative and Qualitative Approaches

Although both quantitative and qualitative methods have been used to study online engagement, their integration remains underutilized in current research. Quantitative studies often identify broad trends, while qualitative research provides deeper insights into students'

lived experiences. However, few studies combine these complementary perspectives to develop a more comprehensive understanding of SE—particularly in the context of online I&P courses at vocational colleges.

To address this methodological gap, the present study adopts a convergent mixed-methods design, leveraging the strengths of both approaches. Quantitative surveys will be used to capture overarching patterns of engagement, while qualitative interviews will explore the contextual and detailed aspects underlying these patterns. This integration not only enhances validity but also offers a richer and more actionable understanding of how students engage with online I&P learning.

In practice, quantitative survey results will inform the design of interview questions, ensuring they target key trends and anomalies revealed by statistical analysis. Conversely, qualitative findings will help interpret and contextualize the numerical data, offering explanations for observed patterns. For example, qualitative content analysis will be applied to discussion forum posts and transcripts of synchronous online sessions to assess the depth of engagement, the complexity of ideas shared, and the ways students build upon one another's contributions.

Similarly, critical questioning will be examined through the qualitative analysis of student reflections and the targeted coding of responses to prompts embedded in assignments and discussions. This will allow for a detailed evaluation of students' abilities to analyze, evaluate, and synthesize information, as well as their capacity to challenge assumptions and consider multiple perspectives.

Through this integrated approach, the study aims to produce a holistic and reliable picture of online SE—one that bridges the gap between surface-level participation metrics and the deeper cognitive, emotional, and behavioral dimensions essential to I&P education.

1.4 Problem Statement

The shift to online education in China's higher vocational colleges—particularly for I&P courses—has exposed significant challenges in sustaining SE. While digital platforms offer flexibility and broader access, they also disrupt traditional pedagogical practices that foster the critical thinking, moral reasoning, and collective inquiry central to I&P instruction. Existing research highlights the urgent need for instructional designs that are sensitive to local learning contexts and disciplinary objectives (Zhang, 2020), especially in courses with civic and ideological significance.

However, online I&P classes are frequently criticized for low levels of student motivation, limited interaction, and insufficient learner autonomy (Huang & Li, 2021; Guo, 2022). Although the broader field of digital learning in higher education has been widely studied (Sun & Chen, 2016; Liu, 2021), empirical research focusing specifically on SE in online I&P courses at vocational colleges remains scarce. Most existing studies are either descriptive in nature or overlook the systemic, relational, and ideological dimensions that make this context unique.

Moreover, few investigations incorporate established theoretical frameworks such as AT (Engeström, 2001), SOI (Moore, 1989), or CP (Freire, 1970) to analyze how engagement develops in digitally mediated civic education. This absence of theory-driven inquiry leaves

a critical gap in understanding the interplay between technology, pedagogy, and socio-political discourse in vocational I&P contexts.

To address this gap, the present study explores how SE is built, experienced, and sustained in online I&P courses within Chinese vocational colleges. It examines the structural, technological, and socio-political factors shaping engagement. Using AT, the research analyzes how mediating tools (e.g., LMS platforms, video conferencing), institutional rules, and divisions of labor influence learning activities. From the SOI perspective, it investigates the forms and quality of interaction among students, between students and teachers, and between students and content. Through the lens of CP, it evaluates how power relations, ideological content, and critical consciousness are negotiated in online environments.

By applying this integrated theoretical approach, the study aims to contribute both to academic theory and educational practice. It will deepen understanding of how digital mediation, institutional structures, and socio-political discourse interact to influence engagement in civic education. At the same time, it will offer practical recommendations for educators, instructional designers, and policymakers seeking to enhance online I&P engagement among vocational students.

1.5 Research Questions

This study explores SE in online I&P courses within higher vocational colleges using a mixed-methods approach. The research is guided by the following questions:

i. What are the interrelationships among the first-order latent variables of AT, SOI, CP, and how do they relate to a higher-order latent factor in the context of online I&P courses, as determined through Structural Equation Modelling (SEM)?

ii. Are there significant differences in SOI—specifically in student-teacher interaction (SOIST), student-student interaction (SOISS), and student-content interaction (SOISC)—across different grade levels (first, second, and third year) in online I&P learning environments, as analysed using the Kruskal-Wallis test?

iii. How do students perceive and experience the interplay between AT, SOI, and CP within these online I&P courses, and in what ways do these experiences influence their engagement and learning outcomes, as explored through qualitative methods?

iv. How do the quantitative descriptive statistics (means and standard deviations) for individual student demographic characteristics and survey items integrate with qualitative insights (themes and codes) on students' experiences and perceptions, to provide a detailed understanding of SE in online I&P courses?

1.6 Research Objectives

This study seeks to investigate and develop a comprehensive understanding of SE in online I&P learning within higher vocational colleges. The specific objectives are to:

i. To quantitatively examine the interrelationships between the first-order latent variables of AT, SOI, and CP in online I&P courses within vocational colleges, using SEM.

ii. To determine whether significant differences exist in SOI—specifically in SOIST, SOISS, and SOISC—across first-, second-, and third-year students in online I&P learning environments, using Kruskal-Wallis.

iii. To qualitatively explore and interpret students' experiences and perceptions of the interplay between AT, SOI, and CP in these online courses, and analyze how these experiences shape their engagement and learning outcomes.

iv. To develop a convergent mixed-methods analysis by triangulating quantitative findings from the SEM with qualitative insights into students' experiences and perceptions, thereby providing a comprehensive, contextualized understanding of SE.

1.7 Research Hypotheses

This study explores SE in online I&P learning within higher vocational colleges. ased on the research questions, the following hypotheses (H) are proposed:

i. **H1:** There are significant differences in overall SOI and its components—SOIST, SOISS, and SOISC—across first-, second, and third-year students in online I&P courses.

ii. **H2:** SE has a significant positive relationship with AT in online I&P courses within vocational colleges.

iii. **H3:** SE has a significant positive relationship with CP in online I&P courses within vocational colleges.

iv. **H4:** SE has a significant positive relationship with SOI in online I&P courses within vocational colleges.

Together, these hypotheses highlight the importance of aligning digital platforms, instructional methods, and collaborative approaches with the specific needs of vocational college students to sustain engagement and promote deeper learning.

1.8 Research Scope

This study investigates SE in online I&P courses offered by higher vocational colleges in Anhui Province, China. The scope is intentionally delimited by specific parameters designed to address the identified research gaps and the limited understanding of deep engagement in this educational context.

The research focuses exclusively on higher vocational institutions, recognizing their distinct student demographics, career-oriented learning priorities, and the unique pedagogical challenges of delivering I&P content online. Geographically, the study is confined to Anhui Province to allow for a contextually rich, locally relevant analysis, while still offering insights that may be transferable to similar vocational settings in China.

Methodologically, the study adopts a convergent parallel mixed-methods design, integrating quantitative and qualitative approaches to provide a comprehensive understanding of engagement. This design is critical for capturing the cognitive, emotional, and behavioral dimensions of SE that cannot be fully assessed through quantitative indicators alone. By combining survey-based measurements with in-depth qualitative exploration, the study aims to produce both statistically valid patterns and detailed interpretations that address the methodological limitations identified in Section 1.3.

1.8.1 Participants

This study targets first-, second-, and third-year students enrolled in higher vocational colleges in China, representing a range of majors including technical, engineering, business, and humanities-related fields. This population is deliberately selected to address

the contextual gap in existing research, as vocational students constitute a distinct demographic characterized by practical learning objectives and career-oriented aspirations.

In China, all higher education students are required to undertake I&P courses, ensuring a consistent curricular baseline across disciplines and institutions. By including students from all three academic years, the study captures variations in engagement related to both academic progression and accumulated I&P learning experience, enabling a more comprehensive understanding of how engagement develops over time in this educational context.

1.8.2 Learning Modalities

This study examines SE exclusively within fully online learning environments for I&P courses. These environments encompass both:

i. Synchronous formats, such as live video conferencing sessions that facilitate real-time interaction between students and instructors.
ii. Asynchronous formats, including online learning platforms, discussion forums, and digital assignments that allow students to engage with course content at their own pace.

Focusing on these modalities is critical for capturing how engagement manifests in diverse online formats, particularly in the post-pandemic educational landscape where online delivery has evolved from an emergency measure to an established mode of instruction. This approach moves beyond superficial engagement indicators (e.g., login frequency) to explore the cognitive, emotional, and behavioral dimensions of participation in both synchronous and asynchronous settings.

1.8.3 Subject Matter

This study focuses exclusively on I&P courses offered within higher vocational colleges. The selection of this subject area directly addresses the central research gap identified in the literature—namely, the limited empirical exploration of online I&P learning in vocational education contexts. I&P courses in China play a pivotal role in cultivating students' values, critical thinking skills, and civic responsibility, which are essential for preparing socially responsible graduates.

The unique pedagogical demands of I&P education—particularly in online environments—necessitate tailored instructional approaches that connect ideological concepts to students' real-world experiences and professional aspirations. As such, this study excludes courses or disciplines outside the I&P domain, ensuring a concentrated investigation into the factors shaping engagement within this specific and mission-critical curriculum.

1.8.4 Geographic Context

This research is conducted exclusively within higher vocational colleges in Anhui Province, China. The province was selected due to established institutional partnerships, accessibility for data collection, and its significance as a representative case of the rapidly developing vocational education sector in central China. This targeted geographic scope enables a context-rich and in-depth investigation of SE in online I&P courses while ensuring methodological feasibility.

However, while this focus supports the development of findings grounded in a specific socio-educational context, it also introduces limitations in generalizability. The

results may not fully extend to other provinces, educational systems, or international contexts. Acknowledging this limitation preserves research transparency and rigor while reinforcing the study's commitment to producing contextually relevant insights.

1.8.5 Timeframe

This study examines SE during and after the major disruptions caused by the COVID-19 pandemic, capturing both the initial emergency transition to fully online learning and the subsequent shift toward blended learning formats. This temporal focus is critical for addressing the research gap concerning the long-term impacts of the pandemic on student expectations, interaction patterns, and participation in evolving online I&P learning environments. By moving beyond short-term responses, the study seeks to understand how engagement is sustained and reshaped in a dynamic educational landscape marked by increased flexibility, changing learner needs, and the integration of digital tools into routine instructional practice.

1.8.6 Exclusions

To maintain a clear and focused research scope, this study excludes the following:

i. Students outside the first- to third-year levels at higher vocational colleges in Anhui Province, China. This ensures the participant group remains relevant to the vocational education context and the specific research gap identified.
ii. Courses or disciplines outside of I&P studies, in order to maintain a precise subject focus and directly address the contextual gap related to online I&P learning in vocational settings.

iii. Educational settings beyond higher vocational colleges in China, thereby emphasizing the study's institutional focus as a key aspect of the identified research gap.

iv. Primary data collection from face-to-face I&P learning environments. While existing literature on traditional classroom-based learning is considered for contextual comparison, the study does not collect new empirical data from current face-to-face classes. Instead, comparisons are drawn within the online learning context—such as between synchronous and asynchronous formats—to better understand engagement patterns unique to digital I&P instruction.

1.9 Significance of Study

This study holds important implications for enhancing the quality and effectiveness of online I&P courses in higher vocational colleges in Anhui Province, China. By examining the complex factors influencing SE, it addresses an urgent need for evidence-based strategies in a rapidly evolving post-pandemic educational landscape. The significance of the study is outlined in three dimensions.

1.9.1 Informing Effective Online Pedagogical Strategies and Enhancing Student Learning Experiences

This research directly addresses the scarcity of empirical work on engagement in online vocational I&P courses by offering actionable, evidence-based recommendations for educators. The findings will support the design and delivery of courses that go beyond surface-level metrics to focus on deep engagement, including improved student-teacher, student-student, and student-content interactions. By capturing students' lived experiences—

such as feelings of isolation, reduced motivation, or limited interaction—the study will inform pedagogical strategies that foster critical thinking, active participation, and civic responsibility. These strategies will be tailored to the diverse backgrounds and career-oriented goals of vocational students, ultimately enhancing learning outcomes and promoting sustained engagement in online I&P contexts.

1.9.2 Contributing to the Theoretical Understanding of Student Engagement

The study advances theoretical discourse by applying AT, SOI, and CP to the unique setting of online I&P education in Chinese vocational colleges. This integrative approach offers a multi-dimensional perspective on engagement, encompassing cognitive, emotional, and behavioral dimensions rather than relying solely on participation counts. AT provides insights into how vocational students' pragmatic learning tendencies influence their interaction with I&P content; SOI examines the quality and depth of student–teacher, student–student, and student–content exchanges; and CP illuminates how students develop critical consciousness, question dominant narratives, and cultivate a sense of agency. Together, these frameworks enable a detailed understanding of how ideological content, technological tools, and social interactions shape genuine engagement in civic education.

1.9.3 Broader Implications and Transferability of Insights

Although the research is grounded in the specific cultural and institutional context of Anhui's vocational colleges, its insights have potential relevance for other settings that face similar challenges in fostering deep engagement in online learning. Strategies identified—such as connecting abstract ideological concepts to real-world experiences, using collaborative projects to encourage critical dialogue, and designing activities that build on

peer contributions—can inform vocational training, adult education, and professional development programs worldwide. Methodologically, the study's convergent parallel mixed-methods design integrates quantitative surveys with qualitative interviews and content analysis of online interactions, addressing the limited integration of data types in prior research.

By measuring both the breadth (e.g., levels of participation) and the depth (e.g., complexity of ideas, critical questioning, and reflective engagement) of online learning, the study not only identifies general patterns but also uncovers how students develop critical thinking and civic responsibility in digital environments. Nevertheless, cultural and institutional differences require careful consideration when adapting these findings to other contexts.

1.10 Theoretical Framework

This study integrates AT, SOI, and CP into a single analytical framework (see Figure 1.1) to examine SE in online I&P courses within higher vocational colleges. The combination is particularly relevant given the post-pandemic shift toward digital learning. In this framework:

i. AT establishes the systemic context of the online learning environment.
ii. SOI (rooted in Social Constructivism, SC) details the interaction processes essential for learning.
iii. CP highlights the transformative aims of engagement, such as critical awareness and empowerment.

Together, they offer a multi-layered lens that captures not only participation but also the quality, meaning, and social purpose of engagement.

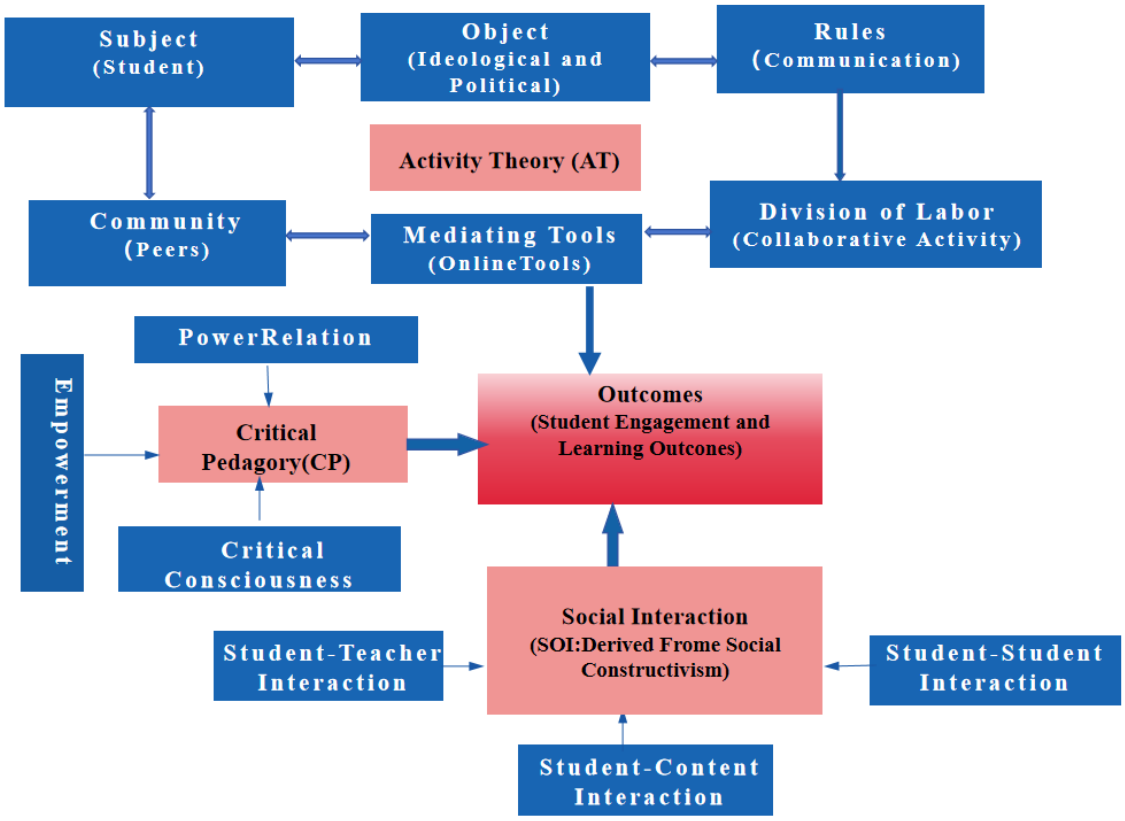


Figure 1.1: Proposed Theoretical Framework of General Concepts

1.10.1 Active Theory (AT)

AT conceptualizes online learning as a dynamic system in which the Subject (students) engages with an Object (I&P course content aimed at developing critical awareness) through Mediating Tools (e.g., online platforms, discussion forums). This activity is shaped by Rules (e.g., participation policies), the Division of Labor (e.g., instructors as facilitators, students as peer learners), and the Community. AT helps identify

how structural and technological factors—such as platform design or explicit participation guidelines—either promote or hinder engagement in complex I&P discussions.

1.10.2 Social Interaction (SOI)

SOI operationalizes SC's principle that knowledge is constructed through interaction. It examines three key dimensions: SOIST (student–teacher), SOISS (student–student), and SOISC (student–content). In online I&P courses, SOI clarifies how learning modalities—such as asynchronous forums, synchronous debates, or collaborative projects—shape engagement depth. A high level of meaningful interaction can promote deeper understanding, while a lack of it may result in passive participation and disengagement.

1.10.3 Critical Pedadogy (CP)

CP provides a transformative perspective, focusing on power relations, critical thinking, and learner empowerment. In the online I&P context, CP examines whether course design enables students to question dominant narratives, engage in reflective dialogue, and connect course concepts to social realities. By fostering a safe and inclusive online space for sharing diverse viewpoints and leading discussions on sensitive issues, CP helps students develop agency and a sense of civic responsibility.

1.10.4 Framework Integration

In the integrated model:

i. AT frames the system-level conditions influencing engagement.
ii. SOI analyzes how interactions occur within that system.

iii. CP ensures the analysis addresses why engagement matters—emphasizing critical consciousness, social responsibility, and empowerment.

This theoretical framework directly informs the study's research design. Quantitative analyses (RQ/RO i and ii) examine relationships among AT, SOI, and CP constructs, including differences in SOI components across student groups. Qualitative analyses (RQ/RO iii) explore students' lived experiences using all three perspectives to interpret perceptions of the learning environment (AT), interactions (SOI), and empowerment (CP). Finally, RQ/RO iv synthesizes findings from both strands, combining structural equation modeling (SEM) results with thematic insights to produce a comprehensive understanding of online I&P engagement.

1.11 Methodological Significance

This study employs a convergent parallel mixed-methods design, collecting and analyzing quantitative and qualitative data simultaneously and independently to achieve triangulation. This approach provides a more comprehensive understanding of SE than either method could offer alone.

A distinctive feature of the study is its targeted focus on the three SOI components—SOIST, SOISS, and SOISC—as operationalized within a SEM. These components are crucial for vocational I&P courses because they capture the range of interactions necessary to develop both conceptual knowledge and applied critical thinking:

i. SOIST enables guided exploration of complex ideological concepts.
ii. SOISS fosters peer debate and collaborative learning on sensitive political topics.
iii. SOISC promotes direct engagement with diverse course materials.

The methodological innovation lies in the integration of quantitative and qualitative findings. SEM results provide a macro-level view of relationships among latent variables, while qualitative interviews and content analysis offer micro-level insights into students' lived experiences. For example, a strong SEM correlation between SOISS and engagement can be enriched by narrative accounts showing how peer debates deepen understanding and commitment.

By systematically comparing and linking both strands, the study identifies areas of convergence, divergence, and complementarity—explicitly connecting qualitative themes to observed and latent SEM variables. This approach moves beyond describing patterns to explaining why and how they occur.

Methodologically, the study makes three contributions:

i. Demonstrates the value of integrating SOI components within an SEM framework.
ii. Provides a replicable model for mixed-methods research in specialized online vocational contexts.
iii. Extends engagement research into the underexplored field of online I&P learning, combining statistical robustness with contextual depth.

By applying this design to a less-studied educational setting, the study not only advances engagement theory but also offers a flexible, evidence-based approach for examining complex social and educational phenomena.

1.12 Definition of Key Terms

The following terms are defined as used in this study:

1.12.1 Remote Online Teaching of I&P Courses

Delivery of I&P courses via internet-based modalities, including synchronous and asynchronous learning through LMS or other digital platforms (Yang, 2021). This includes fully online and hybrid-course online components. In this study, it specifically refers to I&P courses in higher vocational colleges in Anhui Province, China, during and after the COVID-19 pandemic.

1.12.2 Student Engagement (Conceptual)

The degree to which students are actively involved in their learning, encompassing:

i. Behavioral – active participation in learning activities.
ii. Cognitive – deep processing and critical thinking.
iii. Emotional – motivation, interest, and self-regulation (Kim et al., 2015a; Lee et al., 2015; Hu et al., 2016).

This study examines engagement within online I&P courses in vocational colleges.

1.12.3 Student Engagement (Operational)

Measured through the AT lens as interactions within the online learning activity system, using latent variables and observed indicators in a SEM:

i. *Interaction Analysis*: Frequency, depth, and quality of SOIST, SOISS, and SOISC interactions (observed variables under the SOI latent variable).

ii. *Surveys and Interviews*: Data on emotional involvement, satisfaction, and perceptions of the online learning environment; survey items feed SEM constructs, interviews provide qualitative context.

1.12.4 SOI Components (Conceptual)

Forms of interaction in the online learning environment that shape engagement (Stoyanova et al., 2021). Together, these constitute the SOI latent variable in the SEM model:

i. *SOIST*: Student–instructor interaction (feedback, guidance, support).

ii. *SOISS*: Student–student interaction (collaboration, discussion, peer knowledge sharing).

iii. *SOISC*: Student–content interaction (engagement with course materials, application, analysis).

1.12.5 SOI Components (Operational)

Measured as observed variables in the SEM:

i. *SOIST*: Lecturer feedback in forums, guidance to students.

ii. *SOISS*: Student participation in forums, collaborative activities, peer communication.

iii. *SOISC*: Access to materials, completion of activities, engagement with online resources.

1.13 Chapter Summary

This chapter established the foundational framework for the study by identifying key research gaps in the context of online I&P courses at vocational colleges in Anhui Province, China. It outlined the background of the study, emphasizing the impact of the COVID-19 pandemic on online learning and the persistent challenge of sustaining SE in this evolving educational environment. The scope was defined to include first- to third-year vocational college students, both synchronous and asynchronous learning modes, and the geographic focus on Anhui Province.

The chapter highlighted the significance of this research in shaping effective teaching strategies, enhancing students' learning experiences, and contributing to the theoretical understanding of SE. The research objectives, questions, and hypotheses were presented, aligned with the SEM approach guiding the quantitative component of the study.

Key terms were defined to ensure clarity and consistency, directly linking conceptual and operational definitions to their role in the SEM. The integrated theoretical framework—drawing on AT, SOI model, and CP—was introduced, along with the conceptual model forming the foundation for SEM analysis.

The next chapter will review relevant literature, further strengthening the research framework and establishing the theoretical and empirical foundations for this study.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

This chapter critically reviews existing literature on SE in online I&P courses at higher vocational colleges. The COVID-19 pandemic reshaped education globally, intensifying the need to understand and sustain student motivation, engagement, and a sense of community in digital learning environments. In vocational education, where practical skills and civic competencies are equally vital, effective engagement hinges on strong SOI across student–teacher, student–student, and student–content connections.

To explore these complexities, this review applies an integrated theoretical lens combining AT, the SOI framework, and CP. AT examines the online learning environment as an interconnected activity system shaped by tools, rules, roles, and community. SOI, grounded in SC, emphasizes active knowledge co-construction through interaction. CP addresses the transformative dimensions of learning, including power relations, critical awareness, and empowerment—particularly relevant in I&P education. Together, these perspectives provide the foundation for the SEM approach used in this study.

While existing research confirms that online methods maintained instructional continuity during the pandemic, significant gaps remain—particularly in understanding the qualitative dimensions of engagement, such as the depth of peer collaboration, the role of feedback, and the influence of power dynamics. These challenges are amplified in vocational colleges, where disparities in digital readiness and equity persist. Addressing these issues

requires pedagogical approaches that integrate AT, SOI, and CP with targeted interaction strategies to create inclusive and meaningful online learning experiences.

Following this introduction, the chapter (i) outlines the current state of online I&P education, (ii) critically examines prior research on SE, (iii) presents the integrated theoretical framework, and (iv) identifies gaps in the literature. By synthesizing these strands, this review establishes the conceptual and empirical foundation for the SEM model developed in this study.

2.2 Remote Online Learning (ROL)

Remote online learning (ROL) refers to the delivery of instruction through internet-based platforms, including both synchronous and asynchronous formats (Yang, 2020). Its role in higher education has expanded rapidly, particularly in vocational colleges, where even practice-oriented courses such as I&P studies are increasingly offered online. This growth, supported by diverse digital tools and resources (Seaman et al., 2018), offers new opportunities but also presents unique challenges in teaching, learning, and SE.

Opportunities include flexible scheduling for working students, access to virtual industry experts, and the development of essential digital literacy skills. Graham's (2006) classification of educational technology into generative, facilitative, and transformative functions highlights how these tools can enable content creation, support interaction, and fundamentally reshape the learning process. In vocational settings, technology can simulate workplace scenarios, connect learners to professional communities, and enable collaboration across locations (Ali & Maksum, 2020; Kotiash et al., 2022; Shunkov et al., 2022).

Challenges are equally significant. Reliable internet access, specialized hardware and software for practical courses, and authentic replication of workshop environments remain pressing issues. Students with limited digital skills may struggle, while courses requiring manual dexterity or teamwork demand innovative methods for skill development and communication. Furthermore, efficiency-driven technology use can inadvertently reduce active learning and critical thinking (Freeman et al., 2014), making it crucial to ensure that tools enhance—rather than replace—meaningful engagement.

Blended learning, which combines online and face-to-face delivery (Boltz et al., 2021), has shown mixed results. Its success depends on contextual factors such as subject matter, student demographics, and institutional resources (Bernard et al., 2009). In vocational programs, where practical experience and peer interaction are essential, online components must be carefully designed to complement hands-on learning.

Overall, the promise of ROL lies not merely in streamlining delivery but in fostering active participation, critical thinking, and professional skill-building. In the context of I&P education, these goals require a deliberate application of theoretical frameworks such as AT, SOI framework, and CP. Table 2.1 summarizes the key factors and considerations for implementing ROL effectively in vocational settings.

Table 2.1: Key Factors and Considerations in Remote Online Education

No.	Author(s) & Year	Context	Remote Online Learning	Teaching & Engagement (Methods, Engagement, Tech)	Efficiency & Engagement (Streamlining, Balancing)
1	Ali & Maksum (2020); Kotiash et al. (2022); Shunkov et al. (2022)	Integration of technology for streamlined teaching, with caution against compromising depth. (AT: Mediating Tools, Rules, Object; SOI: tech-mediated interaction; CP: efficiency's power dynamics.).	✓	✓ (Examines teaching approaches and their impact on SE)	✓ (Explores streamlined instruction via technology while stressing the need for balance to sustain engagement and depth)
2	Boltz et al. (2021)	Compares fully online and blended learning, emphasizing contextual factors (course, student demographics) and vocational relevance. (AT: Community, Labor Division; SOI: diverse student interactions; CP: empowering diverse learners.)	✓	✓ (Addresses teaching methods, SE)	—

Table 2.1 continued

3	Graham (2006)	Classifies educational technology into generative, facilitative, and transformative types while acknowledging significant overlap.(AT: Mediating Tools; SOI: collaborative content creation; CP: altering power dynamics.)	—	✓Explores functional roles of technology in education.	—
4	Seaman et al. (2018)	Highlights proliferation and complexities of digital resources for online learning, urging further investigation. (AT: Mediating Tools; SOI: enabling interaction; CP: access/equity.)	✓	✓ (Examines the effects on teaching methods and SE)	—
5	Yang (2020)	Defines ROL in higher education, examining its expansion and associated complexities. (AT: Object of activity; SOI: context of interaction; CP: power in educational expansion.).	✓	✓ (Teaching methods, engagement)	—

2.3 ROL for I&P Courses

This study applies a Critical Discourse Analysis (CDA) framework to examine how technology is integrated into I&P courses in Chinese higher vocational institutions. CDA is well-suited to uncovering the assumptions, power relations, and ideological narratives embedded in educational policies and research. Here, it is used to ask: *Does technology in I&P education reinforce existing power structures, or does it genuinely foster student agency, critical thinking, and diverse perspectives?*

Policy and research examples highlight the stakes. For instance, the State Council Office (2019) advocates improving I&P teachers' digital skills—ostensibly to promote information literacy—but such initiatives can also serve to more efficiently disseminate state-approved ideology, potentially narrowing space for critical reflection. Likewise, Wei and Huang (2022) documented the challenges of sustaining participation and skill development in hybrid vocational I&P settings, raising questions about whether online platforms enhance or limit learner autonomy. Similarly, Xu and Chen (2020) found that online communities strengthened ideological dissemination but often failed to foster genuinely critical, multi-perspective dialogue—essential for deeper engagement.

From a CDA standpoint, these findings invite scrutiny of both what technology delivers and how it shapes students' political identity, autonomy, and engagement depth. This study therefore uses CDA to focus on five key areas:

i. *Policy Orientation*: Identifying strategies for integrating emancipatory technologies that enable active participation.

ii. *Curriculum and Pedagogy*: Examining whether teaching methods challenge dominant narratives and encourage deeper reflection.

iii. *Student Agency*: Evaluating if digital tools give students real control over their learning experiences.

iv. *Identity Formation*: Exploring how online I&P environments influence critical thinking and ideological perspectives.

v. *Ethical Practice*: Addressing issues of privacy, censorship, and manipulation that affect trust and authentic engagement.

Ultimately, successful technology integration in I&P courses requires not just digital competence but also an intentional, critical approach to ensure that online learning fosters dialogue, reflection, and diverse viewpoints rather than simply reinforcing predetermined ideology. Table 2.2 illustrates this discussion with case studies that connect available resources, existing challenges, and practical solutions to SE outcomes in ROL for I&P courses.

Table 2.2: CDA helps understand and improve student engagement

No.	Case / Study	Resources	Context & Relevance to I&P & Theory	Solution / Approach	Benefits	Challenges
1	State Council Office (2019)	Policy guidelines ; Teacher training ; Online platforms	Policy guidelines for I&P education in China. Focus: promoting state ideology & policy alignment (CP: power dynamics in curriculum; how policies shape subjectivity).	Equipping teachers with digital dissemination tools.	Streamlined ideological dissemination; standardized instruction	Limiting critical thinking; reinforcing dominant narratives.
2	Wei & Huang (2022)	Online platforms ; Blended learning (face-to-face + online)	Empirical study on online learning in I&P courses within a vocational college context.Focus: balancing online/offline interaction, ensuring practical skill development (AT: object of activity, mediating tools; SOI: teacher-student/student-student interaction).	Blended curriculum design; improved interaction strategies (e.g., online practical tasks).	Flexible learning; increased engagement opportunities in hybrid settings.	Balancing online/offline engagement; tracking practical participation; ensuring student independence.

Table 2.2 continued

3	Xu & Chen (2020)	Online education platforms；Digital learning communities	Research on collaborative ideological interaction among Marxist learners in online settings (general higher education context, relevant to I&P's ideological components) . Focus: strengthening I&P education via online communities; enhancing online discussions (SOI: student-student interaction, online community; CP: fostering diverse interpretations, challenging narratives).	Collaborative online tasks; peer group discussions; real-time resource sharing.	Enhanced student interaction; efficient resource sharing; potential for broader reach of ideological content.	Limited critical engagement; reinforcing official narratives; sustaining participation.

2.4 Online Learning of Ideology and Politics in Vocational Colleges during the COVID-19 Epidemic： A Theoretical Synthesis and Gap Analysis

The COVID-19 pandemic forced vocational colleges to rapidly shift I&P courses to ROL, reshaping their entire activity systems. This section critically reviews literature on online I&P in Chinese vocational colleges during the pandemic, organizing insights through the lenses of AT, SOI, and CP. It identifies key dynamics, pedagogical challenges, and research gaps (summarized in Table 2.3).

2.4.1 AT Perspective

ROL platforms became central mediating tools (Xuan, 2020; Huang, 2024), enabling quick information access, interactive media, and wider reach. Systems like ManageBac supported personalized learning and progress tracking (Cao & Liu, 2022). These changes aligned with national policy aims to modernize I&P via new media (Fan Jun, 2013; Xinhuanet, 2016; State Council Office, 2019) with top-down rules reshaping the stakeholder community (Meihearey, 2020; Chen, 2021; Xiao, 2022). Yet, vocational educators faced constraints—limited resources, varied digital literacy, and challenges in replicating hands-on pedagogies online.

2.4.2 SOI Perspective

Strong teacher presence and peer interaction remain essential for engagement (Li et al., 2021). However, vocational ROL often struggled to sustain dialogue and reduce isolation, even with synchronous tools like Tencent Classroom. Chang (2021) found that digital-only delivery frequently lacked the detailed exchanges required for deep ideological

understanding, echoing Bolliger & Inan's (2012) warning that poor tool design and unclear responsibilities undermine engagement.

2.4.3 CP Perspective

Digital I&P delivery risks reinforcing dominant narratives when content remains unidirectional (Freire, 1970/2000; Giroux, 2022). Seemingly neutral structures—curriculum design, platform affordances, teacher-student dynamics—can unintentionally limit critical awareness. Rapid pandemic shifts left many educators without adequate training to use online spaces for transformative dialogue. Without institutional support, the emancipatory potential of ROL remains underdeveloped.

2.4.4 Gap Analysis

While existing research documents the operational success of pandemic-era ROL in maintaining continuity, three gaps remain:

i. Lack of systematic analysis of how activity system elements, social interactions, and CP intersect in vocational I&P online learning.

ii. Limited exploration of long-term engagement and critical thinking outcomes beyond emergency remote teaching.

iii. Insufficient integration of policy, technology, and pedagogy to align ROL with emancipatory, student-centered learning.

Addressing these gaps requires collaboration among institutions, policymakers, and researchers to improve platform design, teacher training, and curriculum structure. The goal

is not just continuity, but genuinely inclusive and empowering I&P education—fostering critical consciousness through rich interactions between students, peers, teachers, and content (Hooks, 1994). Table 2.3 synthesizes the theoretical insights, key findings, and identified research gaps.

Table 2.3: Case Studies: Online I&P Courses in Vocational Colleges during COVID-19

No	Study	Resources (AT: Tools/Community)	Issues (AT: Object/Subject Challenges)	Solutions (AT: Rule/Labor Adjustments)	Benefits (AT: Object Achievement)	Focus / Drivers (Theoretical Links)
1	Bolliger & Inan (2012); State Council Office (2019)	Government policies as rules; funding/IT tools for national education community.	Mainstream ideology shapes curricula toward unified understanding, but fostering critical thinking and active meaning-making remains a key CP power challenge.	New media tools integrated; teacher digital training.	Government support eased ICT adoption; consistent I&P object delivery.	Modernizing I&P via national policies (AT; CP: Power).
2	Cao & Liu (2022)	Platforms (ManageBac/Moodle) as tools for student-content interaction.	Challenges include balancing online/offline modes (division of labor), unclear online I&P rules, need for teacher training, and risk of prioritizing tech over quality.	Blended learning rules; structured tools for progress/feedback.	Detailed tracking, instant feedback, personalized learning; boosting SE.	Improving online I&P through effective tech integration (AT; SOI: Student-Content).

Table 2.3 continued

3	Chang (2021)	Blended learning combines in-person/online tools and rules.	I&P needs deep student-teacher interaction; purely online limited understanding. Scheduling/resource issues; some teachers struggles; potential for teacher-dominated sessions.	Mix of live/self-paced rules; instructor checkpoints for social interaction.	In-depth ideological content; timely feedback enhancing student-teacher interaction.	Balancing deep learning with flexible online schedules (SOI; AT).
4	Freire (1970/2000); Giroux (2022); Hooks (1994)	CP rules; dialogue-based learning tools.	Online reinforced power hierarchies; passive consumption limited critical consciousness. Conflict with top-down rules; teachers needed support for diverse views.	Critical reflection tasks; student-led debates/discussions.	Promoted critical thinking; diverse perspectives; empowerment and deeper social interaction.	Shifting I&P to student-centered learning (CP: Empowerment, Consciousness; SOI).

Table 2.3 continued

5	Hodges et al. (2020)	Online platforms (Zoom, LMS) as emergency teaching tools..	Sudden shift left subjects unprepared; potential breakdown of activity system. Rapid transition led to poor course design; limited teacher training; risk of superficial learning.	Simple, flexible digital tools prioritized to adjust rules.	Learning continued during lockdowns; foundation for future online education.	Maintaining education during pandemic (AT: Object).
6	Li et al. (2021)	Tencent Classroom/video tools with discussion groups for community.	Reduced face-to-face interaction; disengagement risk without strong teacher presence. Screen fatigue; difficulty assessing understanding without in-person cues.	Regular check-ins, teacher feedback rules; structured group work.	Reduced isolation/boredom; built community and strengthened social interaction.	Strengthening teacher-student/peer interaction (SOI) via live discussions (AT: Tools, Community).

Table 2.3 continued

7	Xuan (2020)	Live platforms (Tencent Classroom, virtual classrooms) as key tools.	Rapid shift strained activity system; student isolation risk. Over-reliance on live sessions; potential for teacher-dominated discussion.	Live streaming with real-time Q&A; interactive class activities rules.	Kept students engaged; quick adaptation to lockdowns.	Expanding online I&P ensuring continuity (SOI; AT: Tools, Object).

2.5 Student Engagement in Online Ideological and Political Courses

2.5.1 The Importance and Definition of Student Engagement (SE)

SE is a critical factor in academic success, especially in online environments (Trowler, 2010; Martin & Bolliger, 2018). It encompasses behavioral (active participation), cognitive (deep processing), emotional (positive attitudes), and social (peer interaction) dimensions, all of which shape motivation and achievement (Anderman et al., 2013; Wang & Eccles, 2013). Engagement involves far more than attendance; it requires active, sustained involvement.

In higher vocational I&P courses, engagement is essential to achieving course objectives. The pandemic-driven shift to digital platforms highlights the need for intentional strategies to keep students focused and motivated. Within AT, this means designing learning activities that deliberately align the subject (students), object (learning goals), and mediating tools (digital platforms) for maximum engagement.

2.5.2 Sociocultural Perspectives on SE and AT

From a sociocultural perspective, institutional norms, course structures, and cultural attitudes shape student belonging and engagement (Lam et al., 2012; Kahu, 2013). In AT terms, these factors act as rules and community elements in the learning activity system (Engeström, 2001; Hardman, 2007).

A classroom culture that values open dialogue promotes collaborative learning and critical thinking—both central to I&P objectives. Here, SOI plays a key role: peer and

student–teacher exchanges can challenge hierarchical structures and encourage democratic dialogue (Hooks, 1994).

Instructors adopting a facilitative role empower students to co-create learning experiences (Shor, 1992). This reflects CP, which emphasizes student voice, agency, and questioning dominant ideologies (Giroux, 2022). Combining CP's focus on power and agency with AT's focus on structure and tools provides a robust framework for designing transformative online I&P courses.

2.5.3 The Role of Social Interaction in Online SE

SE is strongly shaped by SOI's three interaction types (Moore, 1989):

i. *SOIST*: Clarifies expectations and guides learning.
ii. *SOISS*: Builds community and promotes collaboration.
iii. *SOISC*: Deepens understanding and supports practical application.

Each type affects different engagement dimensions: strong SOIST boosts cognitive engagement; active SOISS strengthens emotional and social engagement.

Online formats alter these patterns—offering flexibility and interactive tools but also reducing face-to-face exchanges and risking digital inequities (Hooks, 1994; Bozkurt et al., 2015). Applying Moore's framework online means adapting interactions to threaded discussions, live chats, and collaborative tools. Instructors often take on less directive roles, encouraging students to be more self-directed (Kaptelinin & Nardi, 2006).

From an AT perspective, division of labor and mediating tools are more flexible online, influencing how interaction occurs. Likewise, rules (e.g., forum guidelines) can enable or constrain meaningful exchange, shaping the learning activity as a whole.

2.5.4 Defining SE Through the SEM Framework

Our SEM conceptualizes SE as the product of three latent variables—AT, CP, and SOI—measured through observable indicators.

i. SOI is represented by SOIST, SOISS, and SOISC.
ii. AT includes subject (SUB), object (OBJ), division of labor (DIV), community (COM), mediating tools (MET), and rules (RUL).
iii. CP includes critical consciousness (CRC), empowerment (EMP), and power relations (POR).

SOI serves as a mediating variable, linking the structural and ideological elements (AT and CP) to actual engagement outcomes. Figure 2.1 illustrates these relationships, showing how the constructs interact to shape engagement in online vocational I&P courses.

This operationalization enables empirical testing of how activity structures, social interactions, and CP collectively influence SE—providing a foundation for designing more empowering and participatory online learning environments.

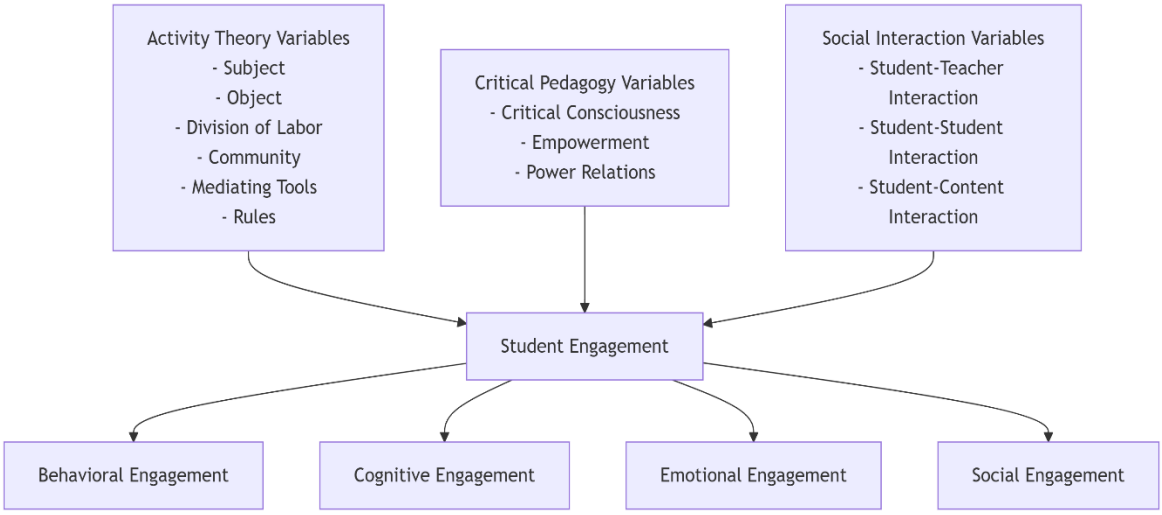


Figure 2.1: Proposed Theoretical Framework of General Concepts

2.5.5 Integrating SOI and SE Strategies in Online Learning

The three SOI types—SOIST, SOISS, and SOISC—map directly onto different engagement dimensions.

i. SOIST (Student–Teacher) nurtures emotional engagement through guidance, encouragement, and timely feedback.
ii. SOISS (Student–Student) stimulates cognitive engagement by fostering collaboration, debate, and peer learning.
iii. SOISC (Student–Content) sustains behavioral engagement through active exploration, application, and practice.

In our SEM model, these interaction types collectively form the SOI latent variable, mediating the influence of AT (structural elements) and CP (critical and empowering pedagogy) on overall SE.

Research comparing asynchronous and synchronous learning shows their differing capacities to support these interaction types (Hrastinski, 2008). Well-structured activities—such as scaffolded group projects, reflective discussion prompts, and structured peer feedback—have been shown to enhance higher-order thinking and social connectedness (Garrison & Anderson, 2003).

However, without deliberate integration of CP and AT principles, digital tools risk being reduced to mere content delivery or attendance tracking. This can create surface-level engagement while neglecting student agency, power relations, and critical consciousness (Freire, 1970/2000; McLaren, 2003). Designing interaction strategies that consciously address these deeper dimensions is essential for meaningful online I&P learning.

2.5.6 Fostering Online Learning Communities: Theoretical Foundations and Practical Strategies

The concept of an online learning community is central to sustaining engagement in remote education. Garrison's (2007) Community of Inquiry (CI) model highlights the interplay of teaching presence, cognitive presence, and social presence. Prior studies (Picciano, 2002; Rovai, 2003) show that strong interaction and social support improve student persistence, while Wu et al. (2023) found that factors such as academic emotions—moderated by gender—affect online learning experiences.

From an AT perspective, these "presences" act as mediating tools and community norms that can either enable or constrain engagement (Engeström, 2001; Kaptelinin & Nardi, 2006). CI's social presence aligns closely with SOI, especially SOISS, reinforcing the role of community as a primary driver of engagement.

CP adds another layer by focusing on power dynamics in online communities (Freire, 1970/2000; Giroux, 2022). Designing courses that allow students to question, challenge, and construct knowledge promotes richer SOISS and deeper SOISC (Hooks, 1994). This often requires redistributing authority—an AT "division of labor" shift—by granting learners more control, reducing hierarchical barriers, and encouraging active participation (Shor, 1992). Such changes directly support student empowerment, a key CP principle.

Translating these insights into practice involves deliberate integration of course design, technology, and instructional strategies (Gavrilis et al., 2020; Ahshan, 2021; Baloran et al., 2021). Effective approaches include interactive content, prompt feedback, and a supportive online culture, which are especially important during crises (Nguyen et al., 2022). The careful choice of mediating tools—such as forums, live sessions, and collaborative projects—can serve both AT's functional role and CP's transformative aims by encouraging students to critically evaluate and reshape their learning environments.

Consistent facilitation and feedback remain essential across SOI dimensions:

i. SOIST clarifies expectations and sustains motivation.

ii. SOISS builds belonging and shared purpose.

iii. SOISC deepens cognitive processing and critical reflection (Shea & Bidjerano, 2010; Martin & Bolliger, 2018).

Meta-analyses (Hu & Li, 2017) reinforce these findings, offering educators clear guidelines for cultivating interactive, student-centered online learning communities that promote both engagement and critical consciousness.

2.5.7 Future Research Directions in Online SE

Despite a growing body of scholarship on online SE, important gaps remain. Longitudinal studies are needed to examine how technology integration, cultural contexts, and learner differences shape engagement over time. Such studies could unpack each engagement dimension—behavioral, cognitive, emotional, and social—to identify context-specific strategies that address the needs of different student populations (Kahu, 2013; Yeh et al., 2019).

Future work should also investigate the intersection of AT and CP. AT's focus on structural elements and systemic contradictions can complement CP's emphasis on power relations and empowerment, offering richer insights into how online learning environments can be both effective and transformative. Key questions include:

i. How do division of labor and mediating tools within an activity system either reinforce or disrupt hierarchical power structures?

ii. What instructional designs most effectively promote student empowerment and critical consciousness in vocational I&P contexts?

Addressing these questions would support the creation of equitable, engaging, and critically aware online learning ecosystems. To guide applied research and practice, Table 2.4 presents practical implications and key considerations for designing effective online I&P courses that align with both AT and CP principles.

Table 2.4: Literature Review on Student Engagement in Remote Online Learning

No	Author(s)/Year	Aspect/Dimension	Key Insights	Theoretical Framework	Implications
1	Ahshan (2021); Baloran et al. (2021); Gavrilis et al. (2020); Nguyen et al. (2022)	Course Design Frameworks & Crisis Response	Integrates technology and instructional strategies to ensure adaptability in crises like COVID-19.	Frameworks align with AT (mediating tools, rules shaping activity) and CP (responsiveness to socio-historical contexts).	Implement adaptive course designs with flexible interactive tools, enabling student agency in challenging circumstances.
2	Anderman et al. (2013); Trowler (2010); Wang & Eccles (2013)	Multidimensional Engagement.	Engagement involves behavioral (participation), cognitive (deep learning), emotional (motivation), and social (peer interaction) factors.	Holistic view crucial for understanding the learning activity's object in AT. Emotional/social dimensions influenced by SOI.	Design courses supporting all engagement dimensions: participation, deep processing, positive attitudes, and social connections for better outcomes.
3	Bozkurt et al. (2015); Kaptelinin & Nardi (2006); Moore (1989)	Digital & Online Learning Modalities	Online platforms offer flexibility and communication tools but may also create digital divides.	Moore's SOI applied directly (SOIST, SOISS, SOISC facilitated/hindered). AT analyzes digital tools as mediating tools and digital divide as a contradiction.	Design digital tools to foster meaningful SOI, considering inequities for equitable access and engagement.

Table 2.4 continued

4	Engeström (2001); Hardman (2007); Kahu (2013); Lam et al. (2012)	Sociocultural & Institutional Factors	Institutional norms, course structures, and cultural attitudes shape engagement and belonging.	Recognized as rules and community components within AT, influencing the subject's engagement with the object.	Adopt culturally responsive teaching for inclusive I&P education.
5	Engeström (2001); Kaptelinin & Nardi (2006); Moore (1989)	AT in Online Engagement	Engagement depends on student goals, digital tools, and learning community interactions.	Directly applies AT: engagement as activity object, influenced by subject's goals, mediating tools, and community interactions (SOI).	Establish clear guidelines and digital tools for structured engagement.
6	Freire(1970/2000) ;Garrison & Anderson (2003); Hrastinski (2008); McLaren (2003)	Asynchronous vs. Synchronous Learning & Future Directions	Asynchronous and synchronous learning impact engagement differently, requiring structured tasks and feedback.	Comparative Analysis of Online Modalities; Integration of CP and AT	Future research should assess the impact of digital modalities on engagement.

Table 2.4 continued

7	Freire(1970/2000); Giroux (2022); Hooks (1994); Shor (1992)	CP & Empowerment	Encourages reflective dialogue, shared authority, and student agency in online learning.	Core tenets of CP, addressing power relations, fostering critical consciousness and empowerment. Impacts division of labor.	Use student-centered approaches fostering reflective dialogue, shared authority, and student agency to enhance critical engagement, challenging traditional power dynamics.
8	Garrison (2007); Picciano (2002); Rovai (2003); Wu et al. (2023)	CI & Social Presence	Builds an online learning community integrating teaching, cognitive, and social presence.	CI's "social presence" maps to SOI (student-student interaction) and AT's community concept. "Teaching presence" relates to SOIST.	Foster collaborative online environments cultivating strong teaching, cognitive, and social presences to improve engagement, retention, and community.
9	Giroux (2022); Hooks (1994); Shor (1992)	CP & Democratic Dialogue	Promotes student voice, co-creation of knowledge, and challenges traditional power structures.	Aligns with CP goals: addressing power relations, promoting critical consciousness, fostering empowerment via democratic dialogue. Impacts division of labor	Shift from didactic to participatory, student-centered learning promoting student voice and co-creation of knowledge, challenging power structures.

Table 2.4 continued

10	Kahu (2013); Yeh et al. (2019)	Research Gaps & Future Directions	More studies needed on long-term technology use and engagement dimensions in diverse settings.	Highlights need for AT to understand longitudinal changes in mediating tools/activity systems, and CP to explore power/empowerment in diverse contexts.	Conduct in-depth research on how structural elements (AT) and empowerment strategies (CP) shape engagement dimensions over time in varied cultural contexts.
11	Martin & Bolliger (2018); Shea & Bidjerano (2010)	Interactive Engagement & Feedback	Active learning, social interaction, and timely feedback boost engagement.	Strategies relate to fostering all SOI types; key rules and mediating tools in effective AT systems.	Use interactive content, prompt/constructive feedback, varied social interaction opportunities (SOIST, SOISS, SOISC) for effective online engagement.
12	Shea & Bidjerano (2010); Yeh et al. (2019)	Self-Efficacy, Self-Regulation & Goal Orientation	Confidence, persistence, and goal-setting enhance online learning engagement.	Aligns with subject's agency/motivation in AT, fostered by CP's emphasis on student empowerment.	Implement strategies building self-efficacy and promoting self-regulation, encouraging goal-setting and ownership in online learning.

2.6 ROL: Opportunities, Challenges, and Factors Affecting Engagement

2.6.1 Theoretical Perspectives on Online Learning Engagement

Research on online learning engagement often draws from three interconnected theoretical perspectives: AT, CP, and SOI (Leont'ev, 1978; Vygotsky, 1978; Giroux, 1983; Moore, 1989; Freire, 1970/2000; Engeström, 2001). Used together, these perspectives offer a multi-layered framework for understanding the structural, cultural, and interactional factors shaping vocational students' engagement in online I&P courses—particularly under dynamic conditions such as the COVID-19 pandemic.

2.6.2 AT Perspective: Structural Components of Engagement

Originating in the work of Vygotsky (1978) and Leont'ev (1978), and expanded by Engeström (2001), AT views teaching and learning as an interconnected activity system comprising six elements (Engeström, 2001; Kaptelinin & Nardi, 2006):

i. *Subject*: Learners (vocational students) and potential teachers.

ii. *Object*: The intended learning goals, such as theoretical knowledge and ethical values in I&P courses.

iii. *Mediating Tools*: Online platforms, forums, and assessment tools—connect learners to learning outcomes by enabling asynchronous and synchronous engagement (Mishra & Koehler, 2006; Moore & Kearsley, 2011). Their accessibility, stability, and interactivity are key to sustaining engagement (Bao, 2020), while technical issues or poor design can reduce it (Hodges et al., 2020). Effective tools should be user-friendly, up-to-date, and aligned with pedagogical goals.

iv. *Rules*: Both formal and implicit—such as institutional policies and course guidelines, provide structure for effective engagement in online learning (Cercone, 2008; Zhan & Mei, 2013). Clear rules promote consistency, clarity, and academic integrity (Zhan & Mei, 2013), while overly strict ones may lead to passive learning (Engeström, 2001). Transparent, adaptable policies that encourage discussion and collaboration foster deeper engagement.

v. *Community*: The network of stakeholders including teachers, peers, administrators, families, enterprises, and local groups—has expanded during the pandemic as students study off-campus (Engeström, 2001; Hodges et al., 2020). This broader reach connects theoretical learning to real-world issues, boosting relevance, motivation, engagement, and a sense of belonging.

vi. *Division of Labor*: The distribution of roles among students, teachers, and external partners—can shift instructors from lecturers to facilitators and co-learners, fostering a collaborative and equitable environment (Engeström, 2001; Darling-Hammond, 2017). Effective implementation, such as through group projects or peer teaching, enhances engagement, initiative, and collaborative skills (Engeström, 2001; Marsden, 2015).

From an AT perspective, online learning reshapes interactions among participants, goals, tools, and community constraints (Engeström, 2001). An LMS serves as a mediating tool linking learners and educators to desired outcomes within a structured community, with guidelines as rules and roles as the division of labor (Engeström, 2001; Kaptelinin & Nardi, 2006). Lack of interactivity or technical issues can reduce engagement (Hodges et al., 2020), while overly complex or poorly introduced tools may misalign roles, disadvantaging learners (Engeström, 2008). AT thus provides a framework for understanding how online I&P course structures influence engagement.

2.6.3 CP Perspective: Power, Critical Consciousness, and Empowerment

CP, developed by Freire (1970/2000) and Giroux (1983), critiques traditional "banking" models of education, instead promoting dialogue, shared authority, and critical reflection. Key concepts include:

i. *Power Relations*: Power relations in traditional settings often limit learner agency. In online I&P courses, overlooking these dynamics can lead to one-way communication and disengagement (Freire, 1970/2000). CP emphasizes empowering learners to question, critique, and co-create knowledge (Freire, 1970/2000; Giroux, 2022), reducing hierarchy through shared decisions and dialogue. Addressing power structures by letting students lead discussions or contribute to content can enhance engagement (Giroux, 1983), while top-down control and lack of support can suppress instructor autonomy (Freire, 1970/2000; Giroux, 2022).

ii. *Critical Consciousness (CRC)*: Encourages students to engage with real-world social or occupational issues tied to I&P course content. Moving beyond rote memorization, it prompts them to critically examine how social norms and institutional policies both shape and are shaped by ideological frameworks.

iii. *Empowerment*: Gives students control over aspects of learning, such as selecting topics or participating in community projects (Giroux, 1983), fostering intrinsic motivation and improving long-term retention.

From a CP lens, asynchronous learning allows more time for responses, helping reduce power imbalances in synchronous lectures and enabling hesitant students to contribute thoughtfully (Freire, 1970/2000; Giroux, 2022). This inclusivity supports CRC and empowerment, key principles of CP (Shor, 1992). An LMS should go beyond storing

content; CP emphasizes enabling learners to question, critique, and co-create knowledge (Freire, 1970/2000; Giroux, 2022). Using forums, group work, and peer-led activities fosters reflection and analytical skills, while rotating moderation roles democratizes power and promotes active participation (Shor, 1992). CP also stresses ethical data use, cautioning against surveillance cultures that undermine autonomy and equity (Hooks, 1994).

2.6.4 SOI Perspective: Interaction as a Driver of Engagement

Moore's (1989) SOI framework identifies three critical interaction types:

i. SOIST—through feedback, Q&A, and real-time conversations—are vital for clarifying expectations and supporting progress (Bailey et al., 2022). In pandemic contexts, these interactions rely on both synchronous and asynchronous tools, requiring instructors to combine subject expertise with strong pedagogical and technological skills (Bao, 2020). Simply replicating "lecture and listen" formats online risks keeping engagement superficial.
ii. SOISS—through collaboration, discussions, and mutual assistance—enhance critical thinking and foster a sense of belonging (Koutsopidou, 2014; Zhu, 2022a). Purposeful design, such as structured discussions and peer review, is essential to prevent freeriding and ensure accountability (Hodges et al., 2020).
iii. SOISC—through engaging, multimedia-rich materials—promote deep processing and knowledge retention (Swan, 2003; Bozarth et al., 2004). High-quality digital resources, such as videos, case studies, and databases, should align with students' professional interests to connect theory with real-world practice (Bao, 2020).

These three interaction dimensions are central in online learning research for examining how structural factors shape participant behavior and outcomes (Moore, 1989).

Mediating tools and digital infrastructure enable diverse engagement modes, fostering supportive communities that enhance involvement and academic success (Moore & Kearsley, 2011). However, delayed feedback in asynchronous formats can let misconceptions persist, weakening SOIST, SOISS, and SOISC interactions (Hooks, 1994). Strategies like structured peer evaluations, reflective journals, and regular instructor-led check-ins help sustain engagement.

2.6.5 Pathways of Influence: Integrating AT, CP, and SOI

AT addresses the structural conditions of learning, CP addresses the values and power relations, and SOI focuses on the interactional processes. Their convergence suggests that:

i. Overly restrictive rules and limited technology can impede SOIST, SOISS, and SOISC interactions, while flexible policies and robust platforms promote richer exchanges (Moore, 1989; Engeström, 2001). Instructors addressing power imbalances further support equitable SOIST and SOISS dialogue (Freire, 1970/2000).

ii. Encouraging students to critically reflect on societal and institutional structures and empowering them to shape learning activities fosters deeper engagement with course content (Giroux, 1983).

iii. When AT's structural elements, such as rules and tools, align with CP principles like shared authority and critical reflection, SOI becomes more inclusive, reflective, and impactful (Giroux, 1983; Engeström, 2001). This is particularly important for vocational college students, whose engagement often hinges on the relevance of I&P course content to their careers and societal roles (Hodges et al., 2020).

2.6.6 Opportunities and Pedagogical Considerations in ROL

Asynchronous online learning provides significant flexibility in scheduling and pacing (Johnson & Aragon, 2003). Students can engage with course materials, instructors, and peers at their convenience, using tools such as discussion boards, emails, and collaborative document-sharing platforms (Harasim, 2012). This flexibility is particularly valuable in I&P education, where ongoing reflection, debate, and critical discourse are central to meaningful engagement. By allowing learners to interact on their own schedule, asynchronous learning supports deeper cognitive processing and sustained participation.

LMS platforms have become essential tools for managing, delivering, and organizing online courses in vocational I&P programs (Allen & Seaman, 2008). When combined with well-designed pedagogical frameworks, LMS features enhance the learning experience by:

i. Facilitating assessment, resource sharing, and communication.
ii. Providing analytics for tracking participation and performance, supporting data-informed instructional decisions (Macfadyen & Dawson, 2010).
iii. Integrating adaptive quizzes, gamified exercises, and interactive simulations, which encourage active engagement and critical inquiry.

Discussion forums, group projects, and peer-led activities embedded within LMS platforms can promote critical thinking, analytical skills, and collaborative problem-solving—essential for I&P courses where content relevance and ideological reflection are key.

Asynchronous formats can reduce power imbalances inherent in synchronous lectures. Students hesitant to speak in real-time discussions gain the time to formulate

thoughtful contributions (Freire, 1970/2000; Giroux, 2022). Strategies such as student-led discussion threads foster ownership, agency, and shared responsibility, aligning with CP principles of critical consciousness (CRC) and empowerment (Shor, 1992).

Additionally, redefining the division of roles—where instructors act as facilitators and co-learners rather than solely as lecturers—creates a more collaborative and equitable learning environment (Darling-Hammond, 2017). This redistribution of authority strengthens interactions among students, teachers, and content, aligning with the CI framework (Moore, 1989) and reinforcing social, cognitive, and teaching presence.

Effectively harnessing ROL requires attention to:

i. Flexible course design that accommodates diverse student schedules and learning preferences.
ii. Interactive digital tools that promote collaboration, critical reflection, and sustained engagement.
iii. Empowering students to take active roles in discussion, facilitation, and content exploration.
iv. Data-informed decision-making using LMS analytics to identify engagement patterns and adjust instruction.

By strategically combining asynchronous learning, LMS capabilities, and CP-informed pedagogical approaches, online I&P courses can maximize SE, critical thinking, and equitable participation in vocational education contexts.

2.6.7 Challenges and Practical Responses in ROL

While ROL provides flexibility and scalability, it also introduces challenges related to teacher well-being, digital literacy, sociocultural contexts, and ethical considerations (Blaine, 2022). These challenges can disrupt online learning communities and compromise the broader goals of I&P courses in vocational colleges. Integrating AT and CP provides a framework to identify structural pressures, navigate power imbalances, and design inclusive digital spaces.

Teacher emotional health directly affects student outcomes in online settings. Educators experiencing burnout or stress may struggle to provide timely feedback and maintain engagement (Blaine, 2022). Within AT, teachers are subjects using mediating tools—such as LMS platforms, discussion boards, or collaborative software—to facilitate learning alongside students within a shared community. However, institutional constraints, including large class sizes, rigid policies, and limited support, can strain teachers' resilience, weakening teacher–student interactions (Engeström, 2001).

From a CP perspective, top-down control and insufficient institutional support can reduce instructor autonomy, making it harder to foster critical dialogue and student empowerment (Freire, 1970/2000; Giroux, 2022). Practical responses include peer mentoring, flexible professional development, and policies targeting systemic sources of stress rather than superficial coping strategies.

Effective teacher–student, student–student, and student–content interactions are essential for meaningful online learning (Kim et al., 2015b). However, digital skill disparities, unfamiliarity with learning platforms, and anxiety about participation can hinder

engagement (Van Wart et al., 2019). Overly complex or poorly introduced tools may misalign the division of labor, disadvantaging some learners (Engeström, 2008). Generic technology training often fails to address the reflective and participatory demands of I&P courses (Clark-Ibáñez & Scott, 2008; Bawa, 2016).

CP emphasizes equitable access to technology, as unequal resources can reinforce digital hierarchies (Hooks, 1994; Giroux, 2022). Practical solutions include structured orientation sessions, targeted tech support, and student-led collaborative planning, which transform digital tools from barriers into instruments of empowerment.

Without deliberate guidance, online discussions may devolve into passive content consumption rather than active engagement (Garrison & Anderson, 2003). Limited immediate feedback can allow misconceptions to persist, weakening all interaction types—student–student, student–teacher, and student–content (Hooks, 1994).

Scaffolding strategies include:

i. Structured peer evaluations and reflective journals
ii. Periodic instructor check-ins
iii. Formative assessments with clear criteria
iv. Group projects and discussion prompts aligned with learning goals (Moore & Kearsley, 2011; Black & Dawson, 2012).

While LMS platforms provide data analytics (Macfadyen & Dawson, 2010), technology alone does not guarantee meaningful learning. Even advanced LMS features, like adaptive modules or real-time dashboards, require intentional pedagogy to avoid superficial engagement (Garrison & Anderson, 2003).

While online analytics can offer insights into learner progress, privacy and ethical issues must be managed carefully (Blaine, 2022). Automated monitoring, location tracking, or excessive data sharing can undermine CP principles, creating surveillance cultures and exacerbating inequalities (Hooks, 1994).

Institutions should establish transparent policies, ensure informed consent, and allow students to opt out. Clear accountability and ethical safeguards uphold student empowerment and privacy in digital learning environments.

Effective ROL depends on instructional design tailored to local contexts and vocational I&P goals (Zhang, 2020). Teachers may require specialized training that combines technical proficiency with strategies emphasizing critical thinking and civic engagement.

Practical applications include:

i. Integrating interactive simulations and live Q&A sessions
ii. Involving students in course design via feedback, rotating facilitator roles, or collaborative problem-based projects (Shor, 1992)
iii. Using AT to refine rules, roles, and tasks to enhance agency and engagement (Kaptelinin & Nardi, 2006)

By addressing teacher well-being, digital literacy, scaffolding, ethics, and context-specific pedagogy, ROL in vocational I&P courses can alleviate challenges while promoting equitable, critical, and meaningful engagement.

2.6.8 Practical Application and Future Directions

Recent research highlights the benefits, modalities, and ongoing challenges of ROL programs, emphasizing the need for flexibility, technological proficiency, and innovative pedagogical strategies, while also noting issues such as digital equity and student readiness (Swan, 2003; Bozarth et al., 2004; Mishra & Koehler, 2006; Cercone, 2008; Moore & Kearsley, 2011; Zhan & Mei, 2013; Koutsopidou, 2014; Marsden, 2015; Darling-Hammond, 2017; Johnston et al., 2021; Tate & Warschauer, 2022a; Zhu, 2022b).

The practical application of ROL in vocational I&P courses can be significantly enhanced by embedding a holistic framework that integrates AT, SOI, and CP principles. Key strategies include:

1. Clear Rules:
    i. Establish and enforce transparent course and technology policies (Cercone, 2008; Zhan & Mei, 2013).
    ii. Provide guidelines for online behavior, assessment criteria, and interaction norms to reduce ambiguity and ensure academic integrity.
2. Active Subject and Defined Object:
    i. Emphasize student agency and self-directed learning (Mishra & Koehler, 2006).
    ii. Offer orientation modules, self-assessment tools, and resources to help learners understand objectives and monitor progress.
3. Reimagined Division of Labor:
    i. Redefine instructors as facilitators and co-learners rather than solely content providers (Darling-Hammond, 2017).

ii. Use team-based projects and peer reviews to distribute responsibilities, enhance collaboration, and promote active participation.

4. Supportive Community:
   i. Foster collaborative environments through forums, group projects, and virtual social spaces (Koutsopidou, 2014).
   ii. Encourage peer-to-peer support and knowledge sharing to enhance belonging and engagement.
5. Robust Mediating Tools:
   i. Employ user-friendly, up-to-date digital tools such as videos, discussion forums, and communication platforms (Swan, 2003; Bozarth et al., 2004).
   ii. Align tool selection with pedagogical goals to optimize learning outcomes.
6. Dynamic Interactions:
   i. Prioritize student–teacher, student–student, and student–content interactions through:
      - Regular instructor feedback
      - Collaborative projects
      - Peer discussions
      - Multimedia-rich course materials (Swan, 2003; Bozarth et al., 2004; Moore & Kearsley, 2011; Koutsopidou, 2014; Bailey et al., 2022; Zhu, 2022a;)
7. Awareness of Power Relations, Critical Consciousness (CRC), and Empowerment:
   i. Reduce hierarchical barriers by encouraging shared decision-making, open dialogue, and student-led initiatives (Freire, 1970/2000; Shor, 1992; Hooks, 1994; Giroux, 2022).

ii. Connect learning to real-world issues and involve students in curriculum design and leadership roles to foster empowerment and engagement.

8. Instructor Training and Professional Development:
   i. Equip instructors with strong pedagogical and technological skills through tailored training programs (Darling-Hammond, 2017; Johnston et al., 2021; Zhu, 2022a;).
   ii. Develop interdisciplinary teams combining expertise in educational technology, psychology, and subject-specific knowledge to test, refine, and scale innovations (Moore & Kearsley, 2011; Darling-Hammond, 2017).
   iii. Such collaborations are essential for testing and scaling research-based innovations, making sure that issues like digital inequality and different levels of student readiness are systematically addressed (Mishra & Koehler, 2006).

Addressing these factors together can enhance remote teaching to meet the diverse needs of today's learners (Giroux, 2020; Zhu, 2022a). This approach fosters an engaging, equitable learning environment, addresses challenges, and improves outcomes in vocational I&P courses. Future research should explore causal or correlational links among these theoretical elements and consider vocational learners' focus on skill development and immediate job prospects. By integrating structural and value-based elements in online I&P course design, institutions can boost engagement and strengthen long-term effectiveness, even in dynamic contexts (Bao, 2020; Hodges et al., 2020). Table 2.5 provides a summary of the practical applications of ROL in this context.

Table 2.5: Practical Application of Remote Online Learning

No	Key Reference	Factor	Theoretical/Conceptual Insight	Practical Applications/Implications
1	Bailey et al. (2022)	Student–Teacher Interactions	i. Foster dynamic, two-way communication. ii. Provide timely feedback, mentoring, and guidance. iii. Clarify expectations and support learner progress.	i. Implement regular feedback and mentoring. ii. Offer virtual office hours for support. iii. Establish channels for personalized guidance.
2	Bozarth et al. (2004); Swan (2003)	Student–Teacher Interactions	i. Use multimedia and interactive materials. ii. Enhance cognitive processing and retention. iii. Support deeper learning engagement.	i. Create engaging, multimedia-rich content. ii. Include interactive quizzes and simulations. iii. Use reflective assignments for active learning.

Table 2.5 continued

3	Bozarth et al. (2004); Mishra & Koehler (2006); Swan (2003)	Mediating Tools	i. Use digital tools like videos, forums, and communication platforms. ii. Facilitate interactions between learners, instructors, and content.	i. Use user-friendly, up-to-date digital tools. ii. Align technology with pedagogical goals. iii. Create centralized platforms for diverse interactions.
4	Cercone (2008); Zhan & Mei (2013)	Rules	i. Set clear guidelines on policies and technology. ii. Reduce ambiguity in the online environment. iii. Promote academic integrity.	i. Establish and enforce clear course and tech policies. ii. Update rules regularly to meet evolving needs.

Table 2.5 continued

5	Darling-Hammond (2017); Marsden (2015)	Division of Labor	i. Shift from lecturing to facilitation. ii. Promote collaborative learning. iii. Foster an egalitarian classroom dynamic.	i. Redefine instructors as facilitators and co-learners. ii. Use team-based projects and peer reviews. iii. Distribute learning responsibilities.

Table 2.5 continued

6	Freire (1970/2000)	Power Relations	i. Acknowledge hierarchical limits on learner agency. ii. Understand power dynamics in education. iii. Promote a more democratic learning environment.	i. Reduce hierarchical barriers through shared decision-making. ii. Foster open dialogue for inclusivity. iii. Balance power between instructors and learners.
7	Freire (1970/2000); Hooks (1994)	CRC	i. Help students recognize sociopolitical and cultural influences. ii. Encourage questioning of established norms. iii. Foster transformative dialogue in education.	i. Use reflective assignments for critical analysis. ii. Connect learning to real-world issues. iii. Encourage dialogue that challenges norms.

Table 2.5 continued

8	Koutsopidou (2014)	Community	i. Foster a supportive, collaborative environment. ii. Engage peers, instructors, and stakeholders. iii. Enhance learner engagement and sense of belonging.	i. Build community with forums, group projects, and live sessions. ii. Create virtual social spaces for interaction. iii. Promote collaboration through shared activities.

Table 2.5 continued

9	Koutsopidou (2014); Zhu (2022a)	Student–Teacher Interactions	i. Encourage peer collaboration for critical thinking. ii. Promote knowledge sharing and construction. iii. Strengthen a sense of belonging.	i. Facilitate group projects and peer discussions. ii. Use breakout sessions for collaboration. iii. Design activities that promote active engagement and social learning.
10	Mishra & Koehler (2006)	Subject	i. The active learner is central to education. ii. Emphasizes student agency and self-directed learning.	i. Offer orientation modules and self-assessment tools. ii. Support learners in self-regulated learning.

Table 2.5 continued

11	Shor (1992)	Empowerment	i. Empower students to take charge of their learning. ii. Promote agency and active participation. iii. Involve students in decision-making processes.	i. Engage students in curriculum design. ii. Foster student leadership opportunities. iii. Encourage active participation in learning decisions.

To visually demonstrate the main practical applications discussed in ROL in Section 2.6.8, Figure 2.2 offers a detailed illustration of these applications.

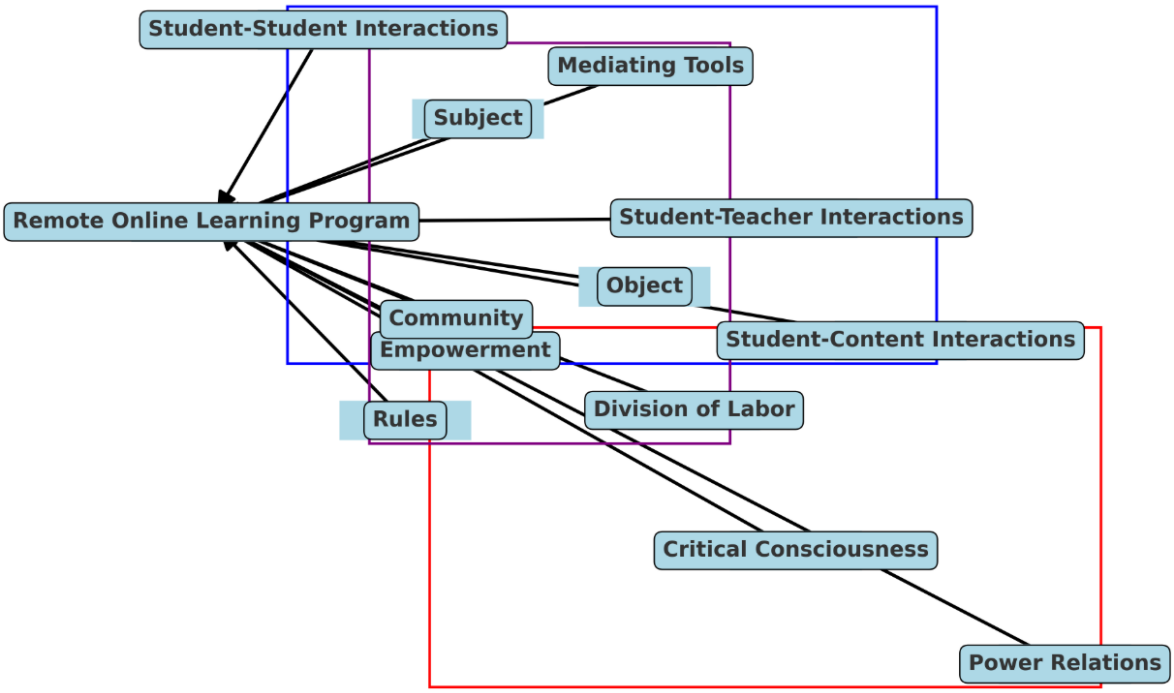


Figure 2.2: Practical Application of Remote Online learning

2.7 Theoretical Frameworks in Online Teaching and Learning

This section examines three widely used theoretical frameworks in online teaching and learning: SOI, AT, and CP. While all three frameworks highlight the social, interactive, and cultural dimensions of learning, each offers a distinct perspective on the learning process:

i. SOI emphasizes how learners construct knowledge through interaction with teachers, peers, and content, highlighting the importance of engagement and communication in shaping learning outcomes.

ii. AT analyzes the systemic elements that support learning activities, including mediating tools, rules, community, and the division of labor, providing a structural lens for understanding how online learning environments function.

iii. CP focuses on how power structures influence educational practices, advocating for learner empowerment, critical consciousness, and transformative social change through participatory and dialogic learning.

This chapter explores the core concepts, seminal studies, contextual applications, and potential challenges of each framework, providing a comprehensive foundation for designing and researching online instructional practices.

Complementing this discussion, Figure 2.3 visually represents the relationships and intersections among these theoretical frameworks, reinforcing the conceptual understanding of their roles in online teaching and learning.

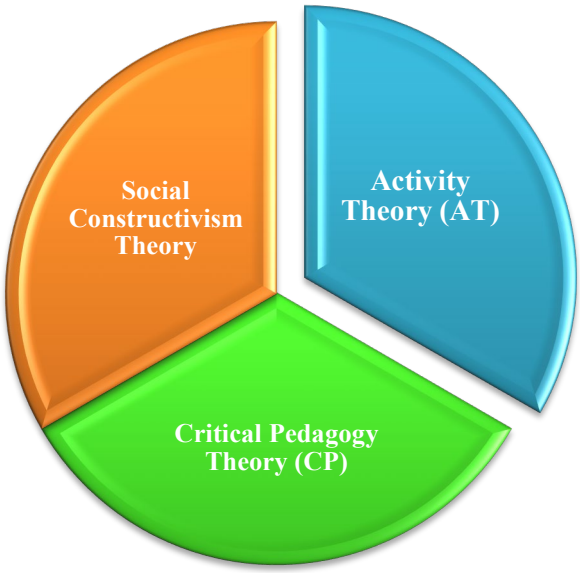


Figure 2.3: Theoretical Frameworks in Online Teaching and Learning

2.7.1 SOI in Online Learning

Rooted in SC, SOI suggests that learners construct knowledge collaboratively through interaction and shared inquiry (Dougiamas & Taylor, 2002). In online environments, this perspective encourages educators to design learning experiences in which students actively co-construct knowledge rather than passively consume content. Drawing on Fernández et al.'s (2001) concept of the zone of proximal development (ZPD), instructors can organize project-based groups or structured discussions, enabling learners to leverage each other's expertise and receive timely scaffolding of new concepts.

Digital platforms—such as discussion forums, chat rooms, and real-time collaboration tools—support "communities of practice" (Lave & Wenger, 1991). These settings provide space for student-to-student dialogue, collaborative problem-solving, and reflective practice. SC emphasizes peer exchange, which is particularly evident in group

discussions and problem-based learning (PBL). LeFoe (1998) highlights that open-ended exploration and structured peer review significantly enhance interaction and foster critical thinking. Incorporating PBL tasks encourages students to research, debate, and co-create solutions, promoting both collaboration and analytical skills (Weegar & Pacis, 2012). Collectively, these strategies establish a dynamic, interactive learning environment in which knowledge is built collaboratively.

A key aspect of SOI is the instructor's role as facilitator rather than mere content provider (Kaendler et al., 2015). In student-to-teacher interactions, this facilitation includes:

i. Guided scaffolding: Providing rubrics, feedback, and guiding questions to support step-by-step knowledge construction.
ii. Assessment practices: Evaluating collaborative projects to measure collective understanding and using reflective journals to track individual growth.
iii. Modeling communication: Maintaining equitable engagement standards and fostering an inclusive environment that encourages all students to share insights and question assumptions.

These strategies nurture a student-centered learning experience, empowering learners to take ownership of their knowledge development.

Beyond peer and instructor interactions, student-to-content engagement plays a critical role in deepening learning. Online environments host diverse resources—recorded lectures, readings, simulations—that allow learners to explore content at their own pace. Effective approaches include:

i. Multimodal resources: Videos, interactive modules, and digital libraries stimulate self-directed inquiry and allow engagement from multiple perspectives (Deubel, 2003; Moallem, 2003).
ii. Reflective engagement: Encouraging students to summarize, critique, and share observations in forums links content exploration with peer discourse, building a strong social presence that mitigates isolation in asynchronous settings.
iii. Supportive networks: Small discussion groups or pairs foster belonging and encourage active participation in student-to-content tasks.

Instructors should anticipate potential barriers—such as technological issues, time zone conflicts, and engagement challenges—and design tasks and resources to promote meaningful dialogue and collaboration.

While SOI can significantly enhance engagement and learning outcomes, it presents challenges. Students may face technological constraints or be unfamiliar with online collaborative norms. Effective facilitation requires time and effort, particularly in managing group dynamics and scaffolding for all learners. However, strategic course design, continuous support, and clear communication of expectations can help overcome these hurdles.

By emphasizing dialogue, collaboration, and collective meaning-making, social constructivist principles naturally expand the three types of SOI—student-to-teacher, student-to-student, and student-to-content—in online education. This approach fosters deeper understanding of subject matter while cultivating essential soft skills such as teamwork and problem-solving. With thoughtful course design, strong instructor facilitation, and equitable access to resources, educators can create vibrant virtual communities that

empower students as active co-creators of knowledge and lifelong learners. Table 2.6 presents a detailed summary of key studies and application factors related to SOI theory.

Table 2.6: SC Theory: Key Studies, Contexts, and Application Factors

No	Reference	Context/Key Concepts	Fit Factors(theory/concept aligns with the phenomenon being studied)	Viability Factors(Practical considerations for implementation and sustainability)
1	Deubel (2003); Moallem (2003)	i. Foster social presence for meaningful interactions. ii. Use multimodal resources like videos and simulations. iii. Bridge student-content and student-student engagement.	i. Diverse online materials support self-paced learning. ii. Promote interest-driven exploration and engagement. iii. Encourage deeper reflection and knowledge sharing.	i. Develop digital literacy skills for effective source evaluation. ii. Maintain social presence to counter delayed feedback in asynchronous learning. iii. Provide strategies to sustain learner motivation.
2	Dougiamas & Taylor (2002); Vygotsky (1962)	i. Knowledge grows through social interaction. ii. ZPD highlights scaffolded group learning. iii. Support learning with guided collaboration.	i. Use group projects and discussions to leverage peer expertise. ii. Provide instructor-guided scaffolding at key learning points.	i. Differences in baseline knowledge affect group dynamics. ii. Provide extra support for those new to peer learning.

Table 2.6 continued

3	Kaendler et al. (2015)	i. Instructor acts as a facilitator or "guide on the side." ii. Provide rubrics, guiding questions, and feedback loops. iii. Support knowledge construction through structured guidance.	i. Provide ongoing scaffolding with rubrics and checkpoints. ii. Coach respectful communication and equitable participation.	i. Instructors need significant time to monitor and intervene. ii. Group tasks must be carefully planned for equal participation.
4	Lave & Wenger (1991)	i. Learning occurs within communities of practice. ii. Shaped by shared inquiry and problem-solving. iii. Rooted in communal activities and collaboration.	i. Utilize forums and chat platforms for peer interaction. ii. Design authentic tasks to build a shared identity.	i. Encourage active participation and consistent contribution. ii. Use structured facilitation for large or diverse groups.

Table 2.6 continued

5	LeFoe (1998); Weegar & Pacis (2012)	i. Use social constructivist dialogue for open exploration. ii. Implement structured peer review for deeper learning. iii. Apply PBL to foster shared knowledge construction.	i. Incorporate both structured and informal peer feedback. ii. Use PBL tasks to promote debate and solution creation.	i. Set clear goals to keep discussions focused. ii. Develop authentic PBL scenarios with careful planning. iii. Allocate time for effective instructional design.
6	Practical Considerations (e.g., Technology, Time Zones, Group Formation)	i. Address technology challenges and scheduling conflicts. ii. Maintain engagement in distributed learning environments. iii. Foster inclusivity and effective peer collaboration.	i. Use technology-based icebreakers and small tasks to build rapport. ii. Establish clear guidelines and transparent expectations.	i. Unreliable internet or software can hinder interaction. ii. Define group roles and timeframes to prevent disengagement and uneven participation.

2.7.2 Understanding AT: A Sociocultural Framework for Analyzing Human Activity

AT is a sociocultural framework rooted in the work of Vygotsky (1978) and further developed by scholars such as Leont'ev (1978, 1981) and Engeström (1987, 2001). Emerging from the cultural-historical school of psychology, AT posits that human consciousness and learning are best understood within the context of goal-oriented, socially mediated activities. At its core, AT examines how individuals (subjects) interact with their environment (mediating tools) to achieve specific goals or motives (objects), all while operating under certain rules, divisions of labor, and within a broader community.

While SOI (rooted in SC) emphasizes knowledge construction through social interaction, AT provides a broader, systems-based perspective, analyzing complex relationships among subjects, objects, tools, rules, division of labor, and community. This allows AT to examine the entire activity system, including underlying motivations and contextual factors, rather than focusing solely on interactive aspects of learning.

Vygotsky's cultural-historical psychology emphasized the sociocultural roots of cognition, highlighting how mediating tools—such as language, symbols, and cultural artifacts—shape mental processes (Vygotsky, 1978). Although not initially called "Activity Theory," Vygotsky's focus on internalization and social interaction laid the foundation for later developments.

Leont'ev expanded on these ideas by introducing activity as the basic unit of analysis in human psychology (Leont'ev, 1978, 1981). He distinguished between:

i. *Activity*: motivated, collective endeavor,
ii. *Action*: goal-oriented processes, and

iii. *Operation*: condition-dependent procedures.

This hierarchy clarified how collective motives can be internalized, shaping individual cognition and behavior.

Engeström (1987, 2001) further developed AT into a systemic model comprising six interconnected components: subject, object, tools (mediating artifacts), rules, division of labor, and community. A key feature of Engeström's model is the concept of contradictions—internal tensions within or between components of an activity system. For instance:

i. Conflicts between rules and division of labor may hinder collaboration.
ii. Mediating tools may not align with the object of the activity.

Identifying these contradictions can foster expansive learning, where participants collectively question norms, test new solutions, and transform the activity system (Engeström, 2001). In classrooms, AT guides curriculum design and evaluation by highlighting how relationships between subjects influence engagement (Barab et al., 2002; Hardman, 2007). Researchers use AT to analyze group projects, teacher-student interactions, and technology use to understand challenges such as low engagement or digital disparities, proposing systemic improvements.

Beyond formal education, AT is widely applied in workplace learning and organizational knowledge creation (Blackler, 1995). Mapping tools, rules, and divisions of labor helps identify contradictions, prompting new practices or structural changes that enhance productivity and job satisfaction (Foot, 2014).

In human-computer interaction (HCI) and user experience research, AT helps show how digital tools influence user activities (Kaptelinin & Nardi, 2006). By analyzing the

context of technology use, researchers can identify design flaws or mismatches between tool functions and user goals, highlighting the importance of context-aware design.

For the current study of online I&P courses in vocational colleges, AT offers a robust framework to analyze the learning environment as a dynamic system. It allows examination of:

i. How online platforms and digital resources (tools) facilitate learning,
ii. How the goals of ideological and political education (object) are pursued by students and teachers (subjects),
iii. How rules and division of labor within the vocational college community influence these activities.

By identifying potential contradictions, AT highlights challenges and opportunities to improve the effectiveness of online I&P education.

While AT offers a comprehensive framework for analyzing human actions, Critics argue that AT can be too broad or abstract, making practical implementation challenging. Others believe that AT needs to incorporate multi-viscidness (Engeström, 2008) more explicitly, since large networks may consist of multiple overlapping activity systems with complex power dynamics. Additionally, emerging digital technologies, such as AI-driven platforms, require adaptation of AT constructs to rapidly evolving socio-technical environments (Karanasios et al., 2021).

Despite these challenges, AT provides a comprehensive, systemic perspective for analyzing goal-oriented, collective human activity across contexts—from classrooms to workplaces. By emphasizing subjects, objects, mediating tools, rules, division of labor, and

community, AT captures the sociocultural factors influencing learning and development. Modern applications in education, HCI, and organizational management demonstrate AT's versatility and enduring relevance. Its focus on contradictions continues to drive innovative, holistic approaches to analyzing and improving activity systems. Table 2.7 provides a detailed overview of AT, including key studies, contexts, and practical applications.

Table 2.7: Applications of AT: Key Studies, Success Factors, and Implementation Challenges

No	Author(s)/ Year	Key Concepts and Context	Factors for Success (Indicators of positive application)	Implementation Challenges (Obstacles or difficulties encountered during application)
1	Barab et al. (2002); Hardman (2007)	i. Examines how educational tools and structures shape learner engagement. ii. Informs curriculum design by analyzing subject-object-tool interactions.	i. Diagnoses specific issues like low engagement and digital inequities.. ii. Supports systemic interventions for improving classroom learning design and effectiveness.	i. Needs multi-level data collection (classroom structure, student interactions, teacher facilitation). ii. Success relies on institutional support and teacher professional development.
2	Blackler (1995); Foot (2014)	i. Identifies how rules, tools, and labor divisions shape knowledge creation and productivity. ii. Highlights social and structural mediators in workplace learning.	i. Drives systemic improvements in management and measurable workflow efficiency. ii. Detects barriers like misaligned rules or inadequate tools that hinder organizational productivity.	i. Organizational change can be challenging and may face resistance. ii. Requires engagement from all levels to resolve contradictions and implement lasting solutions.

Table 2.7 continued

3	Engeström (1987, 2001)	i. Defines six key components shaping human activity (subject, object, tools, community, rules, and division of labor). ii. Highlights contradictions as drivers of learning and system evolution.	i. Provides a holistic framework for examining learning in social and organizational settings,leading to expansive learning. ii. Leverages contradictions to drive fundamental transformation and innovation within activity systems..	i. Systemic changes demand significant time and resources. ii. Effective contradiction management requires ongoing stakeholder collaboration.
4	Engeström (2008); (Karanasios, et al.,2021).	i. Explores how multiple, intersecting activity systems shape collaboration and conflict. ii. Adapts AT to dynamic, technology-driven environments.	i. Exposes underlying power dynamics and specific tensions in complex, networked systems.. ii. Supports continuous adaptation and evolution of AT frameworks.	i. Analyzing multiple overlapping systems can be complex and resource-intensive. ii. Keeping AT relevant requires ongoing updates to account for technological advancements.

Table 2.7 continued

5	Kaptelinin & Nardi (2006)	i. Enhances usability by aligning digital tools with user goals and real-world contexts. ii. Supports iterative design through analysis of tool-mediated interactions in sociotechnical environments.	i. Pinpoints specific design flaws or mismatches between user goals and system functionality. ii. Emphasizes usability in real activity contexts,improving user experience and task completion.	i. Requires deep understanding of the user's work/activity. ii. Adapting AT concepts to evolving technologies (e.g., AI, mobile computing) can be challenging.
6	Leont' ev (1978, 1981)	i. Established Activity as the core unit of analysis. ii. Differentiated between activity (motive-driven), action (goal-directed), and operation (condition-based).	i. Defines hierarchical levels of human activity,offering a structured understanding of action. ii. Illustrates how collective motives are internalized, influencing individual cognition and behavior in predictable ways.	i. Abstract distinctions may be difficult to apply in complex, technology-rich settings. ii. Requires contextual adaptation for effective implementation in learning or work environments.

Table 2.7 continued

7	Vygotsky (1978)	i. Highlights sociocultural mediation through language, symbols, and artifacts. ii. Serves as a foundational concept for AT. iii. Emphasizes the role of culture in cognitive development.	i. Examines how mediating tools specifically shape cognitive processes. ii. Emphasizes internalization through social interaction,providing a basis for collaborative learning approaches.	i. Not originally defined as "Activity Theory." ii. Broad concepts may need adaptation for modern digital applications.

2.7.3 The Evolution and Impact of CP: Power, Empowerment, and Social Transformation in Education

CP is a transformative educational approach that focuses on understanding and challenging power dynamics embedded within learning environments. Drawing on Freire (1970/2000) and other critical theorists, CP aims to empower learners by fostering critical consciousness, questioning systemic inequities, and promoting social change. This section traces the evolution of CP, highlighting its core themes—power relations, CP, and empowerment—and how these ideas manifest across diverse educational settings.

Freire's *Pedagogy of the Oppressed* (1970/2000) forms the foundation of CP. He critiqued the "banking model" of education, in which teachers deposit knowledge into passive students, and proposed a problem-posing approach, co-creating knowledge with learners. This method situates learning in real-life contexts, prompting students to question social injustices. Central to Freire's vision is conscientização (critical consciousness), the process by which learners recognize and act upon oppressive social, political, and economic conditions.

Building on Freire, Giroux (1983, 2020) expanded CP into North American educational and cultural studies. He argued that schools are political and cultural sites, reflecting broader power structures. Giroux emphasizes the role of teachers as "transformative intellectuals", responsible for fostering critical thought, civic responsibility, and collective action within classrooms.

Hooks (1994, 2003) broadened CP by examining the intersections of race, gender, and class in education. Her engaged pedagogy centers the learner's whole self—mind, body,

and spirit—promoting inclusive, holistic classroom communities. Dialogue, self-actualization, and mutual respect are emphasized to bridge theory and practice.

Apple (2004) explored how curricular content and institutional practices reproduce social hierarchies, urging educators to align instruction with social justice goals. His work complements Freire by showing how institutional structures can perpetuate inequalities unless critically examined.

At its core, CP analyzes power—who holds it, how it is exercised, and which groups benefit or are marginalized. Power manifests through curriculum, classroom discourse, assessments, and institutional policies. By exposing these hierarchies, CP encourages learners to critique taken-for-granted norms and consider alternative ways of organizing education (Freire, 1970/2000; Giroux, 1983).

Critical consciousness enables learners to perceive and challenge oppressive elements of reality. Freire (1970/2000) argued that authentic dialogue, reflection, and praxis (action informed by reflection) allow learners to understand structural factors shaping their experiences and envision transformative possibilities.

Empowerment in CP goes beyond individual achievement—it involves collective agency for societal change. Giroux (2022) highlights that CP aims to produce active citizens who see education as intertwined with democratic engagement. Hooks (1994) similarly emphasizes transforming students from passive recipients into co-creators of knowledge, highlighting CP's commitment to social equity and liberation.

Freire's problem-posing education emphasizes dialogue over lecture, where teachers and students become mutual subjects exchanging questions and insights. This approach

flattens hierarchical boundaries, fostering respect, empathy, and shared inquiry (Hooks, 1994). By sharing experiences, students develop a detailed understanding of social complexities.

CP critiques the notion of a "neutral" curriculum, recognizing that content is inherently political. Mgqwashu and Khohliso (2024) demonstrate how curricular choices reflect societal power structures. In an informed classroom, curriculum becomes praxis, shaped by ongoing reflection and action. Teachers and students collaboratively co-create materials, adapting content to local contexts and social concerns (Shor, 1992). Unlike standardized testing, CP emphasizes authentic and formative assessments, including portfolios, reflective journals, peer evaluations, and community projects, allowing learners to demonstrate understanding in meaningful ways.

With the rise of e-learning platforms, critical theorists examine how technology can reproduce or challenge power relations. Scholars ask whether digital classrooms replicate the banking model or promote dialogical interaction aligned with CP (Noble, 2012; Giroux, 2022). Pedagogical strategies using discussion forums, collaborative tools, and open educational resources support CP's vision in virtual settings. CP intersects with multicultural education, critiquing Eurocentric curricula and advocating for diverse perspectives. Addressing race, gender, and identity axes allows learners from various backgrounds to see themselves as knowledgeable agents in the classroom (Hooks, 1994; Ladson-Billings, 1995).

Many practitioners extend CP beyond the classroom, engaging students in community projects that connect coursework to real-world social issues. These initiatives foster experiential learning, linking theory with action while encouraging reflection on structural inequalities and possible solutions (Shor, 1992).

While CP has gained widespread interest, critics note some limitations. Some argue that CP can veer into moralization if instructors impose their political beliefs. Others suggest that CP's focus on dialogue underestimates students' preferences for more direct instruction or faces institutional constraints (Ellsworth, 1989). Practical challenges also exist in classrooms where teachers have limited autonomy, large classes, or strict curriculum demands. Despite these challenges, CP remains essential for promoting equity and social transformation. By navigating practical constraints, educators can adapt CP to different settings while maintaining its goals of equity, CP, and collective empowerment (McLaren, 2003).

Rooted in Freire's problem-posing methods and extended by Giroux, Hooks, and Apple, CP seeks to democratize learning, encouraging students to become active, reflective participants. Applied to multicultural curricula, digital platforms, or community projects, CP invites educators and learners to challenge oppressive structures and envision more equitable futures. As educational landscapes evolve, CP's emphasis on dialogue, co-creation, and social responsibility remains a vital guide for transformative teaching.

Table 2.8 provides a detailed list of key studies and application factors of CP. Table 2.9 offers a comprehensive overview of how the key studies and application factors of SC, AT, and CP can inform a mixed-method case study.

Table 2.8: CP: Key Studies, Contexts, and Application Factors

No	Author(s)/Year	Context/Key Concepts	Fit Factors	Viability Factors
1	Apple (2004): Hidden Curriculum & Ideology	i. Analyzes curricular content and institutional practices. ii. Exposes hidden curriculum reinforcing social hierarchies.	i. Reveals how ideology influences educational norms. ii. Promotes teaching aligned with social justice.	i. Institutional barriers (e.g., policies) may limit changes. ii. Requires institutional support for reform.
2	Ellsworth (1989); McLaren (2003); Noble (2012)	i. *Ellsworth*: Questioned the idea of "empowerment" in CP. ii. *McLaren*: Focused on praxis and broader social change. iii. *Noble*: Criticized digital learning reinforcing the "banking" model.	i. Promotes critical use of technology, not passive. ii. Encourages self-reflection on teaching assumptions.	i. Tension between CP ideals and practical limits (e.g., time, resources). ii. "Empowerment" may feel forced if not dialogical.

Table 2.8 continued

3	Freire (1970/2000): Pedagogy of the Oppressed	i. Critique of the "banking model" of education. ii. Introduced "problem-posing" education. iii. Conscientize (CRC).	i. Dialogue-based learning fosters critical thinking. ii. Real-life contexts enhance learner engagement.	i. Resistance from institutions favoring traditional methods. ii. Requires strong facilitation for meaningful discussions.
4	Giroux (1983, 2022): Transformative Intellectuals	i. Schools as political and cultural sites. ii. Teachers as "transformative intellectuals."	i. Encourages active citizenship. ii. Links classroom learning to broader social and political contexts.	i. Challenging in test-focused curricula. ii. Requires teacher training in critical theory and activism.
5	Hooks (1994, 2003): Engaged Pedagogy	i. Uses an intersectional lens on race, gender, and class. ii. "Engaged pedagogy" nurtures the whole self (mind, body, spirit).	i. Creates inclusive learning communities. ii. Prioritizes dialogue and students' lived experiences.	i. Time-intensive due to deep discussions and personal reflection. ii. Requires culturally responsive and trauma-informed teaching.

Table 2.8 continued

6	Ladson-Billings (1995); Shor (1992)	i. *Ladson-Billings*: Promoted "Culturally Relevant Pedagogy" to affirm diverse identities. ii. *Shor*: Advocated for "Empowering Education" through participatory methods.	i. Encourages collective agency and student voice in the classroom. ii. Bridges cultural gaps by valuing student backgrounds.	i. Some learners/communities may struggle with participatory or culturally relevant methods. ii. Instructors need ongoing support and training.

Table 2.9: Overview of Theoretical Frameworks for a Mixed‐Method Case Study

No	Theory	Core Principles	Applications in Mixed‐Method Study	Potential Challenges
1.	AT	i. Goal-directed, socially mediated activity as the key unit. ii. Interaction between subject, tools, object, community, rules, and labor division.	i. Mapping activity systems to identify contradictions in tasks. ii. Holistic approach to tasks, tools, and roles.	i. Broad framework, hard to apply. ii. Requires detailed data on multiple components.
2.	CP	i. Views education as a political act, analyzing power dynamics. ii. Promotes CRC, dialogue, and social transformation.	i. Uses problem-posing and discussion-based approaches. ii. Emphasizes community-oriented projects for authentic learning.	i. Institutional constraints (testing demands, rigid curricula). ii. Risk of imposing political agendas if not balanced.
3.	SC	i. Knowledge co-constructed through social interaction. ii. Focus on communities of practice, collaboration, and dialogue.	i. Group projects, peer review, collaborative platforms. ii. Facilitated discussions for deeper understanding.	i. Requires strong digital tools and active participation. ii. Unequal group dynamics, tech issues.

2.8 Measuring Student Engagement: Theories, Metrics, and Implications for Online Learning

Accurately assessing SE in online learning is critical for improving course design and fostering meaningful participation (Dunlap et al., 2016; Mucundanyi, 2019, 2020). Dunlap et al. (2016) introduce a "purposeful presence" model for online courses, emphasizing the design of instructional environments and activities that enhance learning while supporting social presence. Mucundanyi (2019, 2020) further explores how course design and SOIST strategies create effective online learning loops, stressing the importance of understanding students' behaviors, real-life contexts, and applying targeted engagement strategies.

The CI framework examines online instruction through teaching, social, and cognitive presences, which together shape student interaction and learning (Akyol, 2012; Zhang et al., 2022). Martin et al. (2022) confirm that these presences improve learner outcomes in online and blended contexts. Li (2022) demonstrates that teaching presence enhances cognitive presence by fostering social presence and community. Similarly, Moore and Miller (2022) highlight that cognitive presence promotes deeper thinking, while Nikolopoulou and Kousloglou (2022) note how institutional perspectives on teaching presence influence instructional practices. Liao et al. (2023) further investigate interactions among self-regulated learning, instructional presence, and SE, showing how these factors shape overall learner experiences.

From an AT perspective, engagement reflects the learner's pursuit of an object (e.g., mastery of course goals) within a community (peers, instructors, administrators), guided by rules (academic policies, netiquette) and mediated by tools (LMS portals, discussion forums,

analytics dashboards) (Engeström, 2001; Kaptelinin & Nardi, 2006). Indicators such as SOIST, SOISS, and SOISC measure how effectively students use these tools and follow institutional rules (Moore, 1989). Structural gaps, insufficient feedback, or poorly designed tasks can expose where engagement—and consequently deeper learning—fails (Robinson & Hullinger, 2008; Lin, 2013).

Within the CP paradigm, engagement goes beyond behavioral measures to include shared power, critical inquiry, and knowledge construction (Freire, 1970/2000; Giroux, 2022). Metrics under CP should capture whether learners critically question content, express diverse perspectives, and influence the learning process (Shor, 1992; Hooks, 1994). Instructors fostering learner agency—through facilitation, social justice discussions, or student involvement in curriculum design—expand engagement beyond simple participation metrics or login counts.

Several studies have developed engagement metrics, including scales by Li Ran (2015) and Xie and Yin (2020) for evaluating student interactions with digital platforms. Robinson and Hullinger (2008) and Lin (2013) emphasize the connection between engagement indicators and institutional quality perceptions. Zhang et al. (2022) advocate a multidimensional approach, capturing cognitive, behavioral, and emotional engagement. Other research highlights the influence of mental health, self-efficacy, and social support on engagement (Appleton et al., 2008; Kahu, 2013; Tannert & Gröschner, 2021). However, validating these tools and adapting them to dynamic contexts, particularly during crises such as the pandemic, remains challenging (Lin, 2013).

Recent advances highlight the need to refine engagement metrics for online environments (Nikolopoulou & Kousloglou, 2022). Liao et al. (2023) show that self-

regulated learning behaviors are dynamic and significantly influence engagement, highlighting the importance of longitudinal or mixed-method studies that track changes in motivation and learning strategies. Integrating insights from AT, CP, and SOI frameworks can help determine whether engagement supports equitable and critically engaged learning. These approaches also reveal how cultural norms, institutional policies, and technological tools facilitate or constrain active participation.

While many methods exist to measure engagement in remote learning, effective tools must be:

i. Context-aware, reflecting institutional and technological conditions.
ii. Theoretically grounded, incorporating SOI, AT, and CP principles.
iii. Sensitive to power dynamics, ensuring genuine learner participation is captured.

An ideal framework should consider structural factors (policies, infrastructure) alongside critical issues (learner empowerment, collaborative authority, and inclusive design). This approach allows measurement of both the quantity and quality of SE and its potential to produce transformative learning. Future research should explore behavioral, cognitive, emotional, and social dimensions of engagement, identifying instructional strategies that enhance learning, retention, and well-being across diverse learner populations and contexts.

2.9 Types of Interactions in Online Learning

The quality of SOIST, SOISS, and SOISC interactions is crucial for fostering engagement, motivation, and meaningful learning in online environments (Miao et al., 2022). Research grounded in the CI framework highlights how social, cognitive, and teaching presences collectively shape learners' experiences (Akyol, 2012; Wang & Eccles, 2012).

Beyond CI, AT and CP offer perspectives that emphasize the structural and power-related dimensions of these interactions, providing a more holistic understanding of engagement in online learning contexts.

2.9.1 Social Interaction Between Student-Teacher (SOIST)

SOIST is strongly associated with learners' sense of community, motivation, and academic persistence (Çakiroğlu & Kahyar, 2022). From an AT perspective, student-teacher exchanges can be conceptualized as a dynamic interaction between a subject (student or instructor) and an object (educational goals), mediated by tools (discussion forums, synchronous videoconferencing, timely feedback), regulated by rules (course policies, netiquette), and embedded within a community (the class or institution) (Engeström, 2001; Kaptelinin & Nardi, 2006).

Instructors who actively facilitate discussions and respond promptly to students' questions establish norms that enhance participation, comprehension, and deeper engagement with course material (Rovai, 2007a ; Martin et al., 2019). However, broader institutional factors—including class size, resource availability, and learner demographics—can influence the effectiveness of these interactions (Nortvig et al., 2018).

From a CP perspective, student-teacher dialogue can "flatten" hierarchical structures and promote learner empowerment (Freire, 1970/2000; Giroux, 2022). Instead of unidirectional knowledge transmission, teachers can share authority in course design or discussion facilitation (Shor, 1992; Hooks, 1994). This approach encourages student initiative, expression of diverse perspectives, and critical awareness of social or political contexts, aligning with CP's focus on developing critical consciousness and agency.

Figure 2.4 visually illustrates key elements of student-teacher interaction, highlighting how AT and CP perspectives inform both engagement strategies and instructional design in online learning.

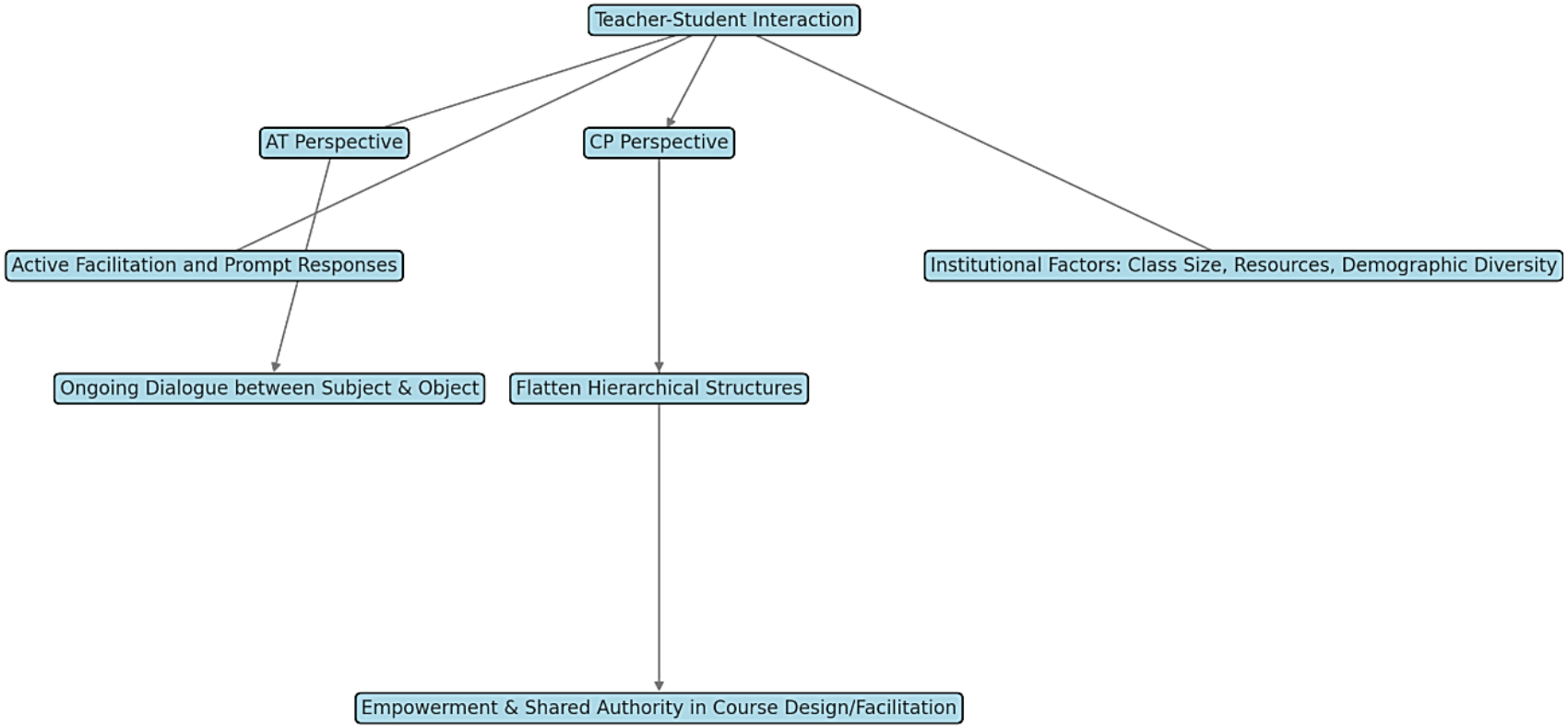


Figure 2.4: Student-Teacher Interaction

2.9.2 Social Interaction Between Student-Content (SOISC)

SOISC is a critical factor in learner engagement, as the design and structure of course materials directly influence motivation, knowledge retention, and persistence in complex topics (Mucundanyi, 2019). Well-crafted learning resources—such as multimedia content, hands-on simulations, and problem-based tasks—allow students to explore concepts at their own pace, promoting active learning and deeper understanding.

From an AT perspective, these materials serve as mediating tools that connect the subject (student) to the object (learning goals or skill acquisition) (Engeström, 2001). Digital resources such as interactive eBooks, adaptive quizzes, and simulation software facilitate iterative practice and self-regulated learning, supporting students in achieving conceptual mastery and applying knowledge to real-world contexts.

Applying CP principles to student-content interaction encourages learners to critically engage with course materials, moving beyond passive consumption (Giroux, 2022). Educators can incorporate real-world case studies, reflective prompts, and problem-posing tasks to inspire learners to question dominant narratives, analyze social structures, and connect academic content with broader societal issues (Shor, 1992). This approach fosters analytical thinking, empowerment, and critical consciousness, linking cognitive skills with social and political awareness.

Figure 2.5 visually illustrates the core elements of student-content interaction, showing how AT and CP perspectives guide the design of meaningful and transformative learning experiences in online environments.

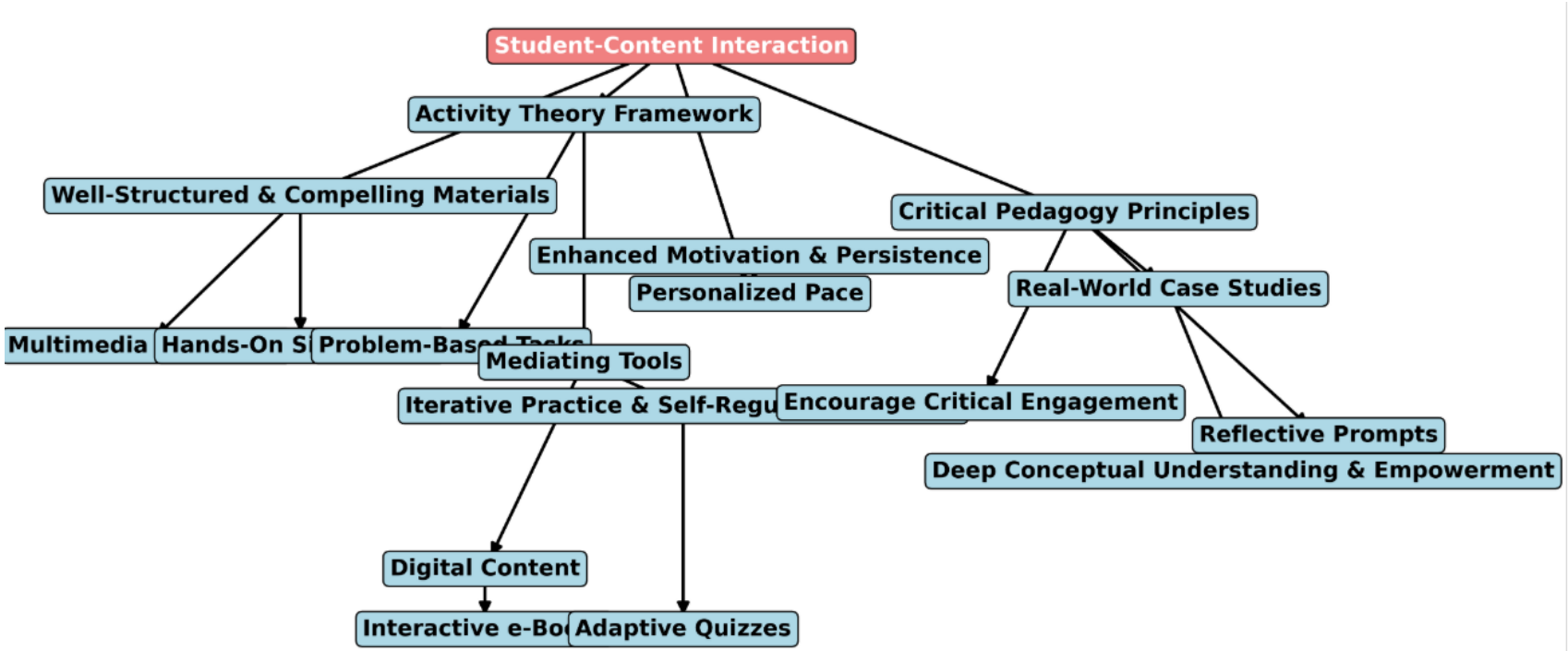


Figure 2.5: Student–Content Interaction

2.9.3 Social Interaction Between Student-Student (SOISS)

SOISS emphasizes the role of peer collaboration in motivating learners, fostering a sense of belonging, and promoting collective problem-solving (Pekrun et al., 2011; Johnson, 2014). In the framework of AT, the division of responsibilities—such as moderating discussions, reviewing peer work, or contributing to shared tasks—affects how students engage within the community and achieve collective learning goals (Kaptelinin & Nardi, 2006). Well-designed activities that utilize synchronous and asynchronous tools, including group forums, shared documents, and collaborative platforms, enhance the quality of reciprocal feedback, support co-learning, and encourage sustained engagement through shared accountability.

While quantitative metrics of peer engagement are useful, they may fail to capture underlying motivational, cultural, or social dynamics that influence collaboration (Miao et al., 2022). Incorporating CP principles, educators can foster environments where students critically examine assumptions, discuss social justice issues, and rotate leadership roles (Hooks, 1994). Such practices amplify marginalized voices, strengthen mutual support networks, and cultivate an ethic of shared ownership and collective agency.

By combining AT's systemic perspective with CP's focus on empowerment, SOISS not only enhances academic outcomes but also prepares learners for democratic participation and socially responsible engagement. Figure 2.6 visually depicts the essential elements of student-student interaction in online learning environments.

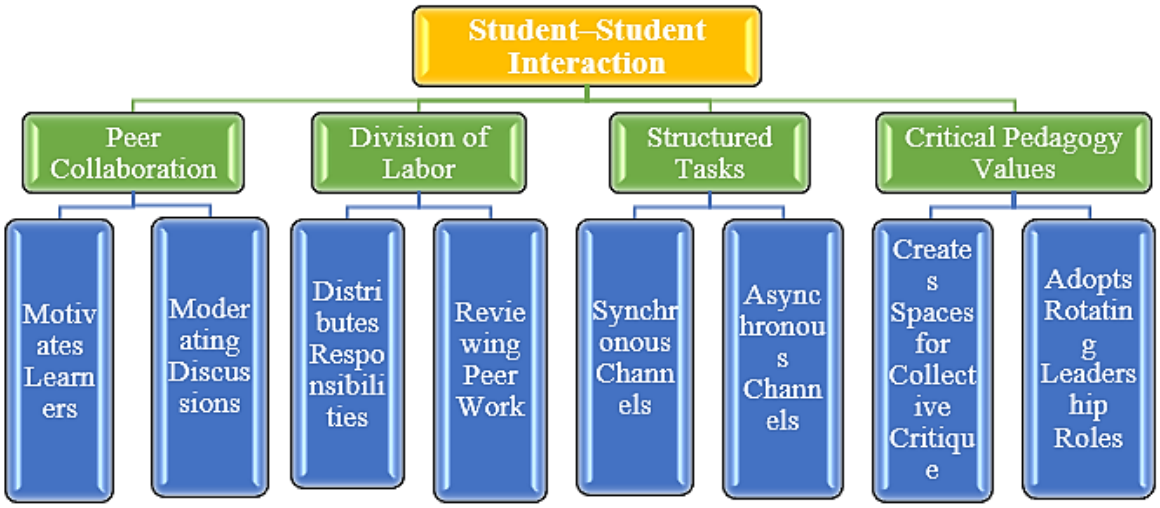


Figure 2.6: Student–Student Interaction

2.9.4 Overcoming Methodological and Contextual Gaps in Online Interactions

Although substantial evidence supports the importance of SOIST, SOISC, and SOISS, several methodological and contextual challenges persist. Cross-sectional designs often limit understanding of how interactions evolve over time (Lin, 2013), while context-specific samples may restrict the generalizability of findings across diverse educational settings. Unrecognized selection biases can further complicate interpretation (Miao et al., 2022).

Future research should consider longitudinal or mixed-methods approaches to capture detailed shifts in engagement across varying institutional, cultural, and technological environments (Çakiroğlu & Kahyar, 2022). Through the dual lenses of AT and CP, educators can examine how institutional policies, available tools, and course structures interact to either facilitate or constrain these three types of interaction. For instance, analysis of discussion board participation may reveal the extent to which student ownership drives debates and how teacher facilitation shapes participatory learning. Similarly, implementing CP-oriented strategies—such as student-led seminars, peer moderation, or collaborative

projects—can illuminate power dynamics and identify ways to foster shared authority and critical inquiry rather than one-way instruction (Freire, 1970/2000; Shor, 1992).

In conclusion, SOIST, SOISC, and SOISS each contribute uniquely to the depth and sustainability of online engagement. Aligning these interactions with AT principles helps identify structural supports and constraints, while CP highlights the sociopolitical and ethical dimensions of online learning design. Together, these frameworks highlight the necessity of a deliberate, reflective, and responsive approach to planning, facilitation, and ongoing feedback, which is essential for creating meaningful, interactive, and empowering online learning experiences.

2.10 Research Gap

While extensive studies examine online SE (Akyol, 2012; Martin et al., 2019), noteworthy gaps remain in understanding engagement within unique educational settings and subject areas. Much of the existing literature is Western-centric, primarily describing engagement, motivation, and digital competence without critically evaluating sample size, methodological rigor, or the generalizability of findings to diverse populations. For instance, research often focuses on university students (Wang & Eccles, 2012), leaving a distinct lack of studies on Chinese vocational college students, whose engagement dynamics are shaped by unique career motivations and practical skill aspirations. Additionally, the pedagogical and political aims of I&P education introduce complexities that existing engagement models have not yet addressed comprehensively.

Current theoretical frameworks, including the CI (Akyol, 2012; Zhang et al., 2022) and Technological Pedagogical Content Knowledge, are often applied in isolation. These

models rarely link their principles explicitly to the challenges and opportunities in online I&P education. For example, little research investigates how teaching or social presence can foster critical discussions on sensitive ideological topics in vocational college contexts. Likewise, the detailed power relations and goals of critical consciousness central to CP (Freire, 1970/2000; Giroux, 2022) remain underexplored in practical online I&P course applications.

Studies within the Chinese context provide some insights but often lack critical comparison, detailed methodological analysis, or discussion of contradictory findings. This descriptive emphasis limits understanding of how engagement strategies operate within the Chinese vocational education landscape.

In summary, despite broad research on online SE, a significant gap persists in examining its mechanisms within online I&P education, particularly for Chinese vocational college students. No prior study has comprehensively analyzed the interplay of SOI, AT, and CP to offer a multi-faceted understanding that considers cultural, institutional, and pedagogical contexts. This study addresses this gap by providing a structured, in-depth analysis of online engagement in Chinese vocational I&P courses, using these three theoretical lenses to examine the quality, purpose, and transformative potential of interactions.

2.11 Chapter Summary

This chapter explored the challenges and opportunities of delivering I&P courses online in higher vocational colleges, with a particular focus on enhancing SE. It highlighted the impact of the COVID-19 pandemic on students' motivation, participation, and sense of

community, emphasizing the central role of social interactions—student-teacher, student-student, and student-content—in fostering engagement and knowledge retention.

The chapter integrated AT, SOI, and CP to examine how online course design can effectively enhance engagement. It also addressed contextual factors such as digital literacy gaps, resource disparities, and equity issues, which influence how students interact with course materials and peers in higher vocational education settings.

In conclusion, the chapter highlights that effective online I&P instruction requires more than digital tools; it depends on critical discussion, collaborative inquiry, and purposeful facilitation. Educators should prioritize professional development to design interactive and inclusive learning environments that promote engagement, reflection, and critical thinking, ensuring sustainable and high-quality online education experiences.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Overview

This chapter outlines the methodological approach used to study SE in online I&P courses at higher vocational colleges. It details the use of a convergent parallel mixed-methods design, combining quantitative and qualitative data collection, analysis, and interpretation. The chapter also addresses key ethical considerations and explains how the research questions guided the study's methodology. By providing a transparent account of the research process—from design to analysis—this chapter enables readers to understand how the findings were obtained and to evaluate the credibility of the results.

3.2 Research Philosophy

Maintaining integrity and rigor in philosophical inquiry is crucial for shaping how scholars understand, conduct, and interpret research (Saunders & Bezzina, 2015). This study is grounded in ontological, epistemological, and axiological assumptions that collectively guide the investigation of SE in online I&P courses. By integrating AT, SOI, and CP, the research acknowledges the dynamic interplay of rules, power, and social processes that shape the learning environment.

3.2.1 Ontological Considerations

Ontology concerns the nature of reality—how phenomena are recognized, constructed, and defined (Saunders & Bezzina, 2015). This study adopts a constructivist

ontological stance, extended through dialectical pluralism, acknowledging that multiple, coexisting realities shape online learning experiences (Bryman, 2012; Johnson, 2012).

Within this framework, AT conceptualizes human activities—teaching and learning—as interactions among subjects (students and instructors), mediating tools (digital platforms, course materials), and an object (enhanced engagement and learning outcomes) within a community (classmates, educators, administrators). Rules (institutional policies, cultural norms) and the division of labor (who instructs, who participates) influence how learners construct and negotiate these realities.

SOI—SOIST, SOISS, and SOISC—are understood as socially mediated experiences, reflecting how constructivist principles shape perceived realities in the digital classroom. Additionally, CP highlights the role of power dynamics, encouraging learners to question and reinterpret dominant ideological frameworks (Freire, 1970/2000).

This constructivist ontology emphasizes empowerment, fostering active learning, reflective dialogue, and social transformation as learners critically engage with content, peers, and instructors within online I&P courses.

3.2.2 Epistemological Foundations

Epistemology concerns how knowledge is understood, constructed, and validated (Cohen et al., 2011). This study draws on three complementary epistemological positions: pragmatism, interpretivism, and elements of cognitive epistemology. Positivism aligns with the scientific measurement of observable behaviors, consistent with behaviorist expansions such as Weimer's (2022) view of behaviorism as applied phenomenology. This enables

quantitative investigation of SE variables, allowing for objective data analysis and hypothesis testing (Bryman, 2012).

Pragmatism emphasizes real-world problem-solving (Tashakkori & Teddlie, 2003), supporting a mixed-methods approach that combines quantitative and qualitative data. Within the lens of AT, pragmatism helps researchers target practical outcomes by examining how mediating tools, rules, and community structures influence learning processes and engagement in online I&P courses.

Finally, cognitive epistemology (Simon, 1982; Zander & Kogut, 1995) highlights abstract and transferable knowledge structures (Marr et al., 2003). In educational contexts, this perspective resonates with constructivist views, suggesting that learners actively synthesize new knowledge with preexisting cognitive frameworks (Doolittle & Camp, 1999), reinforcing the role of internal knowledge construction alongside socially mediated learning.

By integrating these epistemological positions, this study ensures that knowledge about SE is both contextually grounded and practically actionable, capturing the dynamic interplay of objective measures, subjective experiences, and cognitive processes.

3.2.3 Axiological Principles and Ethical Considerations

Axiology examines the role of values and ethics in guiding research decisions (Fischer et al., 2012). In this study, where I&P dimensions are central, ethical considerations are fundamental for responsible scholarly inquiry. The key principles include:

i. *Power Relations (CP)*: Critical Pedagogy emphasizes the need for fair and equitable knowledge creation. This principle entails actively working to reduce the perpetuation of oppressive structures in the research process. It involves empowering

participants, ensuring their voices are authentically represented, and addressing inherent power imbalances within educational contexts.

ii. *Community Responsibilities (AT)*: Activity Theory highlights the importance of awareness of multiple stakeholders within the activity system, including administrators, instructors, and learners. Researchers are expected to adhere to institutional policies and consider the normative frameworks of the community, ensuring that the study benefits all participants and respects communal values.

iii. *Methodological Integrity*: This principle demands strict ethical oversight across all research stages. For human-participant research, it involves obtaining informed consent with clear explanations of the study's purpose, procedures, and participants' right to withdraw at any time. Protecting anonymity and data confidentiality during collection, analysis, and dissemination is essential. Additionally, findings must be presented accurately and respectfully, avoiding misrepresentation or harm to individuals or groups.

Collectively, these axiological principles ensure that ethical rigor is embedded throughout the research process, aligning epistemological and methodological choices with justice, transparency, and social accountability.

3.2.4 Philosophical Framework and Rationale for This Research

This study investigates SE in online I&P courses post-pandemic, integrating both quantitative and qualitative perspectives to capture the complexity of learning experiences. It balances positivist hypothesis testing with constructivist meaning-making, employing

dialectical pluralism to reconcile the objective measurement of observable behaviors with the subjective comprehensive of learner experiences (Johnson, 2012).

While quantitative data—such as survey metrics on SOIST, SOISS, and SOISC—provides measurable insights into engagement patterns, qualitative inquiry—including interviews exploring perceptions of power, empowerment, and social dynamics—illuminates the subtle influences of context and institutional factors on student behavior. This dual perspective allows the study to examine both structural and experiential dimensions of online learning.

Aligned with CP, the research promotes learner empowerment, fostering reflective and engaged citizens consistent with Chinese socialist principles. It also applies AT to analyze how institutional rules, division of labor, and available mediating tools shape interactions and engagement outcomes.

In essence, the study's ontological (constructivist, pluralist), epistemological (positivist, pragmatic, interpretivist), and axiological (values-driven) commitments underpin a mixed-methods approach. This framework captures both the breadth of engagement variables and the depth of student experiences, offering a comprehensive understanding of how learners navigate, co-construct, and experience educational realities that are academically rigorous, socially meaningful, and transformative.

3.3 Research Design, Methodological Framework, and Mixed Methods Strategy

This study employs a Convergent Parallel Mixed Methods Design to examine SE in online I&P courses at higher vocational colleges comprehensively. This approach integrates quantitative (numeric) and qualitative (descriptive) data, collected and analyzed concurrently,

to provide a rich and detailed understanding of engagement dynamics. By combining these methods, the research captures both measurable indicators of engagement and the deeper, contextually grounded experiences that shape them, offering more robust and actionable evidence for educational practice and policy than either method alone.

3.3.1 Mixed Methods Research Approach and Theoretical Foundations

A mixed-methods approach systematically combines quantitative and qualitative data to generate a more holistic understanding of complex phenomena (Creswell & Plano Clark, 2017). Quantitative data provides measurable insights into overall engagement patterns, while qualitative data reveals contextual finer details, personal experiences, and perceptions that cannot be captured numerically. The integration of these two data types allows researchers to resolve discrepancies, strengthen interpretations, and provide multi-faceted evidence that supports both inductive and deductive reasoning (Morgan, 2007; Creswell & Plano Clark, 2018).

This approach is particularly suited to studying online I&P courses, where the layered complexities of social interaction, institutional policies, and ideological content require both objective measurement and context-sensitive exploration, especially in the post-pandemic educational landscape. Mixed methods also enhance credibility, validity, and practical relevance (Hesse-Biber, 2010).

The study is grounded in three theoretical frameworks—AT, SOI, and CP—which together guide its methodological design:

i. AT conceptualizes teaching and learning as goal-directed activities within a system of interacting elements: subject (learner), mediating tools (digital platforms, course

materials), rules (institutional policies, cultural norms), community (peers, instructors, administrators), and division of labor (roles and responsibilities). AT is used to analyze how these systemic components facilitate or constrain engagement.

ii. SOI informs the examination of SOIST, SOISS, and SOISC interactions. The study explores these interactions in detail to identify patterns, strengths, and areas for improvement in online learning environments.

iii. CP provides a lens for understanding power relations (POR), fostering critical consciousness (CRC), and promoting empowerment (EMP). This framework allows the study to analyze how students engage critically with ideological content and co-construct knowledge while navigating institutional and sociopolitical structures.

To systematize these methodological decisions, the study adopts the research onion framework (Saunders & Bezzina, 2015), which layers philosophical assumptions, methodological choices, and data collection strategies in a structured manner (Figure 3.1). An adapted version explicitly links each layer—from ontological and epistemological foundations to methods and analysis—to AT, SOI, and CP (Figure 3.2). This design captures complex sociocultural interactions, including rules, power dynamics, and engagement patterns, ensuring a comprehensive and theoretically grounded investigation of online I&P courses.

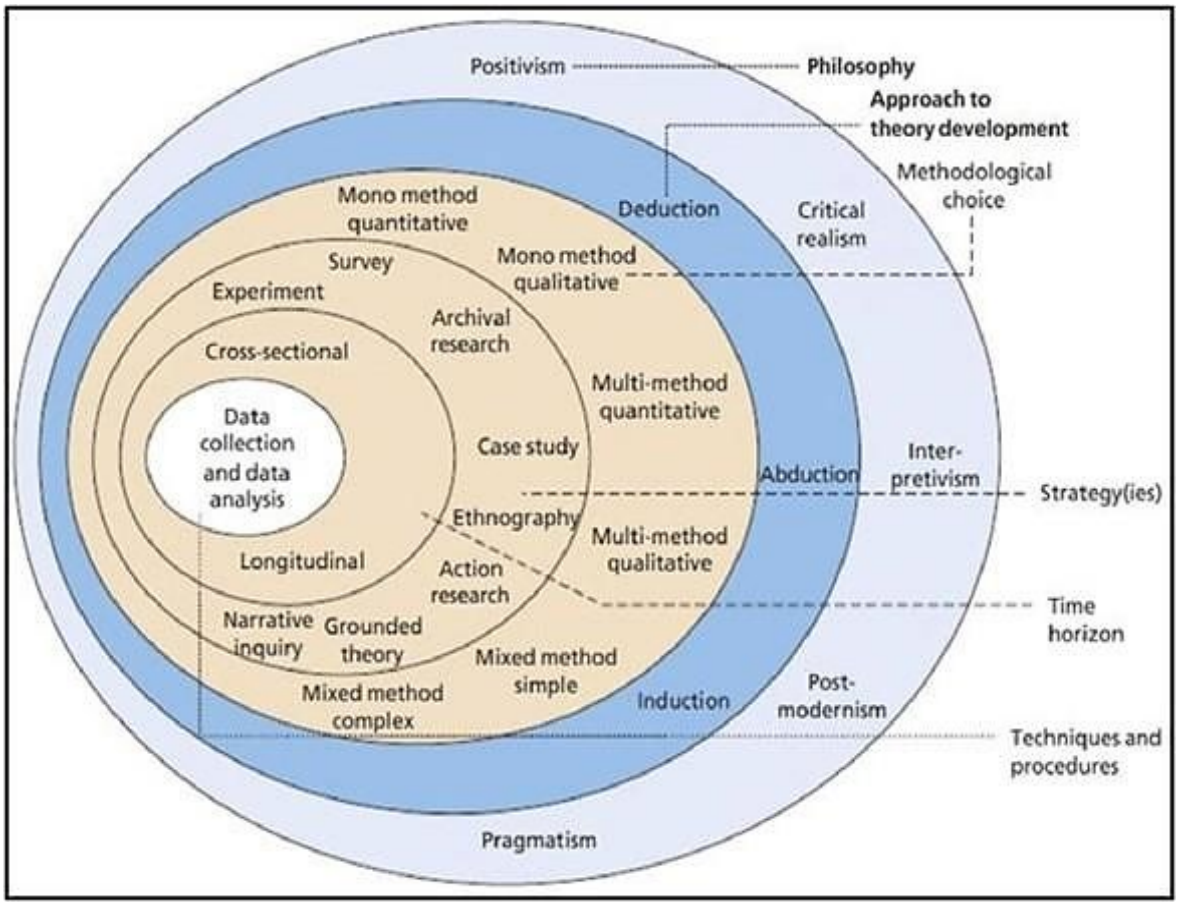


Figure 3.1: The Research Onion (Saunders & Bezzina, 2015)

3.3.2 Mixed Methods Design and Implementation Strategy

The Convergent Parallel Mixed Methods Design was selected to provide a thorough and multifaceted understanding of SE in online I&P courses. This design allows triangulation, where quantitative and qualitative data confirm, challenge, or expand upon each other, thereby enhancing the study's validity and reliability. Quantitative data offers structured measurements of engagement, while qualitative data provides deeper insights into power relations and CP within student-teacher and student-student interactions. The combination captures both objective and subjective aspects of engagement, offering a more complete picture of the phenomena.

By integrating these two data streams, the study aligns with AT, SOI, and CP principles, highlighting the influence of rules, community, and power relations. This approach enables an understanding of how learners co-create and navigate their educational experiences, offering both theoretical and practical insights for vocational colleges in a post-pandemic context (refer Figure 3.2). While CP emphasizes ongoing praxis, the convergent design provides an immediate snapshot of engagement and power dynamics at the time of data collection.

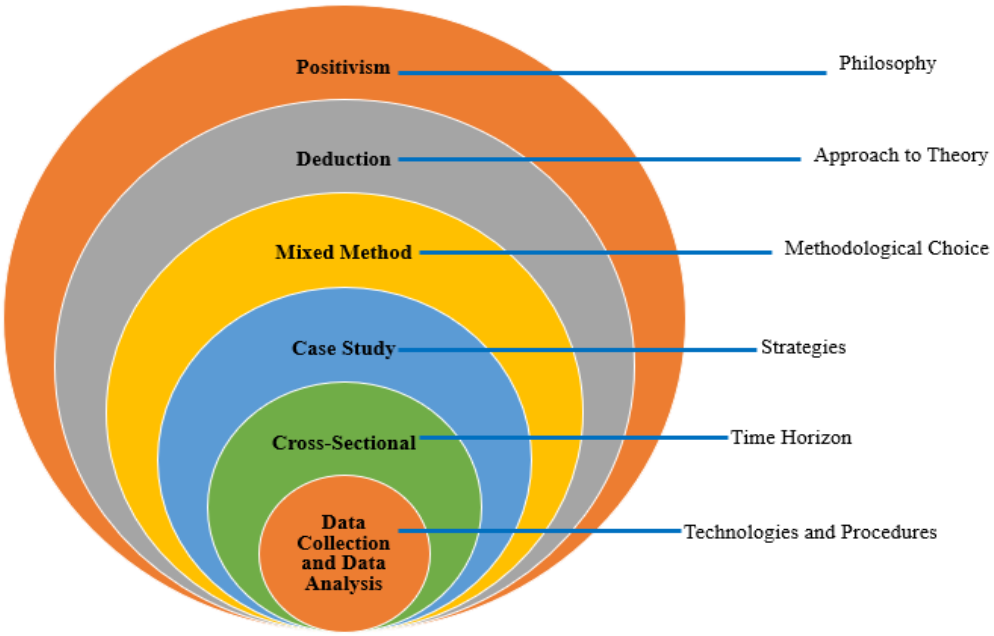


Figure 3.2: The Research Onion Revised

The implementation of this mixed-methods design follows a clear, structured process. Researchers typically begin by formulating quantitative research questions and selecting appropriate tools, such as surveys, to collect closed-ended data. Simultaneously, qualitative research questions are developed, and methods like interviews or focus groups are used to gather open-ended data (Creswell & Plano Clark, 2017). Each data stream is then analyzed using suitable strategies: quantitative data through descriptive statistics, and qualitative data

via thematic or topic-based analysis. To compare or combine results, researchers often use joint displays or convert qualitative findings into quantitative variables. Synthesizing both datasets ultimately provides a more comprehensive understanding of the phenomenon under study (Creswell & Plano Clark, 2017).

In qualitative research, themes typically consist of clusters of words or phrases that convey shared meanings and contribute to broader conceptual frameworks. After analyzing qualitative and quantitative data separately, researchers deepen their understanding by integrating findings across multiple dimensions. According to Creswell and Plano Clark (2017), this integration involves connecting, building, merging, and embedding the two data streams. Researchers may also identify participant groups or subunits based on predefined criteria and compare datasets accordingly. Combining quantitative and qualitative findings in this manner enables richer insights and a more detailed understanding of the research problem (Creswell & Plano Clark, 2017). The sequence followed in this study design is illustrated in Figure 3.3.

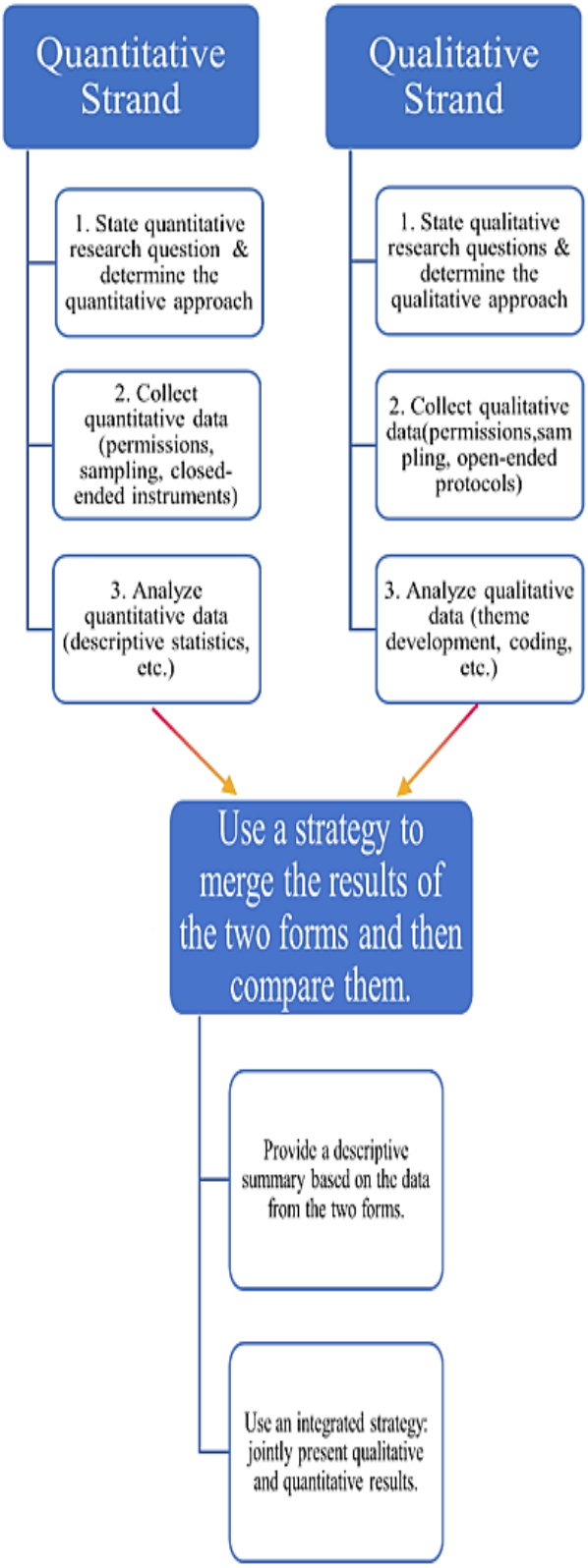


Figure 3.3: Adapted Flowchart of Mixed Methods Case Implementation

The study employs quantitative surveys and qualitative semi-structured interviews as its primary data collection methods, enabling the simultaneous gathering of both data types.

Quantitative data will be collected remotely using Likert-type surveys administered via the Wen Juan Xing platform. These surveys assess SE across factors derived from AT—Rules, Subject, Object, Division of Labor, Community, and Mediating Tools—SOI—Teacher-Student, Student-Student, and Student-Content interactions—and CP—Power Relations, Critical Consciousness, and Empowerment. This approach provides numerical insights into interaction patterns and evaluates how institutional rules or mediating tools influence engagement. The survey instrument, adapted from the Remote Online Community and Engagement Scale (ROCES) by Young and Bruce (2011), contains 54 items rated on a 5-point Likert scale.

Qualitative data will be collected through one-on-one semi-structured interviews conducted via Tencent video conferencing. Interview questions are aligned with the survey to explore students' experiences, perceptions, and the potential influence of CP, providing in-depth understanding of how power structures, community dynamics, and different interaction types affect engagement. Instructor perspectives, as integral members of the community and division of labor within the activity system, will primarily inform the study's context and facilitation of SE, with any direct contributions detailed in specific data collection procedures.

Data analysis will occur in separate streams before integration:

i. Quantitative data will undergo descriptive and inferential statistical analyses, including Exploratory Factor Analysis (EFA) and Kruskal-Wallis tests, to evaluate factor influences on engagement and compare mean scores across student subgroups.

ii. Qualitative data will be analyzed using descriptive and in vivo coding, followed by thematic organization and cluster analysis to identify patterns linked to AT, SOI, and CP.

Finally, findings from both analyses will be integrated through joint displays and data transformation techniques (e.g., converting qualitative codes into quantitative variables) to examine convergence, divergence, and complementarity. This integration supports AT by addressing contradictions and fosters a critical, empowered perspective consistent with CP. Detailed procedures for data collection, participant recruitment, and analysis are presented in subsequent sections.

3.4 Population and Sample

3.4.1 Population

The target population for this study comprises junior college students from higher vocational colleges in Anhui Province, China, totaling approximately 20,000 students. This population was chosen due to the recent shift toward online learning, particularly in I&P courses.

The accessible population included students from Anhui Vocational and Technical College (AVTC) and Chuzhou Vocational and Technical College (CVTC). These students were enrolled in mandatory I&P courses delivered either fully online or in a hybrid format

during and after the pandemic. The study primarily focused on students admitted in 2019, 2020, and 2021, with additional data considered from cohorts admitted after 2021.

These colleges were selected based on existing research collaborations and the convenience of data collection. Furthermore, they are regarded as representative of the regional network of higher vocational colleges in Anhui Province, given their comparable student demographics, I&P curricula, and implementation of online learning methods.

3.4.2 Sampling Strategy

Participants were recruited using a stratified random sampling approach. Students were informed about the study through announcements on the university's online learning platform and email invitations sent by course instructors. Participation was entirely voluntary and anonymous.

Stratification was based on students' admission year, grouping them into the following categories: 2019, 2020, 2021, and cohorts admitted after 2021. This strategy was designed to capture the diverse experiences of students who began their studies after 2019, reflecting the impact of the COVID-19 pandemic on their education.

Since I&P courses are mandatory for all students, analyzing engagement among vocational students in these courses—whether delivered fully online or in a hybrid format—provides valuable insights into teaching effectiveness and student learning outcomes during and after the pandemic.

3.4.3 Sample Size Determination

The sample size of 377 participants (as shown in Figure 3.4) was determined using the Krejcie and Morgan (1970) table, which calculates an appropriate sample based on the population size of 20,000 students. This calculation targets a 95% confidence level with a 5% margin of error, ensuring that the sample provides a statistically robust representation of the population.

Although this approach offers a solid foundation for generalizability, future research could incorporate additional sampling strategies, such as stratified or purposive sampling, to capture an even more diverse and contextually rich participant pool, particularly for qualitative analyses.

N	*S*	*N*	*S*	*N*	*S*	*N*	*S*	*N*	*S*
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	20000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384

Figure 3.4: Determining Sample Size from a Given Population

3.4.4 Sampling Procedure

i. Quantative Sampling:

To ensure a robust quantitative analysis, this study adhered to established sample size guidelines. Kline (2015) recommends a subject-to-variable ratio of at least 5:1, with a minimum sample size of 150. Hutcheson and Sofroniou (1999) suggest a sample size range of 150–300, while Beavers et al. (2013) advocate for at least 150 participants. Norušis (2005) advises a minimum of 300 samples.

Guided by these recommendations, this study targeted first-year, sophomore, and junior students from higher vocational and technical colleges in Anhui Province, ensuring that all participants had experienced at least one online or hybrid I&P learning activity. The final quantitative sample of N = 377 not only met but exceeded the minimum thresholds proposed by these scholars, providing a strong foundation for statistical analysis. All eligible students (n = 377) were invited to complete a survey assessing their engagement in online I&P courses.

ii. Qualitative Sampling:

For the qualitative phase, a stratified random subsample representing approximately 10% of survey respondents (n = 30) was selected for individual semi-structured interviews. Stratification criteria included grade level (first-year, sophomore, junior) and self-reported engagement levels (high, moderate, low) based on survey responses. Within each stratum, 10 participants were randomly selected to ensure diverse perspectives. Interviews were scheduled flexibly to accommodate students' availability and preferences, supporting rich, contextually grounded qualitative insights.

3.4.5 Participant Selection and Inclusion/Exclusion Criteria

Participants were students enrolled in mandatory I&P courses delivered via the ROL. This ensured that all respondents had direct experience with the course content and the online learning environment under investigation. Prior knowledge of I&P courses was not required, as the study focused on how learners engaged with the online materials, regardless of their previous understanding of the subject.

The study included students from AVTC and selected higher vocational colleges in Chuzhou, Anhui Province. To be eligible, participants had to:

i. Be enrolled in I&P courses delivered either fully online or in a hybrid format.

ii. Have commenced their studies in 2019 or later, ensuring exposure to the educational impact of the COVID-19 pandemic.

Exclusion criteria were:

i. Students who did not participate in online or hybrid components of I&P courses.

ii. Students not enrolled in higher vocational and technical colleges within Anhui Province during the data collection period.

iii. Individuals who did not provide informed consent to participate in the study.

This selection ensured a relevant and representative sample, capturing the experiences of students directly affected by online I&P course delivery.

3.4.6 Researcher's Positionality

As an experienced practitioner in I&P courses, with expertise in both traditional classroom and online learning environments, I bring a unique perspective to this study. My practical experience provides valuable insights into the pedagogical challenges and opportunities of delivering online courses in this specialized field. Additionally, my proficiency with statistical software, including Excel and SPSS, enhances the rigor of the quantitative data analysis.

However, it is important to acknowledge how my positionality could influence the research process. My strong interest in, and generally positive attitude toward, online I&P courses may introduce interpretive biases. To mitigate these potential influences, I employed the following strategies:

i. *Reflexivity*: I maintained a reflexive journal throughout the research process to document personal thoughts, assumptions, and potential biases. This practice helped identify and control subjective influences during data collection and analysis.

ii. *Triangulation*: By using a mixed-methods approach, combining both quantitative and qualitative data, the study ensured triangulation. This prevented any single perspective from unduly influencing the findings, thereby increasing the robustness of the study.

iii. *Transparency*: The chapter provides a detailed account of research methods, including data collection and analysis procedures. This transparency enables readers to critically evaluate the methodology and assess the credibility of the findings.

By explicitly acknowledging and addressing my positionality, I aim to maintain objectivity and rigor, presenting a balanced and comprehensive understanding of SE in online I&P courses within Chinese higher vocational contexts. This approach recognizes that research is shaped by the researcher's experiences and perspectives, rather than being entirely neutral.

3.5 Data Preparation and Screening

Data preparation is the initial stage in the analysis process, ensuring the accuracy, completeness, and suitability of the dataset before evaluating the research model (Hair et al., 2020). In this study, only respondents who answered "Yes" to the qualifying question in Section A—indicating that they are enrolled in or have experienced online I&P courses in a vocational college—were included in the analysis. All questionnaire items were pre-coded prior to data collection, with variables measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). This coding facilitated efficient data entry. All data were entered into SPSS version 29, with variable names, labels, value labels, and missing values properly defined and handled.

3.5.1 Data Screening

The first step in data cleaning involved checking for blank responses in the collected questionnaires. This process was conducted using Microsoft Excel, with the COUNTBLANK(item1:itemN) function applied to ensure all questions were completed. Any blank responses were excluded from the dataset.

The next stage focused on identifying missing or incomplete data. The significance of missing data depends on its pattern, extent, and cause. Following Hair et al. (2018), a four-step process was used to manage missing data:

i. Determine whether the missing data is ignorable or non-ignorable. Ignorable missing data happens when respondents choose not to answer specific questions. Non-ignorable missing data can result from researcher errors during data entry or the respondent's reluctance to answer particular items (Hair et al., 2018).
ii. Assess the extent and pattern of non-ignorable missing data before applying corrective measures.
iii. Evaluate the amount of missing data for all critical survey items related to the structural model.
iv. Apply corrective measures if necessary, such as imputation techniques or exclusion, depending on the nature of the missing data.

In this study, SPSS version 29 was used to screen for missing data. As reported in Appendix A, no missing data were detected among the 54 observed variables included in the survey. This confirms the dataset was complete and ready for subsequent descriptive and inferential analysis.

3.5.2 Outliers

Outliers are data points that deviate markedly from the normal pattern of responses, exhibiting unusual characteristics compared to the rest of the dataset (Sarstedt et al., 2017; Hair et al., 2018). They can arise from atypical responses to specific questions or variables and, if left unaddressed, may distort data distributions and lead to inaccurate results (Hair et al., 2018; Tabachnick & Fidell, 2019). While some outliers may provide valuable insights

into unique population characteristics, harmful outliers that do not accurately represent the target population can mislead analyses and undermine research objectives (Hair et al., 2018).

In this study, outliers were detected using multivariate methods for both independent and dependent variables. Specifically, the Mahalanobis D^2 measure was applied to identify observations that were distant from the multivariate center of the dataset (Hair et al., 2018). Using SPSS version 29, the Mahalanobis D^2 calculates the distance of each data point in the multidimensional space formed by all observations. Higher D^2 values indicate potential outliers, which may need to be excluded from the analysis to maintain data integrity.

A total of 12 study variables were included in this outlier assessment. The chi-square distribution was used to determine the threshold for identifying outliers, with degrees of freedom set to 11 (12 variables minus 1). Following Mishra and Koehler (2006), the significance level was set at $p = 0.001$, resulting in a chi-square cutoff value of 31.2641, as presented in Table 3.1. Observations exceeding this threshold were flagged for further review and potential removal from the dataset.

Table 3.1: Chi-square Statistical Table

Df	***p-value***					
	0.1	**0.05**	**0.025**	**0.01**	**0.005**	**0.001**
1	2.7055	3.8415	5.0239	6.6349	7.8794	10.8276
2	4.6052	5.9915	7.3778	9.2103	10.5966	13.8155
3	6.2514	7.8147	9.3484	11.3449	12.8382	16.2662
4	7.7794	9.4877	11.1433	13.2767	14.8603	18.4668
5	9.2364	11.0705	12.8325	15.0863	16.7496	20.515
6	10.6446	12.5916	14.4494	16.8119	18.5476	22.4577
7	12.017	14.0671	16.0128	18.4753	20.2777	24.3219
8	13.3616	15.5073	17.5345	20.0902	21.955	26.1245
9	14.6837	16.919	19.0228	21.666	23.5893	27.8772
10	15.9872	18.307	20.4832	23.2093	25.1882	29.5883

Table 3.1 continued

11	17.275	19.6751	21.92	24.725	26.7568	31.2641
12	18.5493	21.0261	23.3367	26.217	28.2995	32.9095
13	19.8119	22.362	24.7356	27.6882	29.8195	34.5282
14	21.0641	23.6848	26.1189	29.1412	31.3193	36.1233
15	22.3071	24.9958	27.4884	30.5779	32.8013	37.6973
16	23.5418	26.2962	28.8454	31.9999	34.2672	39.2524
17	24.769	27.5871	30.191	33.4087	35.7185	40.7902
18	25.9894	28.8693	31.5264	34.8053	37.1564	42.3124
19	27.2036	30.1435	32.8523	36.1909	38.5823	43.8202

Any case with a Mahalanobis D^2 value of 31.2641 or higher was considered a multivariate outlier. As shown in Table 3.2, 10 cases in the sample exceeded this threshold. Each of these identified outliers was carefully reviewed to determine whether they resulted from data entry errors or genuinely represented extreme, yet valid, responses within the population. It was confirmed that all 10 cases were valid observations. Furthermore, given that these outliers constitute less than 10% of the total sample, their presence is unlikely to significantly violate the assumptions of the planned statistical analyses (e.g., EFA or Kruskal-Wallis tests) or distort the primary relationships under investigation. Consequently, all outliers were retained in the dataset.

Table 3.2: Multivariate Outlier Detection

No	Case Number	Mahalanobis (D^2)	p-*value*
1.		38.93159	.00005
2.		36.89227	.00012
3.		35.42877	.00021
4.		34.52876	.00030
5.		34.30110	.00032
6.		33.87517	.00038
7.		33.87073	.00038
8.		33.68124	.00041
9.		32.96762	.00053
10.		32.92715	.00054

3.6 Data Collection Methods and Procedures

3.6.1 Instrument Development

This section systematically details the development of both quantitative and qualitative instruments, designed to capture online learning engagement in I&P courses. The

items were derived from established literature and carefully aligned with the study's theoretical framework, which integrates AT, SOI, and CP. This structured approach ensures that the instruments accurately capture the finer details of SE in online learning environments.

3.6.2 Quantitative Questionnaire Item Development

Table 3.3 provides a comprehensive overview of the quantitative questionnaire items. The development process involved a thorough review of existing instruments and theoretical constructs, followed by careful selection and adaptation to ensure relevance to the constructs under investigation:

i. *AT constructs*: Rules (RUL), Subject (SUB), Community (COM), Mediating Tools (MET), Division of Labor (DIV), and Object (OBJ)

ii. *SOI constructs*: Student-Teacher Interaction (SOIST), Student-Content Interaction (SOISC), Student-Student Interaction (SOISS)

iii. *CP constructs*: Power Relations (POR), Critical Consciousness (CRC), and Empowerment (EMP)

Items related to Rules (RUL) and Subject (SUB) were adapted from validated scales to specifically reflect the context of online tasks and student self-management within digital learning platforms. Items addressing SOI were tailored to capture the unique dynamics of teacher-student and student-student interactions in online settings. Constructs rooted in CP—such as POR, CRC, and EMP—were carefully modified to explore how student voice, critical questioning, and agency manifest in online I&P courses.

This iterative process of selection, adaptation, and validation ensured that the 54-item questionnaire accurately measured the intended constructs and was contextually appropriate for the study's focus on online engagement in vocational I&P courses.

Table 3.3: Development of Quantitative Questionnaire Items and Their Theoretical Foundations

No	Construct	Questionnaire Items	Dimensions/Focus	Author(s)/Year
1	RUL	6 (Items 1, 2, 3, 4, 5 and 6)	Clarity of course tasks/rules and fairness in enforcing regulations.	Liu (2021); Wang (2023)
2	SUB	8 (Items 7, 8, 9, 10, 11, 12, 13,and 14)	Active participation, motivation, self-management, confidence, and goal setting.	Leaston (2024); Liu (2021); Schumacher (2018); Ugwu (2024)
3	OBJ	3 (Items 15, 16, and 17)	Course goals, learning tasks, tools, and effective participation in expressing views.	Leaston (2024); Ugwu (2024)
4	DIV	4(Items 18, 19, 20, and 21)	Roles and responsibilities of students, teachers, and support staff; perceived benefits of collaboration.	Cheng (2024); Chin (2024)
5	COM	3 (Items 22, 23, and 24)	Teacher support and feedback, social network expansion, and interactive, community-based online environment.	Suttle (2010); Ugwu (2024)
6	MET	4 (Items 25, 26, 27 and 28)	Technology proficiency, user-friendly interfaces, and platform features that facilitate idea sharing.	Chen (2015); Leaston (2024); Ugwu (2024)
7	SOIST	5 (Items 29, 30, 31, 32, and 33)	Course organization, teacher responsiveness, timely feedback, and classroom interaction management.	Liu (2021)

Table 3.3 continued

8	SOISS	4 (Items 34, 35, 36, and 37)	Peer interaction, collaboration, mutual support, and experience sharing.	Liu (2021)
9	SOISC	5 (Items 38, 39, 40, 41, and 42)	Engagement with course materials, timely assignment submission, interest in content, and frequent site visits.	Liu (2021)
10	POR	5 (Items 43, 44, 45, 46, and 47)	Distribution of authority and voice; perceived imbalances; course content aligning with student perspectives.	Kuo et al. (2014); Martin & Bolliger (2018); Tian (2021); Zhang (2023)
11	CRC	4 (Items 48, 49, 50, and 51)	Awareness of social/political issues, questioning dominant narratives, and reflecting on personal values.	Martin & Bolliger (2018); Wang (2023); Weng (2021); Zhang (2023)
12	EMP	3 (Items 52, 53 and 54)	Sense of agency, autonomy in class decisions, and applying knowledge to social/political contexts.	Martin & Bolliger (2018); Yang (2023)

3.6.3 Qualitative Questionnaire Item Development

Table 3.4 outlines the development of qualitative questionnaire items, designed to gain deeper insights into students' lived experiences and to complement the quantitative data. The development process involved identifying relevant interview questions and thematic areas from prior studies and carefully adapting them to align with the specific research questions and the study's theoretical frameworks (AT, SOI, and CP). For example:

i. Questions related to Rules (RUL) explored students' detailed perceptions of task clarity, fairness in rule enforcement, and the contextual factors shaping their online learning experiences.

ii. Items addressing Social Interaction (SOIST, SOISS, SOISC) focused on the dynamics of peer and teacher interactions, the role of technology as a mediating tool, and collaborative practices within the online environment.

iii. Questions grounded in CP (POR, CRC, EMP) were designed to elicit narratives about students' critical thinking, sense of agency, and perceptions of power relations within online I&P courses.

Each qualitative item was carefully crafted to illustrate how these theoretical constructs manifest in students' real-world experiences, providing rich, contextual insights that complement the survey findings. The table 3.4 highlights key interview questions; the full interview protocol is provided in Appendix B.

Table 3.4: Development of Qualitative Questionnaire Items and Their Theoretical Foundations

No	Items Original Source(Conceptual Basis/Original Question)	Items in this Study	Theoretical Linkages and Quantitative Construct	Author(s) /Year
1	How active do you think you are when participating in online settings (reading other responses in discussions, collaborative work)? (eg)	What online learning tools do you frequently use in your online classes?	AT: MET; SOI: SOISC. Quantitative Link: MET	Liu (2021)
2	Describe situations in which your classmates have reached out to communicate with you? Would you give some details regarding how responsive your classmates are when you have questions to ask?	How do online learning tools and platforms help you participate in discussions and interactions? (OBJ)	AT: MET, OBJ; SOI: SOISS. Quantitative Link: MET, OBJ	Liu (2021)
3	What specific rules/procedures do your interaction instructors use to manage teaching?How do your instructors enforce these rules/procedures consistently?	How do you perceive the clarity of tasks and rules in online political education courses? Are the rules enforced fairly by the teacher? How do these factors affect your learning participation? (RUL)	AT:RUL; CP:POR. Quantitative Link: RUL, POR	Liu (2021)

Table 3.4 continued

23	Please describe how you use Canvas? interaction Is it for reading materials, reading syllabus? (frequency)	How do you use platforms like ClassIn? Are they primarily used for reading learning materials or browsing the syllabus?	AT:MET; SOI:SOISC. Quantitative Link: MET, SOISC	Liu (2021)
24	In what way are you using Canvas differently since the Pandemic began?	How has your use of platforms like DingTalk or ClassIn changed or adjusted since the outbreak of COVID-19?	AT: MET. Quantitative Link: MET	Liu (2021)
37	Describe situations in which your classmates have reached out to communicate with you? Describe some details regarding how responsive your classmates are when you have questions ?	How do your classmates maintain contact with you? When you need to ask classmates questions, how do they usually respond? Can you provide some specific details to illustrate this?	SOI:SOISS;AT: COM. Quantitative Link: SOISS, COM	Liu (2021)

3.6.4 Quantitative Instrument: Survey Instrument and ROCES Details

Surveys provide a structured method to collect information about participants' experiences, attitudes, or behaviors (Gonyea, 2005; Schwarz, 2007). In educational research, surveys are particularly useful for large-scale studies to gain insights into students' engagement, perceptions, and motivations (Mucundanyi, 2019). As Kitchen et al. (2016) observed, surveys possess a "powerful personal reference," encouraging self-reflection on learning and engagement.

This study employed a validated instrument adapted from the ROCES, originally developed by Young and Bruce (2011), to measure SE in online I&P courses. The ROCES evaluates three core aspects of online interaction, aligned with SOI principles: student-teacher engagement, student-student engagement, and student-content engagement (Alvarez & Montes, 2021). By analyzing learners' interactions with peers, instructors, and course materials, the scale also reflects AT constructs, capturing the relationships among subjects (students), mediating tools (online platforms and course materials), and the community (classmates, instructors, and institutional context).

While ROCES primarily measures engagement through interaction types and participation, it implicitly captures aspects of CP by evaluating learners' perceived opportunities for active participation in the online environment. Qualitative interviews, conducted alongside the survey, explicitly explore students' empowerment, critical consciousness, and ability to challenge or negotiate within the learning space, thereby directly addressing CP objectives.

The ROCES is an adaptation of Rovai's (2002) Community of Inquiry Scale (CIS), which was originally designed for face-to-face learning contexts. This adaptation ensures accurate measurement of behavioral, cognitive, and emotional engagement in online distance learning. Young and Bruce (2011) noted limited consistency with core engagement factors in the original CIS; the revised ROCES used in this study incorporates dimensions such as teacher interaction, peer collaboration, and assignment completion.

To reduce potential order bias, survey items were randomized. Each statement corresponded to a specific latent variable—for example, "*I enjoyed the interaction in the classroom*" measured interaction enjoyment, while "*I was very organized in my learning*" assessed self-reported organizational skills. Responses were recorded on a five-point Likert scale ranging from "strongly disagree" to "strongly agree," providing a comprehensive and detailed assessment of engagement levels.

3.6.5 Qualitative Instrument: Interview Questions

As reported by Castro et al. (2010), qualitative interview questions can be designed to align with quantitative survey instruments, sometimes incorporating rating-style prompts. Creswell and Plano Clark (2017) similarly argued that aligning qualitative and quantitative questions facilitates smoother integration of datasets in mixed-methods research.

In this study, interview questions were developed based on Young and Bruce's (2011) ROCES. For instance, a survey item asked participants: "*I completed all assigned classwork*." The corresponding interview question was: "*How did you perceive yourself completing homework?*" Similarly, for the survey item "*I was very organized in my studies*," the interview asked: "*What specific strategies did you use to organize yourself in the distance*

online course?" Essentially, the quantitative survey addressed "what" students did, while the qualitative interviews explored "how" and "why" these behaviors occurred.

The interview protocol was explicitly designed to align with the study's theoretical frameworks:

i. AT and SOI questions explored rules, student motivations, learning outcomes, division of labor, community dynamics, mediating tools, and social interactions.

ii. CP questions examined power relations, critical consciousness, and perceived empowerment.

By linking the interview guide to ROCES, the qualitative phase provided in-depth insights into the underlying processes and motivations behind observed SE behaviors, complementing the quantitative findings and supporting a comprehensive mixed-methods analysis.

3.6.6 Data Collection Procedures

This section outlines the systematic procedures for collecting both quantitative and qualitative data, designed to provide a comprehensive understanding of SE in ROL for I&P courses.

Quantitative data were collected remotely through Likert-scale surveys administered via the Wen Juan Xing platform. The survey targeted university students enrolled in mandatory I&P courses at AVTC and CVTC, China. During the spring semester of 2021, in response to the nationwide COVID-19 situation, courses were delivered in fully online,

hybrid, or in-person formats, with online sessions facilitated via platforms such as ClassIn, Tencent Meetings, and other synchronous or asynchronous video conferencing tools.

Faculty provided student email addresses and granted permission to conduct the study during scheduled classes. Participants completed the survey on personal computers, either during on-campus class sessions or through remote online sessions. Instructors allocated approximately 15 minutes of class time for survey completion. During this period, researchers introduced the study, provided an overview of consent procedures, and displayed the survey link on classroom screens or via shared screens during video calls. Students indicated informed consent by clicking the "I Consent" or "I Agree" button on the Wen Juan Xing platform before proceeding. All survey data were securely stored in an encrypted Excel file.

Self-report surveys were selected based on their proven value in capturing students' perceptions of online learning experiences (Jaffee, 2003; Samaras & Freese, 2006). This method aligns with prior research exploring online learning engagement (Bates & Khasawneh, 2007). Institutional ethics approval was obtained from AVTC, ensuring adherence to ethical research standards.

Qualitative data were collected through one-on-one semi-structured interviews conducted via Tencent Meetings or similar platforms, providing flexibility and minimizing disruption to students' schedules. Interview participants were selected from the survey respondents, with appointments confirmed via email. Each interview lasted approximately 30 minutes, during which participants shared their experiences, perceptions, and reflections on online engagement, with particular attention to power relations, critical consciousness, and empowerment as informed by CP.

All interviews were audio-recorded, encrypted, and securely stored. Transcripts were generated using web-based transcription tools and carefully reviewed by the research team for accuracy and completeness. This procedure ensured that qualitative data were reliable, detailed, and aligned with the theoretical frameworks of AT, SOI, and CP.

By integrating these data collection procedures, the study systematically captured both quantitative indicators of engagement and qualitative insights into the underlying processes, enabling a rich, multi-dimensional understanding of SE in online I&P courses.

3.7 Data Management and Analysis

This section presents a detailed overview of the data management and analysis strategies employed in this research, covering both quantitative and qualitative methods and their integration. Grounded in SC, the study emphasizes how learners construct knowledge, gain experiential insights, and participate in social interactions (Jonassen, 2004). By capturing both quantitative patterns and qualitative intricacies, the study examines the relationships among learner-centered practices, cognitive processes, and institutional factors, reflecting a comprehensive and contextually sensitive approach to evaluating instructional effectiveness during and after the COVID-19 pandemic.

3.7.1 Quantitative Data Analysis procedures

The quantitative component utilizes both descriptive and inferential statistical methods to examine key engagement metrics. Survey data are initially organized and reviewed in Excel before cleaning and screening for missing values and outliers. Following this, EFA is employed to identify underlying dimensions within the survey responses. EFA

is particularly appropriate for uncovering latent constructs that cluster survey items, providing insights into SOISS, SOIST, and SOISC.

Eigenvalues will be examined to determine the number of factors to retain, focusing on factors with eigenvalues greater than one and significant item loadings. This ensures that the retained factors represent coherent constructs relevant to the study's theoretical framework. For example:

i. High loadings on SOISS items indicate strong peer collaboration.

ii. High loadings on SOIST items reflect substantial engagement with instructors.

iii. High loadings on SOISC items reveal active interaction with course content.

Through this process, the study aims to illuminate the dimensionality of online engagement and identify key factors that contribute to students' learning experiences.

Survey responses, collected on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), will be numerically coded in Excel to ensure consistency and support initial data screening. Data analysis will then be conducted using Excel and IBM SPSS Amos (IBM, n.d.), including:

i. Descriptive statistics: mean, median, standard deviation, and frequency distributions to summarize engagement levels.

ii. Inferential statistics: Kruskal-Wallis tests to assess whether significant differences exist among student subgroups (first-year, sophomore, junior cohorts).

The Kruskal-Wallis test is a non-parametric alternative suitable for Likert-scale data, which are ordinal and may not satisfy the normality assumptions required for parametric tests. In SPSS, the test is conducted via: Nonparametric Tests → Legacy Dialogs → K Independent Samples, with engagement metrics as test variables and student cohort as the grouping variable. A p-value < 0.05 indicates statistically significant differences among cohorts.

This analysis enables the study to assess how institutional rules (AT), power structures (CP), and interaction patterns (SOI) shape SE across different populations, providing a robust quantitative foundation for integration with qualitative findings.

3.7.2 Qualitative Data Analysis Procedures

The qualitative data analysis complements the quantitative findings by providing in-depth insights into students' experiences, perceptions, and engagement in online I&P courses. Grounded in AT, SOI, and CP, the analysis focuses on themes related to institutional rules, power dynamics, and interaction patterns (SOIST, SOISS, and SOISC).

All interviews conducted via Tencent Video Meeting were audio-recorded, encrypted, and transcribed verbatim. The transcripts were carefully reviewed for accuracy, with corrections and contextual notes added as needed. All materials—including transcripts, participant notes, and related documents—were organized into a centralized database to facilitate systematic coding and analysis.

The coding process was conducted in multiple stages:

i. *Descriptive Coding*: Using Saldana's (2016) approach, researchers assigned short labels or phrases to meaningful excerpts (e.g., "strict attendance policies," "teacher fairness," "peer collaboration"). These labels highlighted critical aspects of institutional rules, power relations, and social interactions, providing an initial framework for understanding how students navigate the online learning environment.

ii. *In Vivo Coding*: To preserve participants' authentic voices, in vivo coding captured direct quotations related to power, pedagogy, and empowerment (CP). Phrases such as "lack of evidence," "privacy concerns," and "feeling of belonging" retained the finer details and subtlety of students' perspectives, ensuring that critical details were not lost in interpretation.

iii. *Thematic Grouping*: Descriptive and in vivo codes were then grouped into broader themes (e.g., "teacher enforcement of course rules," "student autonomy online") to identify patterns in how participants perceive and manage power, social interactions, and learning responsibilities.

iv. *Cluster Analysis and Theme Refinement*: The coded data were imported into specialized software (e.g., ATLAS.ti) to perform cluster analysis and refine themes iteratively. Codes were organized into categories and networks reflecting participants' experiences, often connecting to AT concepts—such as digital tools' role or the division of labor between instructors and students—and SOI elements, including peer collaboration versus teacher-led activities.

By systematically organizing the data thematically, this approach links raw narratives to the study's theoretical frameworks, illuminating how rules, power relations, and social interactions influence engagement in online I&P courses. This method ensures that

qualitative findings provide a rich contextual understanding, complementing the quantitative patterns and supporting a comprehensive mixed-methods analysis.

3.7.3 Data Integration

This study employs a convergent mixed methods design to integrate quantitative survey results with qualitative interview insights (Creswell & Plano Clark, 2017). By comparing statistically significant patterns identified through EFA or Kruskal-Wallis tests with themes emerging from descriptive and NVivo coding, the study provides a comprehensive understanding of SE in online I&P courses.

Integration involves examining areas of convergence, where quantitative findings align with qualitative narratives. For example, high survey scores on SOIST may be corroborated by interview quotes describing instructors' empathetic and responsive behaviors, reinforcing confidence in the findings. Conversely, divergence occurs when moderate or low quantitative ratings contrast with enthusiastic qualitative descriptions. Such discrepancies can reveal complexities—like technological barriers, implicit power structures, or contextual challenges—that numeric measures alone may not capture.

To enhance comparability, selected qualitative codes will be quantified (Creswell & Plano Clark, 2017). For instance, references to "feeling isolated" or "instructor fairness" can be coded as binary variables (1 = code present, 0 = code absent) for statistical analysis. This allows the study to examine correlations between specific qualitative themes and quantitative engagement scores, and to compare patterns across student subgroups (e.g., high vs. low engagement). This approach aligns with CP by uncovering multiple dimensions of empowerment and AT by highlighting diverse institutional roles and rules.

A central integrative strategy involves creating joint displays, which visually juxtapose statistical results with illustrative excerpts or summarized themes. For instance, a high mean SOIST score can be paired with a participant quote illustrating instructor attentiveness. Joint displays go beyond simple side-by-side presentation by systematically linking quantitative data—such as factor loadings or engagement scores—with qualitative insights like in vivo quotes or thematic clusters. These displays enable researchers to:

i. Identify areas of agreement, reinforcing confidence in the findings.

ii. Examine contradictions, highlighting hidden factors or complexities within institutional structures, social interactions, and power dynamics.

iii. Explore outliers or unexpected patterns, revealing detailed student experiences not captured by surveys alone.

Designing effective joint displays requires careful preparation: selecting suitable visual formats (tables, matrices, or charts), labeling clearly, and connecting findings to theoretical frameworks such as teacher-learner power balances (CP) or components of the activity system (AT). This systematic approach allows meaningful comparisons across participant groups, course types, and institutional contexts, uncovering both measurable engagement trends and the narratives that shape them.

By integrating descriptive and NVivo coding, thematic organization, and cluster analysis with quantitative metrics, the study develops a rich, contextualized understanding of students' online learning experiences. This convergent design illuminates how institutional rules (AT), social interactions (SOI), and power relations (CP) collectively influence engagement in I&P courses. Ultimately, this integrative approach reveals how

learners navigate, negotiate, and reshape online educational spaces, offering insights into both the measurable and experiential dimensions of online learning.

3.8 Reliability and Validity

Ensuring reliability and validity is critical in this mixed-methods investigation of SE in online I&P courses. Given the integration of quantitative survey data and qualitative interview insights, methodological rigor is essential to maintain the accuracy, consistency, and meaningfulness of the findings. This section outlines the strategies employed to safeguard data integrity and emphasizes the role of integrated data analysis in strengthening validity assessments.

3.8.1 Reliability and Validity in Quantitative Instruments

This study employed Young and Bruce's ROCES, a validated 54-item instrument adapted from prior large-scale research (Young & Bruce, 2011). Using an established instrument provides a solid foundation for measuring online SE.

Reliability was assessed through internal consistency analysis using Cronbach's alpha coefficients for each dimension of the ROCES scale. The coefficients obtained for the dimensions—RUL (0.844), SUB (0.862), OBJ (0.739), DIV (0.772), COM (0.736), MET (0.787), SOIST (0.826), SOISS (0.793), SOISC (0.804), POR (0.793), CRC (0.808), and EMP (0.716)—all met or exceeded the commonly accepted threshold of 0.70, indicating good internal consistency. Additionally, corrected item-total correlation (CITC) values for most items within each dimension reached acceptable levels, further confirming the reliability of the scale.

To enhance validity, several measures were applied in the survey design. The 54 variables were randomized to reduce order effects and fatigue. Following Pace's (1984) criteria, the questionnaire ensured participant familiarity, used clear and concise wording, focused on recent experiences for accurate recall, encouraged thoughtful reflection, and included items that could be externally verified where possible.

Furthermore, construct validity was addressed through EFA. Patterns of item loadings onto expected factors will provide empirical evidence supporting the degree to which the adapted ROCES scale measures theoretical constructs derived from AT, SOI, and CP within this specific sample and context.

By combining these strategies—Cronbach's alpha for reliability, careful survey design for content and response validity, and EFA for construct validity—the study ensures that the quantitative data are both trustworthy and meaningful, forming a solid foundation for integrated analysis with qualitative insights.

3.8.2 Validity Considerations in Mixed Methods Research

Methodological differences and potential integration gaps present significant challenges to validity in mixed-methods research. Quantitative surveys capture numerical trends, whereas qualitative interviews provide rich, contextual, and subjective insights. Without careful examination and integration of both data types, discrepancies may arise, limiting the study's interpretive depth. Poorly integrated datasets can leave inconsistencies unaddressed, weakening the overall validity of findings.

To address these challenges, this study emphasizes coherent integration of quantitative and qualitative insights. Joint displays are employed as a powerful tool to

visually combine and present findings, facilitating clear identification of areas of convergence and divergence. Convergence occurs when numerical results align with interview narratives, thereby enhancing credibility. Conversely, divergence highlights contradictions or contrasting patterns, prompting deeper investigation into underlying factors that influence engagement.

Additionally, triangulation—through cross-checking multiple data sources—strengthens the robustness of inferences, supporting a more comprehensive and valid interpretation of SE in online I&P courses (Creswell & Plano Clark, 2017). The concept of legitimation ensures that the mixed-methods design is justified within the specific research context, reinforcing the rationale for combining quantitative and qualitative approaches. Moreover, inference quality, as defined by Teddlie and Tashakkori (2011), reflects the strength and trustworthiness of conclusions drawn from the integrated data.

By rigorously integrating datasets, this study enhances credibility, ensures methodological soundness, and maintains contextual relevance, ultimately producing interpretations that are both reliable and meaningful within the scope of online I&P learning.

3.8.3 Ensuring Reliability and Validity During Interpretation

Interpretation plays a crucial role in maintaining the reliability and validity of mixed-methods research. Beyond data collection and analysis, meaningful interpretation requires contextual awareness, systematic evaluation, and critical reflection. Researchers must connect numeric indicators to real-world conditions—such as technological limitations, institutional policies, or online learning practices—to enhance the relevance and applicability of findings.

Systematic evaluation strengthens credibility by highlighting areas where quantitative and qualitative results converge and investigating reasons for discrepancies, which may arise from sampling biases, cultural differences, or measurement limitations. Engaging in a reflective dialogue with the data enables researchers to uncover overlooked factors and better understand complex patterns, thereby enhancing the overall validity of conclusions.

In this study, a multifaceted approach ensures reliability and validity throughout interpretation. Quantitative data are collected via a validated and randomized survey instrument, while qualitative insights are rigorously analyzed using descriptive, in vivo, and thematic coding. Integrating both datasets through joint displays facilitates visualization, comparison, and reconciliation of points of agreement and divergence. These procedures align with established concepts of legitimation and inference quality, ensuring that interpretations are methodologically robust and contextually meaningful within the framework of I&P courses in higher vocational colleges.

3.8.4 Ethical Issues

Ethical considerations are fundamental throughout all stages of the research process, from planning to data collection, analysis, and dissemination (Creswell & Poth, 2018). Upholding ethical integrity requires adherence to principles of respect, transparency, and participant welfare. Following Baker and Edwards (2012), researchers should cultivate supportive and respectful relationships with participants, fostering trust that encourages honest responses while minimizing discomfort or anxiety during disclosure.

Key ethical measures in this study included:

i. *Informed Consent* – Participants were fully informed about the study's purpose, procedures, and their rights, and consent was obtained prior to participation.

ii. *Voluntary Participation* – Participation was entirely voluntary, allowing respondents to withdraw at any point without penalty.

iii. *Confidentiality and Privacy* – Participant identities were protected through anonymization of data and secure storage of digital files.

iv. *Sensitivity to Power Dynamics* – Considering the hierarchical context of I&P courses, the study mitigated risks related to institutional influence, social desirability bias, or perceived repercussions for honest feedback.

v. *Ethical Reflexivity* – Researchers continuously assessed potential risks, biases, and unintended consequences, ensuring ongoing ethical vigilance throughout the study.

By implementing these safeguards, the study maintained research integrity while prioritizing the rights and well-being of all participants. Ethical approval for this non-medical human research was granted by the Human Research Ethics Committee of Universiti Malaysia Sarawak, as documented in Appendix H.

3.8.5 Approvals and Informed Consent

This study obtained formal approval from AVTC, with multiple supervisors granting permission prior to the commencement of data collection. Participants were fully informed about the study's objectives, methods, and potential risks before providing their informed consent. They were made aware of their rights, including the ability to withdraw at any time without penalty.

Following American Psychological Association (2010) guidelines, strict measures were implemented to ensure the confidentiality of participants' identities and responses:

i. *Online Survey*: Participants were presented with a detailed informed consent form at the start of the questionnaire. They had to read and digitally click an "I Agree" or "I Consent" button to proceed, thereby confirming their voluntary participation and understanding of the study's terms.

ii. *Qualitative Interviews*: Informed consent was obtained verbally at the beginning of each session after a thorough explanation of the study. Participants then confirmed their consent via a signed digital consent form, ensuring both transparency and ethical compliance.

By implementing these procedures, the study maintained ethical integrity while fostering an environment of trust and respect for all participants, supporting both voluntary participation and the protection of sensitive data.

3.8.6 Data Confidentiality and Privacy Protections

All research data are securely stored in encrypted files on a dedicated, study-specific server. While virtual face-to-face interviews (e.g., Zoom, Tencent Meetings) cannot fully guarantee anonymity, strict measures were implemented to safeguard participant identities, including the use of pseudonyms and omission of identifiable information. Survey and interview data will be retained for five years to support the thesis process and any future professional presentations, after which data will be securely archived or destroyed. Key confidentiality and privacy measures include:

i. *Anonymization*: One month after the study's conclusion, all identifiable information—including access logs and interview transcriptions—was anonymized. Participants' real names were replaced with pseudonyms to further protect privacy.

ii. *Secure Data Access*: Access to research data is strictly limited to the immediate research team, ensuring that only authorized personnel handle sensitive information.

These measures uphold the ethical principles of confidentiality and privacy, maintaining participants' trust and the integrity of the study.

3.8.7 Consent, Transparency, and Collaboration

To promote transparency, participants were informed that the study's findings would be shared after its completion. By adhering to protocols such as informed consent, secure data storage, anonymization, and restricted data access, the study maintains high ethical standards. These measures ensure participants' rights and privacy are protected while complying with disciplinary and institutional guidelines. Additionally, the study fostered collaboration by keeping participants informed and engaged throughout the research process, thereby reinforcing trust and ethical integrity.

3.9 Pilot Study

Before the main investigation, a pilot study will be conducted to evaluate each phase of the mixed-methods design within a distance and hybrid learning setting. Five participants, representing a microcosm of the target population, will complete the questionnaire and participate in researcher-led interviews. By analyzing participants' responses to both survey questions and interview prompts, the pilot aims to refine question design, enhance clarity,

and ensure that participants can provide meaningful, in-depth perspectives on online I&P courses.

3.9.1 Data Transformation in Pilot Testing

Following Onwuegbuzie and Teddlie's (2003) rationale for converting qualitative data into quantitative form, the researchers will create dichotomous categories to indicate the presence (score = 1) or absence (score = 0) of specific themes or codes (Creswell & Plano Clark, 2017). This process is essential for constructing joint displays, which visually integrate qualitative insights—such as participants' reflections on course rules, power relations, or SOISC—with quantitative metrics, including survey scores for SOIST and SOISS. By using data transformation, the pilot study will help identify and represent these relationships more effectively, refining the analytical approach for the full-scale study.

3.9.2 Rationale for the Pilot Study

Persistent challenges in SE within I&P courses—particularly in online environments—highlight the need to refine both the research instruments and methodology. Drawing on Baker and Edwards (2012), who adopted a constructivist approach to studying online I&P education, this pilot study examines how learners (the subject, as per AT) interact with teachers and peers (SOIST, SOISS) as well as with course materials (SOISC).

These interactions are closely linked to CP's focus on power dynamics, critical inquiry, and student empowerment, particularly in fostering meaningful engagement or challenging dominant narratives. Consequently, the pilot phase is essential for identifying and addressing potential technical, organizational, or pedagogical issues before proceeding with full-scale data collection.

3.9.3 Anticipated Outcomes

The pilot study is expected to refine both survey and interview items to better capture key engagement factors, such as clarity of course rules, the influence of power relations, and the dynamics of teacher-student collaboration. Feedback from participants will determine whether the items effectively measure core constructs, including mediating tools and SOIST, ensuring the final instruments yield meaningful and reliable data.

The pilot will also confirm that quantitative and qualitative components work together seamlessly, allowing joint displays to highlight areas of convergence and divergence in the findings. Additionally, it will help identify potential biases, such as leading questions or culturally insensitive language, which could affect data interpretation.

Insights gained from the pilot will further guide the management of large-scale data collection, addressing technical challenges with online platforms and clarifying potential misunderstandings of survey or interview items. The study will examine whether online I&P courses foster specific types of interactions, particularly concerning divisions of labor and power structures that may impede SE.

Ultimately, the pilot provides a solid foundation for the full-scale study. By integrating AT, SOI framework, and CP principles, it ensures that both quantitative and qualitative methods are optimized to explore the complexities of SE, learning activities, power dynamics, and CP in online learning contexts.

3.10 Chapter Summary

Chapter 3 presents the methodological framework for examining SE in online I&P courses at higher vocational colleges. The study employs a convergent parallel mixed methods design, grounded in constructivism and dialectical pluralism, to integrate quantitative and qualitative data for a comprehensive understanding of the research questions. The theoretical foundation includes AT, SOI, and CP, highlighting how rules, power structures, and social dynamics influence the learning experience.

The convergent parallel design was selected for its ability to achieve triangulation, complementarity, and completeness, thereby enhancing the validity and reliability of findings. Participants were recruited from AVTC and other selected institutions in Anhui Province, focusing on students enrolled from 2019 onward to ensure prior experience with online or hybrid I&P courses. The quantitative phase targeted a sample size of N=377, while n=30 students participated in in-depth qualitative interviews.

Data collection utilized a validated 54-item scale adapted from the ROCES to measure engagement across SOIST, SOISS, and SOISC. Semi-structured interviews conducted via Tencent Classroom provided deeper insights into students' experiences and perceptions of online learning. Quantitative data analysis included EFA and Kruskal-Wallis tests, while qualitative data was analyzed using thematic analysis, descriptive coding, and in vivo coding. Integration was achieved through joint displays and data transformation, allowing comparison and synthesis of quantitative and qualitative findings.

Reliability and validity were strengthened through randomized item presentation, internal consistency checks, triangulation, and critical reflection. Ethical considerations were

rigorously addressed via institutional approvals, informed consent, and strict data confidentiality protocols. The researcher's role as a practitioner in I&P courses was acknowledged, and strategies such as reflexivity, triangulation, and transparency were employed to alleviate potential biases.

A pilot study was conducted to refine instruments and procedures, ensuring that both quantitative and qualitative methods were optimized for accuracy and depth.

Overall, Chapter 3 provides a comprehensive and transparent account of the study's methodology, demonstrating the rigor and careful planning undertaken to explore the complexities of SE in online I&P courses.

CHAPTER 4

MEASUREMENT MODEL AND DATA ANALYSIS

4.1 Overview

This chapter presents the measurement model used to examine SE in online I&P courses, detailing the definition of variables, constructs, and the formulation of hypotheses. Building on the research methodology and design outlined in Chapter 3, the chapter also explains the data analysis techniques applied to both quantitative and qualitative data and how these are integrated. It bridges the theoretical framework of the study with practical analytical procedures, offering a transparent explanation of how the research questions are addressed through empirical evidence.

4.2 Model Variables and Constructs

During the COVID-19 pandemic, online I&P courses in higher vocational institutions became a primary method for delivering I&P education. To thoroughly examine the factors affecting SE in these courses, this study develops a multidimensional model grounded in prior literature and empirical survey data. The model is based on AT, SOI, and CP, as discussed in Chapter 2, and was refined using preliminary EFA on survey data to verify empirical distinctiveness and grouping of variables. The model comprises 12 key variables, categorized into multiple layers:

i. *Rules*: Measures the clarity and enforcement of course tasks, rules, and assignment submission requirements.

ii. *SOIST*: Captures the instructor's role in course organization, classroom management, active engagement in discussions, and timely feedback.

iii. *Subject (Student)*: Examines students' active participation, learning attitudes, self-management skills, and goal-setting behaviors.

iv. *Object (Course Objectives and Tools)*: Assesses the achievement of learning objectives and the effectiveness of online tools in supporting task completion.

v. *SOISC*: Analyzes how students engage with course materials through discussion, assignment submission, and regular study.

vi. *SOISS*: Reflects peer communication, mutual assistance, experience sharing, and collaborative learning.

vii. *Mediating Tools*: Evaluates the technical support provided by the online platform, including mastery of communication tools and the user-friendliness of the digital interface.

viii. *Communities (Learning Community)*: Highlights teacher support, feedback, and opportunities for expanding students' social networks through online interactions.

ix. *Division of Labor*: Examines the allocation of roles and responsibilities among instructors, students, and technical support teams, ensuring smooth course progression.

x. *Power Relations*: Analyzes the distribution of power, influence, and student voice in the online classroom.

xi. *Critical Consciousness*: Measures students' sensitivity, reflection, and critical thinking regarding sociopolitical issues.

xii. *Empowerment*: Captures students' ability to participate in decision-making, engage in social practice, and enhance their personal development through learning.

The model is organized into four distinct levels, reflecting the progression from foundational support to transformative outcomes:

i. *Foundational Support Level*: Rules (RUL), Division of Labor (DIV), and Mediating Tools (MET) — ensures a clear and structured learning environment.

ii. *Individual and Course Level*: Subject (SUB) and Object (OBJ) — focuses on learner motivation, engagement, and task-related behaviors.

iii. *Interaction Level*: SOIST, SOISS, SOISC, and Community (COM) — emphasizes information exchange, collaboration, and knowledge internalization.

iv. *Power and Outcome Level*: Power Relations (POR), Critical Consciousness (CRC), and Empowerment (EMP) — recognizes that fair power distribution supports critical thinking and personal agency, reflecting the transformative goals of CP.

This model is designed for SEM to test hypothesized relationships and pathways, examining how different levels of variables collectively influence SE and learning outcomes in online I&P education. It serves both as a theoretical framework for understanding online learning engagement during the pandemic and as a practical tool for improving the effectiveness of online I&P courses.

Tables 4.1 and 4.2 provide detailed operationalization of the model:

i. *Table 4.1*: Maps each of the 12 variables to hierarchical levels, survey items, and main scholarly sources, ensuring transparency, replication potential, and construct validity.

ii. *Table 4.2*: Offers a comprehensive overview of the hierarchical structure and variable classifications.

This detailed mapping establishes a strong academic foundation for the planned SEM analysis and supports a rigorous investigation of SE dynamics.

Table 4.1: Model Constructs and Item Classification (12 Variables)

No	Component (Variable)	Model Level	Definition	Item Nos.	Primary Sources
1	RUL	Foundational Support Level.	The clarity and enforcement of tasks, rules, and submissions in online courses.	1, 2, 3, 4,5,6	Liu (2021); Wang (2023)
2	SUB (Student)	Foundational Support Level.	Students' active participation, learning attitudes, self-management skills, and goal-setting behaviors.	7, 8, 9, 10, 11, 12, 13, 14,	Liu (2021); Schumacher (2018); Leaston (2024); Ugwu (2024)
3	OBJ (Course Objectives and Tools)	Foundational Support Level.	Course objective attainment and the support of online tools (e.g., LMS, video conferencing) for task completion.	15,16, 17	Leaston (2024); Ugwu (2024)
4	DIV	Foundational Support Level.	The allocation and synergy of roles among teachers, students, and technical support in online learning.	18, 19, 20,21	Cheng (2024); Chin (2024)
5	COM (Learning Community)	Interaction Level.	Teacher support, feedback impact, and opportunities for social networking through online interactions.	22, 23,24	Suttle (2010); Ugwu (2024)

Table 4.1 continued

6	MET	Foundational Support Level.	Technical support, proficiency in communication tools, and ease of digital navigation.	25, 26,27,28	Chen (2015); Leaston (2024)
7	SOIST	Interaction Level.	The instructor's role in course organization, classroom management, discussions, and feedback.	29, 30, 31, 32, 33	Liu (2021)
8	SOISS	Interaction Level.	Communication, mutual assistance, experience sharing, and collaborative learning among students.	34, 35, 36, 37	Liu (2021)
9	SOISC	Interaction Level.	SE with course materials through discussions, timely submissions, and prompt content review.	38, 39, 40, 41, 42	Liu (2021)
10	POR	CP and Outcomes Level.	The distribution of power, influence, and expression opportunities between teachers and students online.	43, 44, 45, 46, 47	Kuo et al. (2014); Martin & Bolliger (2018); Tian (2021); Zhang (2023)

Table 4.1 continued

11	CRC	CP and Outcomes Level.	The development of students' sociopolitical awareness, reflective thinking, and critical analysis skills.	48, 49, 50, 51	Martin & Bolliger (2018); Wang (2023); Zhang (2023)
12	EMP	CP and Outcomes Level.	The extent to which students feel valued, engage in decision-making, and participate in social practice to enhance their agency.	52,53,54	Martin & Bolliger (2018); Yang (2023)

Table 4.2: Overall Model Hierarchical Structure and Variable Classification

No	Model Level	Included Constructs (Variables)	Explanation
1.	Foundational Support Level	RUL, DIV, and MET	These elements clarify course tasks and rules while ensuring stable technical support, forming a solid foundation for learning.
2.	Individual and Course Level	SUB, and OBJ	This level represents students' attributes and course objectives, highlighting how they engage with and comprehend the content. Analytically, it focuses on individual learner characteristics and the fulfillment of instructional goals.
3.	Interaction Level	SOIST, SOISC，SOISS,and COM	Emphasizes various interactions (teacher－student, student－student, student－content, and community support) that foster information exchange, collaboration, and knowledge internalization, aligning with Moore's (1989) interaction types. Analytically, this level captures the dynamic interplay between learners, instructors, content, and the broader learning community.

Table 4.2 continued

4.	CP and Outcomes Level	POR, CRC, and EMP	This level integrates power dynamics with critical consciousness and empowerment, reflecting how an equitable classroom environment fosters the development of higher-order critical thinking and personal agency, as theorized in CP. Analytically, it examines the transformative aspects of learning and the development of students' critical agency.

4.3 Definitions of Model Constructs

The proposed model is organized around three first-order constructs—AT, CP, and SOI—which together form a comprehensive hierarchical framework for analyzing SE in online I&P courses.

AT establishes the foundational structure of the model, integrating six key subcomponents (illustrated in Figure 4.1). These subcomponents define the organizational and functional aspects of the learning system, including rules, mediating tools, division of labor, subjects, objects, and communities. AT provides a lens to examine how institutional structures, course design, and tools influence SE and behavior.

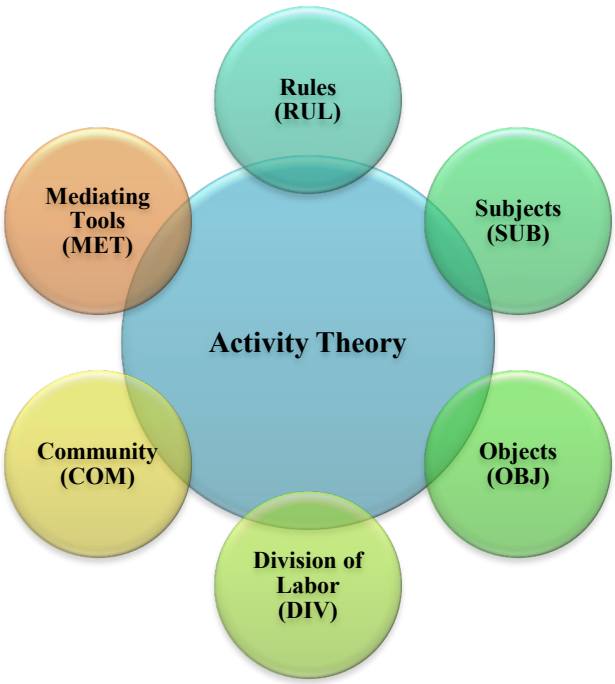


Figure 4.1: Activity Theory Model Construct

CP emphasizes principles that shape awareness, equity, and transformative action (refer Figure 4.2). This construct examines power relations, critical consciousness, and

empowerment, highlighting how fair power distribution and reflective practices influence student agency, decision-making, and capacity for social engagement within the online learning environment.

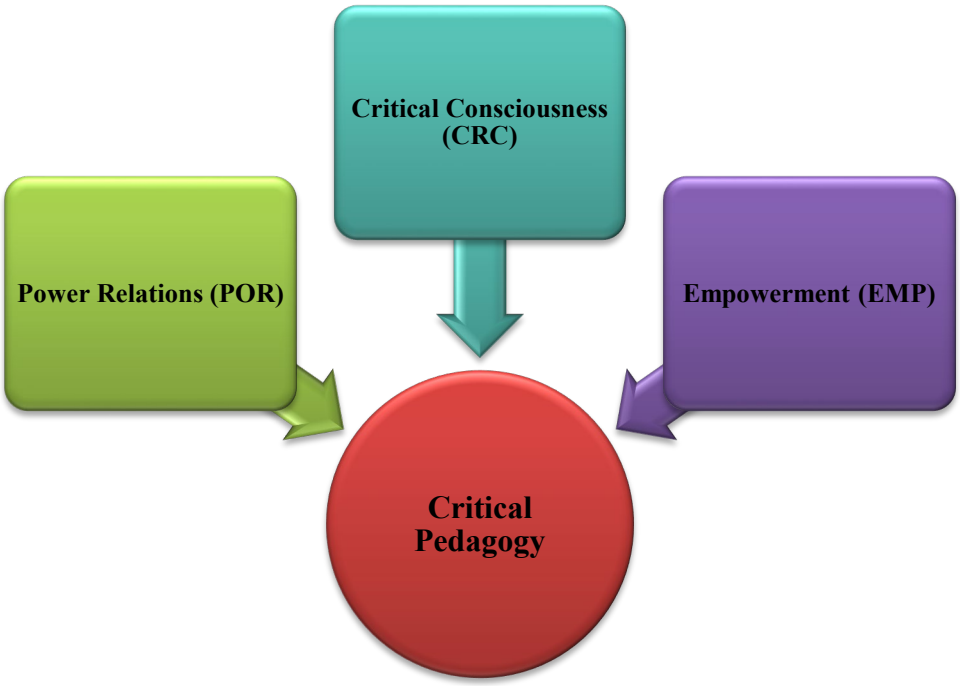


Figure 4.2: Critical Pedagogy Model Construct

SOI captures the relational and communicative dimensions of learning, subdivided into three components—SOIST, SOISS, and SOISC (refer to Figure 4.3). SOI focuses on the ways students engage with instructors, peers, and course materials, emphasizing collaboration, communication, and knowledge internalization.

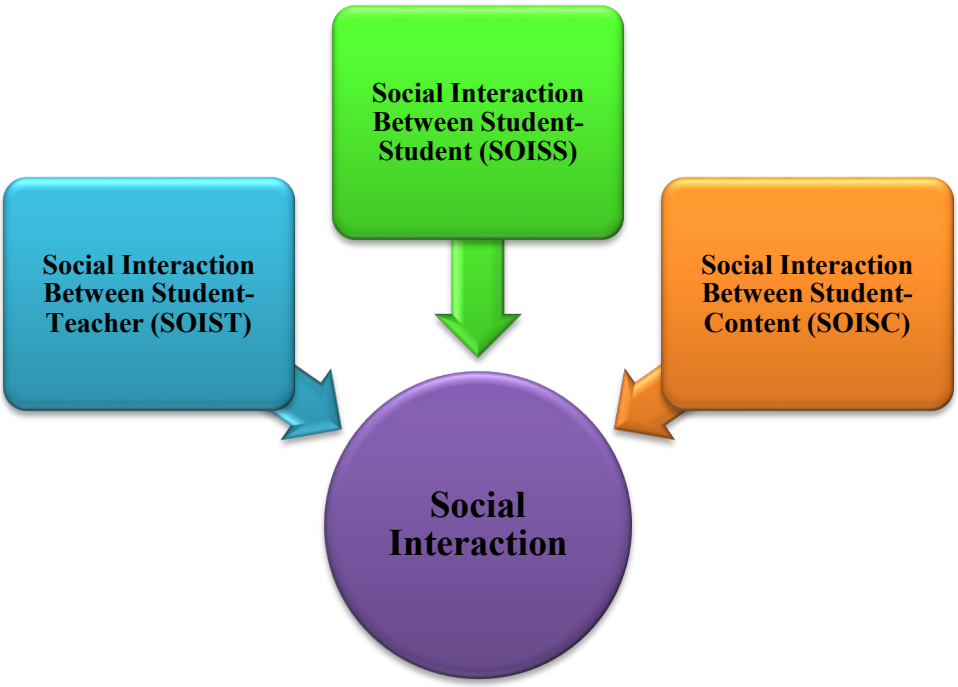


Figure 4.3: Social Interaction Model Construct

By clearly defining each construct and its subdivisions, the model clarifies the interrelationships between components and provides a structured framework for understanding the complex dynamics of online learning engagement.

For a comprehensive list of operational definitions and measurement details, refer to Table 4.3, which maps each construct and subcomponent to specific survey items, theoretical foundations, and empirical indicators.

Table 4.3: Model Constructs' Definitions

No	Author(s)/Year	First-Order Theories	Construct	Explanation
1	Cheng (2024); Chin (2024)	AT	RUL	The allocation of responsibilities among students, instructors, and support staff, defining their roles and expected contributions.
2	Leaston (2024); Ugwu (2024)	AT	SUB	The I&P course content, learning objectives, and assessments that define student learning outcomes.
3	Leaston (2024); Liu (2021); Schumacher (2018); Ugwu (2024)	AT	OBJ	The students enrolled in the online I&P course, encompassing their demographics, prior learning experiences, and motivations.
4	Kuo et al (2014); Martin & Bolliger (2018); Tian (2021); Zhang (2023)	AT	DIV	The allocation of authority, influence, and control in the online environment, encompassing teacher–student hierarchies, peer dynamics, and student ownership of learning.
5	Liu (2021); Wang (2023)	AT	COM	The formal and informal guidelines, norms, and expectations that regulate student behavior and interactions in the online course.
6	Leaston (2024)	AT	MET	Technological resources, platforms, and communication tools that enable online learning and support SE (e.g., LMS, email, video conferencing).

Table 4.3 continued

7	Liu (2021)	SOI	SOIST	The communication channels and relational dynamics between instructors and students, including feedback, Q&A sessions, and support, which influence learning motivation and satisfaction.
8	Liu (2021)	SOI	SOISS	The collaboration, mutual assistance, and peer discussions among students that foster shared knowledge building and community formation.
9	Liu (2021)	SOI	SOISC	The depth and frequency of students' engagement with course materials, including readings, videos, and assignments.
10	Martin & Bolliger (2018); Yang (2023)	CP	POR	The agency, autonomy, and capacity for action students develop through active participation, enabling them to apply knowledge to social or political challenges.
11	Martin & Bolliger (2018); Wang (2023); Zhang (2023)	CP	CRC	The enhancement of students' critical thinking skills, enabling them to analyze social and political perspectives, question dominant narratives, and reflect on real-world implications.

Table 4.3 continued

12	Suttle (2010); Ugwu (2024)	CP	EMP	The online learning community, encompassing relationships and interactions among students, instructors, and broader institutional or community stakeholders.

4.4 Assessing Multivariate Assumptions

After data cleaning, it is essential to verify the statistical assumptions underlying multivariate analysis. Assumption testing is necessary for two main reasons: (1) the presence of complex correlations among multiple variables may introduce distortions and biases, and (2) the complexity of multivariate analyses can obscure violations that would be more easily detected in simpler univariate analyses (Hair et al., 2018). In this study, assessing normality and multicollinearity is critical, as violations of these assumptions can lead to biased parameter estimates and invalid conclusions (Meyers et al., 2017).

4.4.1 Normality

Normality assessment is particularly important when using covariance-based SEM tools such as AMOS, which rely on distributional assumptions. Hair et al. (2020) recommend evaluating both skewness and kurtosis to determine the extent to which the data approximate a normal distribution.

In this study, normality was assessed using cleaned datasets with outliers removed. Both univariate and multivariate normality were examined:

i. Univariate normality: Skewness and kurtosis values for each variable were calculated to assess individual distributions. Acceptable ranges were evaluated following guidelines from Tabachnick and Fidell (2019).

ii. Multivariate normality: Mardia's tests for multivariate skewness and kurtosis were conducted to assess the joint distribution of variables. The results of these tests are presented in Table 4.4, alongside the univariate skewness and kurtosis values for all variables.

Ensuring normality allows the SEM analysis to produce reliable and unbiased estimates, supporting the validity of the study's conclusions regarding SE in online I&P courses.

Table 4.4: Mardia's Multivariate Skewness and Kurtosis

No		b	p-value
1.	Skewness	20.33881	0.001
2.	Kurtosis	209.19896	0.001

Output of skewness and kurtosis calculation

```
Sample size:  611
Number of variables:  12

Univariate skewness and kurtosis
      Skewness SE_skew  Z_skew Kurtosis SE_kurt Z_kurt
COM     -1.090   0.099 -11.028    0.585   0.197  2.965
CRC     -1.045   0.099 -10.576    0.313   0.197  1.585
DIV     -1.151   0.099 -11.639    1.005   0.197  5.090
EMP     -1.045   0.099 -10.575    0.563   0.197  2.854
MET     -0.951   0.099  -9.618    0.155   0.197  0.785
OBJ     -0.945   0.099  -9.560    0.164   0.197  0.832
POR     -1.113   0.099 -11.257    0.782   0.197  3.960
RUL     -1.177   0.099 -11.905    0.602   0.197  3.051
SOISC   -1.111   0.099 -11.241    0.574   0.197  2.910
SOISS   -1.106   0.099 -11.192    0.566   0.197  2.866
SOIST   -1.087   0.099 -11.000    0.398   0.197  2.018
SUB     -1.183   0.099 -11.972    0.662   0.197  3.352

Mardia's multivariate skewness and kurtosis
                b         z p-value
Skewness  20.33881 2071.1687       0
Kurtosis 209.19896   27.7784       0
```

Figure 4.4: Univariate Skewness and Kurtosis

As recommended by Hair et al. (2017), univariate skewness and kurtosis were assessed for all variables (refer Figure 4.4). The analysis indicated that the data did not

meet multivariate normality assumptions, as evidenced by Mardia's multivariate skewness ($\beta = 20.33881$, $p < 0.01$) and Mardia's multivariate kurtosis ($\beta = 209.19896$, $p < 0.01$). These results confirm that the dataset is not normally distributed. Consequently, a non-parametric or robust analysis approach is required, as the violation of normality assumptions limits the validity of parametric SEM tests in AMOS.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
RUL	.206	611	<.001	.867	611	<.001
SUB	.192	611	<.001	.873	611	<.001
OBJ	.214	611	<.001	.893	611	<.001
DIV	.195	611	<.001	.889	611	<.001
COM	.222	611	<.001	.882	611	<.001
MET	.184	611	<.001	.901	611	<.001
SOIST	.189	611	<.001	.883	611	<.001
SOISS	.188	611	<.001	.882	611	<.001
SOISC	.195	611	<.001	.887	611	<.001
POR	.176	611	<.001	.897	611	<.001
CRC	.190	611	<.001	.889	611	<.001
EMP	.208	611	<.001	.889	611	<.001

a. Lilliefors Significance Correction

Figure 4.5: Test of Normality

As shown in Figure 4.5, both the Kolmogorov-Smirnov and Shapiro-Wilk tests yielded statistically significant results for all variables ($p < .001$). Specifically, the Kolmogorov-Smirnov statistic ranged from 0.176 to 0.222, and the Shapiro-Wilk statistic ranged from 0.867 to 0.901, with all corresponding p-values below 0.001. These results indicate a significant departure from normality for all variables. The consistent rejection of the null hypothesis of normality across both tests strongly suggests that the data does not conform to a normal distribution. This non-normality may be attributed to skewness,

kurtosis, or the presence of outliers within the dataset.

Given the observed non-normality, the use of parametric statistical tests that assume normality may be inappropriate. Therefore, alternative non-parametric methods or data transformations have been considered to ensure the robustness and validity of subsequent analyses. For instance, the Kruskal-Wallis test was employed for group comparisons. Visual inspections of histograms, boxplots, and Q-Q plots (presented in Appendix G) further support these findings, visually demonstrating the departure from normality.

4.4.2 Multicollinearity

Another key assumption in multivariate analysis is the absence of multicollinearity among independent variables. Multicollinearity occurs when predictors are highly correlated, which can obscure the interpretation of each variable's contribution to the variance explained in the dependent variable. It may also cause variables that are individually significant to appear non-significant or even reverse the direction of path coefficients when analyzed together (Hair et al., 2018).

A full collinearity test was conducted to assess whether any constructs exhibited problematic correlations, using the variance inflation factor (VIF) criterion of ≤ 5 (Kock & Lynn, 2012). Tolerance and VIF values, derived from regression results in SPSS v29, are presented in Table 4.5. For this analysis, SE was treated as the dependent variable. Results indicate that tolerances ranged from 0.588 to 0.792, well above the critical threshold of 0.1, and VIF values ranged from 1.262 to 1.700, well below the recommended maximum of 3.3. According to Hair et al. (2018) and Pallant (2010), these values confirm low multicollinearity and suggest that the independent variables are suitable for inclusion in the regression and SEM analyses.

Table 4.5: Full Collinearity

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)				11.510	<.001		
	RUL	.063	.031	.103	2.051	.041	.590	1.695
	SUB	.055	.034	.083	1.636	.102	.576	1.735
	OBJ	-.046	.027	-.084	-1.740	.082	.643	1.555
	DIV	.018	.029	.029	.616	.538	.669	1.495
	COM	.036	.027	.065	1.356	.175	.644	1.553
	MET	.025	.029	.043	.881	.379	.623	1.606
	SOIST	-.080	.027	-.135	-2.981	.003	.724	1.382
	SOISS	-.061	.027	-.105	-2.264	.024	.696	1.437
	SOISC	-.095	.030	-.151	-3.165	.002	.652	1.533
	POR	.020	.030	.031	.675	.500	.701	1.426
	CRC	.054	.026	.094	2.021	.044	.683	1.463
	EMP	-.043	.026	-.073	-1.654	.099	.762	1.312

4.5 Hypotheses for Online I&P Course Engagement

This section presents the theoretical foundations and hypothesized relationships among the key dimensions of online I&P course engagement—Rules (RUL), Subject (SUB), Object (OBJ), Division of Labor (DIV), Communities (COM), Mediating Tools (MET), Social Interaction Between Student–Teacher (SOIST), Social Interaction Between Student–Student (SOISS), Social Interaction Between Student–Content (SOISC), Power Relations (POR), Critical Consciousness (CRC), and Empowerment (EMP)—within the broader frameworks of AT, SOI, and CP.

i. ***Rules (RUL)***: Rules provide structure and clarity in the learning environment, forming a core dimension of AT. Transparent and consistently enforced rules are hypothesized to shape social interactions and foster an environment conducive to critical reflection and meaningful engagement.

ii. ***Subject (SUB)***: Subject represents individual learner characteristics, including self-regulation, motivation, and goal-setting. Strong learner self-management is expected to enhance engagement in social interactions and facilitate higher-order cognitive processes, including critical thinking and analysis.

iii. ***Object (OBJ)***: Object pertains to course content and learning objectives. Well-structured materials aligned with learner goals are hypothesized to drive participation in social interactions and stimulate critical analysis of course concepts.

iv. ***Division of Labor (DIV)***: Division of Labor concerns the allocation of roles among students, instructors, and support staff. Clearly defined responsibilities are expected

to promote structured collaboration, ensure diverse perspectives, and positively influence both social and critical learning dimensions.

v. ***Communities***: A strong sense of community is essential in online learning contexts. Community is hypothesized to encourage social interaction, collaborative engagement, and critical discourse, supporting knowledge co-construction among learners.

vi. ***Mediating Tools (MET)***: Mediating Tools encompass the technological platforms and Mediating Tools include technological platforms and resources that facilitate online learning. User-friendly and functional tools are expected to enhance communication, collaboration, and structured opportunities for critical engagement.

vii. ***Social Interaction Between Student–Teacher (SOIST)***: Student-Teacher social Student–Teacher interaction captures communication quality, feedback, and instructional support. High-quality interactions are hypothesized to foster learner engagement, autonomy, and critical thinking.

viii. ***Social Interaction Between Student–Student (SOISS)***: Student–Student interaction focuses on peer engagement and collaborative learning. Frequent and meaningful peer interactions are expected to reinforce knowledge exchange, promote critical discussions, and enhance collective learning outcomes.

ix. ***Social Interaction Between Student–Content (SOISC)***: Student–Content interaction concerns how learners engage with course materials. Active engagement with content is hypothesized to deepen conceptual understanding, enhance cognitive involvement, and strengthen analytical thinking.

x. ***Power Relations (POR)***: Power Relations examine authority dynamics within the online classroom. Balanced power distribution is expected to encourage participatory engagement, facilitate open discussions, and create inclusive spaces that promote critical thought and collaborative learning.

xi. ***Critical Consciousness (CRC)***: Critical Consciousness reflects students' ability to critique dominant narratives and apply reflective insights. Learning environments that support critical reflection are hypothesized to stimulate dynamic discussions and empower students to translate knowledge into real-world applications.

xii. ***Empowerment (EMP)***: Empowerment relates to learners' autonomy, agency, and decision-making capacity. Empowered students are expected to demonstrate higher engagement, persistence in collaborative tasks, and proactive application of knowledge, fostering meaningful participation and critical engagement.

In a nutshells, Table 4.6 systematically maps the relationships among AT, SOI, and CP, illustrating how these dimensions interact to influence engagement and learning outcomes in online I&P courses. These hypotheses establish a conceptual framework for investigating the roles of structured learning environments, social interactions, and critical engagement in vocational education.

Table 4.6: Hypothesized Relationships Between AT, SOI, and CP in Online I&P Course Engagement

No	Hypothesis (H)		Explanation
1.	H1	There are significant differences in overall student SOI across first, second, and third-year students in online I&P courses.	This hypothesis examines how students' academic year may affect their SOI engagement in online learning.
2.	H2	There is a significant positive relationship between SE and AT in online I&P courses within vocational colleges.	Students' emotional, cognitive, and behavioral engagement shapes their participation in rule-governed, tool-mediated learning activities in AT.
3.	H3	There is a significant positive relationship between SE and CP in online I&P courses within vocational colleges.	Higher SE promotes reflective dialogue, challenges to power structures, and the development of critical consciousness, key to CP in online learning.
4.	H4	There is a significant positive relationship between SE and SOI in online I&P courses within vocational colleges.	Highly engaged students initiate and sustain richer peer, instructor, and content interactions, core to SOI and driven by emotional, behavioral, and cognitive involvement.

4.6 Content Validity

Content validity refers to the extent to which an instrument's items accurately and comprehensively represent the construct being measured. In this study, both the quantitative questionnaire and qualitative interview prompts for assessing online I&P course engagement were developed using a multi-step process to ensure maximal content validity.

Initially, items were adapted from established research (Liu, 2021; Leaston, 2024; Ugwu, 2024), ensuring alignment with recognized dimensions of engagement, including RUL, SUB, OBJ, DIV, COM, MET, and others. By grounding the instrument in prior theoretical and empirical work, it captured a wide spectrum of factors influencing SE in online learning.

Subject matter experts assessed each item and interview prompt for relevance—how well it reflected the intended construct—and clarity—how unambiguous the wording was. Feedback led to several refinements, including:

i. Merging redundant items.

ii. Rewriting vague or abstract language.

iii. Specifying behaviors or observable outcomes (e.g., changing "complete all assigned class work" to "consistently submit assignments on time").

Proposed changes were documented in comparative "before and after" tables. For example, quantitative edits included replacing phrases such as "put in much effort" with "invest significant effort" and emphasizing "easy to follow" guidelines instead of "very

clear.” These modifications ensured each item was conceptually precise and linguistically clear, minimizing potential misinterpretation.

Each revised item was explicitly mapped to its corresponding construct. For instance:

i. SOIST: “The schedule of online I&P courses provided by the teacher is very organized,” highlighting instructor organization.

ii. SUB: “I actively participate in I&P online learning activities and strive to complete online learning tasks,” reinforcing student autonomy and motivation.

Through this systematic approach, the instrument achieved comprehensive coverage of key engagement dimensions—from RUL, which guides online course behavior, to EMP, assessing students’ perceived agency and empowerment.

Furthermore, terminology adjustments (e.g., "political education" → "ideological and political") ensure consistency with course terminology. Pronoun shifts (e.g., "you" → "I") standardize responses to first-person for clarity. Compound questions were split into separate items (e.g., MET-1 and MET-2) to improve measurement precision. Redundant phrases (e.g., "and with care") were removed to streamline items. Constructs (e.g., SOI, SUB) were aligned with thematic categories for analysis coherence.

Specific modifications to quantitative and qualitative items are detailed in Appendix C (Modified Quantitative Items) and Appendix D (Modified Qualitative Items). The final questionnaire is presented in Appendices E and F, providing full transparency of instrument development. Appendix E illustrates examples of modifications, linking each item’s internal

tracking number (“No.”) to its construct label (e.g., RUL-1), corresponding to the complete item numbering (1–54) detailed in the final questionnaire.

The revision process followed a systematic approach to enhance conceptual clarity, focus, and measurement reliability:

i. Questions were reorganized to align with core research themes, ensuring coherent flow.
ii. Redundant items on feedback formats and platform usage frequency were simplified to reduce participant fatigue.
iii. Complex questions were split to clarify variables such as motivation, interest, and interaction.
iv. Abstract questions were replaced with concrete scenarios to improve empirical reliability.
v. A new research question was added to explore alignment between qualitative and quantitative data, enriching the study’s mixed-methods design.
vi. Sensitive questions regarding grades were removed, with academic outcomes assessed indirectly through qualitative feedback to minimize bias and enhance objectivity.

Collectively, these steps ensure that the instrument accurately represents the full spectrum of online I&P course engagement, strengthening the content validity and empirical rigor of both the quantitative and qualitative measures.

4.7 Pilot Test

This pilot study focuses primarily on measuring SE, investigating how vocational college students participated in I&P courses during the pandemic. By examining students' motivation, classroom interaction, and the impact of these courses on their I&P literacy under online teaching conditions, the research collected 52 valid responses via an online questionnaire. The data encompass multiple dimensions of SE, including learning behaviors, classroom experiences, interactive participation, and overall outcomes.

This report analyzes the pilot test data, focusing on 12 variable groups to evaluate their reliability (Reliability Analysis) and variable characteristics (Item Total Statistics). The key areas of analysis include:

i. Cronbach's Alpha – used to assess the internal consistency of variable groups.
ii. The influence of individual variables – mean, variance, and correlation after variable deletion.
iii. Overall data quality assessment.

4.7.1 Reliability Analysis of the 12 Variable Groups

Cronbach's Alpha is used to evaluate the internal consistency of each variable group:

i. $\geqslant$ 0.9: Excellent reliability

ii. 0.8-0.9: Good reliability

iii. 0.7-0.8: Acceptable reliability

iv. < 0.7: May require optimization

All variable groups in Table 4.7 have a Cronbach's Alpha of 0.8 or higher, indicating strong data reliability. The SUB variable group (0.961) shows the highest reliability, demonstrating the most outstanding consistency in measurement. The COM variable group (0.821) has the lowest reliability but still qualifies as "good."

Table 4.7: Reliability Analysis of 12 Variable Groups

No	Variable Group	Cronbach's Alpha	Number of Items	Reliability Evaluation
1.	RUL	0.894	6	Good
2.	SUB	0.961	8	Excellent
3.	OBJ	0.948	3	Excellent
4.	DIV	0.938	4	Excellent
5.	COM	0.821	3	Good
6.	MET	0.937	4	Excellent
7.	SOIST	0.902	5	Excellent
8.	SOISS	0.937	4	Excellent
9.	SOISC	0.922	5	Excellent
10.	POR	0.928	5	Excellent
11.	CRC	0.898	4	Good
12.	EMP	0.916	3	Excellent

4.7.2 Detailed Data Analysis For 12 Variable Groups

i. **Pilot Test Data Analysis for the Rules Variable Group:**

As shown in Tables 4.8 and 4.9, the reliability analysis of the RUL (RUL 1–6) variable set, comprising six items, yielded a Cronbach's Alpha of 0.894, indicating high internal consistency. Corrected item-total correlations ranged from 0.552 to 0.804, all within acceptable limits. Analysis of "Cronbach's Alpha if Item Deleted" shows that removing any single item maintains overall reliability between 0.860 and 0.899, indicating that no item adversely affects the scale. Thus, the instrument demonstrates strong internal consistency and stability, with no items requiring removal.

Table 4.8: Reliability Statistics (RUL)

Cronbach's Alpha	**N of Items**
0.894	6

Table 4.9: Item Total Statistics (RUL)

No	**Item**	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item Total Correlation**	**Cronbach's Alpha if Item Deleted**
1.	RUL -1	22.8269	6.185	0.785	0.866
2.	RUL -2	22.8846	5.712	0.804	0.860
3.	RUL-3	22.8077	5.845	0.756	0.868
4.	RUL -4	22.7308	6.201	0.687	0.879
5.	RUL -5	22.7308	6.554	0.552	0.899
6.	RUL -6	22.8462	6.054	0.720	0.874

ii. **Pilot Test Data Analysis for the Subject Variable Group:**

As shown in Tables 4.10 and 4.11, the reliability analysis of the SUB 7–14 variable set, comprising eight items, yielded a Cronbach's Alpha of 0.961, indicating exceptionally high internal consistency. Corrected item-total correlations ranged from 0.779 to 0.900, reflecting strong alignment of each item with the overall scale. "Cronbach's Alpha if Item Deleted" values ranged from 0.953 to 0.961, showing that removing any item has minimal effect on reliability. Thus, the scale demonstrates excellent internal consistency and stability, with no items requiring removal.

Table 4.10: Reliability Statistics (SUB)

Cronbach's Alpha	**N of Items**
0.961	8

Table 4.11: Item Total Statistics (SUB)

No	**Item**	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item Total Correlation**	**Cronbach's Alpha if Item Deleted**
1.	SUB -1	31.1538	17.741	0.779	0.961
2.	SUB -2	31.0769	18.151	0.831	0.957
3.	SUB -3	31.2115	17.386	0.854	0.956
4.	SUB -4	31.3077	16.413	0.877	0.956
5.	SUB -5	31.0962	18.245	0.863	0.956
6.	SUB -6	31.1538	18.094	0.896	0.954

Table 4.11 continued

7.	SUB -7	31.2692	17.416	0.861	0.956
8.	SUB -8	31.1731	17.126	0.900	0.953

iii. **Pilot Test Data Analysis for the Object Variable Group:**

As shown in Tables 4.12 and 4.13, the reliability analysis of this three-item scale yielded a Cronbach's Alpha of 0.948, indicating very high internal consistency. Corrected item-total correlations ranged from 0.873 to 0.908, and "Cronbach's Alpha if Item Deleted" values ranged from 0.912 to 0.940, showing that removing any item does not significantly affect reliability. Overall, the scale demonstrates excellent internal consistency and stability, with no items requiring removal.

Table 4.12: Reliability Statistics (OBJ)

Cronbach's Alpha	**N of Items**
0.948	3

Table 4.13: Item Total Statistics (OBJ)

No	**Item**	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item Total Correlation)**	**Cronbach's' alpha if Item Deleted)**
1.	OBJ -1	8.8462	1.623	0.908	0.912
2.	OBJ -2	8.8462	1.741	0.873	0.940

Table 4.13 continued

3.	OBJ -3	8.9615	1.449	0.905	0.919

iv. **Pilot Test Data Analysis for the Division of Labor Variable Group:**

As shown in Tables 4.14 and 4.15, the reliability analysis of this four-item scale yielded a Cronbach's Alpha of 0.938, indicating high internal consistency. Corrected item-total correlations ranged from 0.814 to 0.932, demonstrating strong alignment of each item with the overall scale. "Cronbach's Alpha if Item Deleted" values ranged from 0.897 to 0.933, showing that removing any item has minimal impact on reliability. Overall, the scale exhibits strong internal consistency, with no items requiring removal.

Table 4.14: Reliability Statistics (DIV)

Cronbach's Alpha	**N of Items**
0.938	4

Table 4.15: Item Total Statistics (DIV)

No	**Item**	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item Total Correlation**	**Cronbach's Alpha if Item Deleted**
1.	DIV -1	13.6538	2.466	0.851	0.925
2.	DIV -2	13.5192	2.725	0.932	0.897
3.	DIV -3	13.5577	2.683	0.814	0.933
4.	DIV -4	13.4423	2.879	0.848	0.923

v. **Pilot Test Data Analysis for the Communities Variable Group:**

As shown in Tables 4.16 and 4.17, the reliability analysis of this three-item scale yielded a Cronbach's Alpha of 0.821, indicating moderately high internal consistency. Corrected item-total correlations ranged from 0.639 to 0.748, and "Cronbach's Alpha if Item Deleted" values ranged from 0.689 to 0.790, showing that removing any item does not significantly affect reliability. Overall, the scale demonstrates good internal consistency, with no items requiring removal.

Table 4.16: Reliability Statistics (COM)

Cronbach's Alpha	**N of Items**
0.821	3

Table 4.17: Item Total Statistics (COM)

No	**Item**	**Scale Mean if Item Deleted**	**Scale Variance if Item Deleted**	**Corrected Item Total Correlation**	**Cronbach's' Alpha if Item Deleted**
1.	COM -1	8.8654	1.727	0.639	0.790
2.	COM -2	8.9808	1.353	0.665	0.783
3.	COM -3	8.8846	1.594	0.748	0.689

vi. **Pilot Test Data Analysis for the Mediating Tools Variable Group:**

As shown in Tables 4.18 and 4.19, the reliability analysis of this four-item scale yielded a Cronbach's Alpha of 0.937, indicating high internal consistency. Corrected item-

total correlations ranged from 0.808 to 0.922, demonstrating strong alignment of each item with the overall scale. "Cronbach's Alpha if Item Deleted" values ranged from 0.894 to 0.937, showing that removing any item has minimal effect on reliability. Overall, the scale exhibits excellent internal consistency and stability, with no items requiring removal.

Table 4.18: Reliability Statistics (MET)

Cronbach's Alpha	N of Items
0.937	4

Table 4.19: Item Total Statistics (MET)

No	Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted
1.	MET -1	13.5385	3.116	0.880	0.908
2.	MET -2	13.5192	2.960	0.808	0.937
3.	MET -3	13.4615	3.038	0.922	0.894
4.	MET -4	13.4231	3.543	0.826	0.929

vii. **Pilot Test Data Analysis for the Social Interaction Student-Teacher Variable Group:**

As shown in Tables 4.20 and 4.21, the reliability analysis of this five-item scale yielded a Cronbach's Alpha of 0.902, indicating good internal consistency. Corrected item-total correlations ranged from 0.704 to 0.831, demonstrating strong alignment of each item with the overall scale. "Cronbach's Alpha if Item Deleted" values ranged from 0.864 to 0.892,

showing that removing any item has minimal effect on reliability. Overall, the scale exhibits strong stability and internal consistency, with no items requiring removal.

Table 4.20: Reliability Statistics (SOIST)

Cronbach's Alpha	N of Items
0.902	5

Table 4.21: Item Total Statistics (SOIST)

No	Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach's' Alpha if Item Deleted
1.	SOIST-1	18.3462	3.995	0.715	0.892
2.	SOIST-2	18.4038	3.853	0.827	0.864
3.	SOIST-3	18.2692	4.397	0.704	0.891
4.	SOIST-4	18.2692	4.357	0.724	0.887
5.	SOIST-5	18.4038	4.206	0.831	0.866

viii. **Pilot Test Data Analysis for the Social Interaction Student-Student Variable Group:**

As shown in Tables 4.22 and 4.23, the reliability analysis of this four-item scale yielded a Cronbach's Alpha of 0.937, indicating high internal consistency. Corrected item-total correlations ranged from 0.796 to 0.886, reflecting strong alignment of each item with the overall scale. "Cronbach's Alpha if Item Deleted" values ranged from 0.906 to 0.943,

showing that removing any item does not substantially affect reliability. Overall, the scale demonstrates high internal consistency, with no items requiring removal.

Table 4.22: Reliability Statistics (SOISS)

Cronbach's Alpha	N of Items
0.937	4

Table 4.23: Item Total Statistics (SOISS)

No	Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted
1.	SOISS-1	13.3654	3.413	0.796	0.943
2.	SOISS-2	13.3077	3.668	0.886	0.906
3.	SOISS-3	13.3077	3.707	0.866	0.912
4.	SOISS-4	13.2692	3.887	0.885	0.910

ix. **Pilot Test Data Analysis for the Social Interaction Student-Content Variable Group:**

As shown in Tables 4.24 and 4.25, this five-item scale has a Cronbach's Alpha of 0.922, indicating high internal consistency. Corrected item-total correlations ranged from 0.681 to 0.865, and "Cronbach's Alpha if Item Deleted" values ranged from 0.890 to 0.927, showing that removing any item does not substantially reduce reliability. Although removing VAR00039 could slightly increase the Alpha to 0.927, the scale overall demonstrates solid internal consistency, with no items requiring immediate removal.

Table 4.24: Reliability Statistics (SOISC)

Cronbach's Alpha	N of Items
0.922	5

Table 4.25: Item Total Statistics (SOISC)

No	Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted
1.	SOISC-1	18.0385	5.097	0.854	0.894
2.	SOISC-2	17.7308	6.750	0.681	0.927
3.	SOISC-3	17.9808	5.823	0.783	0.907
4.	SOISC-4	17.9423	5.663	0.840	0.895
5.	SOISC-5	18.0000	5.373	0.865	0.890

x. **Pilot Test Data Analysis for the Power Relations Variable Group:**

As shown in Tables 4.26 and 4.27, the reliability analysis of this five-item scale yielded a Cronbach's Alpha of 0.928, indicating high internal consistency. Corrected item-total correlations ranged from 0.787 to 0.852, demonstrating strong alignment of each item with the overall scale. "Cronbach's Alpha if Item Deleted" values ranged from 0.906 to 0.916, showing that removing any item would have minimal effect on reliability. Overall, the scale demonstrates good stability and internal consistency, with no items requiring removal.

Table 4.26: Reliability Statistics (POR)

Cronbach's Alpha	N of Items
0.928	5

Table 4.27: Item Total Statistics (POR)

No	Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach's' Alpha if Item Deleted
1.	POR-1	17.8077	5.570	0.852	0.906
2.	POR-2	17.9038	5.344	0.790	0.915
3.	POR-3	17.8654	5.491	0.827	0.909
4.	POR-4	17.8077	5.335	0.787	0.916
5.	POR-5	17.9231	5.053	0.818	0.911

xi. **Pilot Test Data Analysis for the Critical Consciousness Variable Group:**

As shown in Tables 4.28 and 4.29, the reliability analysis of this four-item scale yielded a Cronbach's Alpha of 0.898, indicating high internal consistency. Corrected item-total correlations ranged from 0.723 to 0.818, reflecting strong alignment of each item with the overall scale. "Cronbach's Alpha if Item Deleted" values ranged from 0.858 to 0.889, showing that removing any item would have minimal impact on reliability. Overall, the scale demonstrates good internal consistency and stability, with no items requiring removal.

Table 4.28: Reliability Statistics (CRC)

Cronbach's Alpha	N of Items
0.898	4

Table 4.29: Item Total Statistics (CRC)

No	Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted
1.	CRC-1	13.3269	3.479	0.818	0.858
2.	CRC-2	13.2500	3.681	0.723	0.889
3.	CRC-3	13.4615	2.959	0.797	0.861
4.	CRC-4	13.5577	2.840	0.806	0.860

xii. **Pilot Test Data Analysis for the Empowerment Variable Group:**

As shown in Tables 4.30 and 4.31, the reliability analysis of this three-item scale yielded a Cronbach's Alpha of 0.916, indicating high internal consistency. Corrected item-total correlations ranged from 0.816 to 0.849, and "Cronbach's Alpha if Item Deleted" values ranged from 0.865 to 0.893, showing that removing any item would have minimal impact on reliability. Overall, the scale demonstrates excellent internal consistency and stability, with no items requiring removal.

Table 4.30: Reliability Statistics (EMP)

Cronbach's Alpha	N of Items
0.916	3

Table 4.31: Item Total Statistics (EMP)

No	Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach's' Alpha if Item Deleted
1.	EMP-1	9.0385	1.528	0.831	0.881
2.	EMP-2	9.1154	1.437	0.849	0.865
3.	EMP-3	9.0000	1.412	0.816	0.893

4.8 Chapter Summary

Chapter 4 provided a detailed overview of the methodology used to examine SE in online I&P courses. It began with the research design, model constructs, and hypotheses, establishing the theoretical foundation for the empirical study. The chapter then described the development of quantitative and qualitative questionnaire items, emphasizing a literature-based approach and expert review to ensure content validity. Subsequent sections covered data preparation, including screening for blank responses, missing data, and outliers, as well as an evaluation of multivariate assumptions such as normality and multicollinearity. The chapter concluded with an analysis of the pilot test results, assessing the reliability and internal consistency of the measurement scales. This comprehensive approach ensured the

study's rigor and validity, setting the stage for the next phase of data analysis and interpretation.

CHAPTER 5

FINDINGS

5.1 Introduction

This study aimed to explore SE in online I&P courses within higher vocational colleges, using a mixed-methods approach to capture both the breadth and depth of student experiences. The primary goal was to understand the complex interplay of factors influencing engagement in this educational context. Four guiding research questions (RQ) were formulated:

i. What are the interrelationships among the first-order latent variables of AT, SOI, and CP in online I&P courses, as determined by SEM?
ii. Are there significant differences in SOI—specifically SOIST, SOISS, and SOISC—across grade levels (first, second, and third year), as analysed using the Kruskal-Wallis test?
iii. How do students perceive and experience the interplay between AT, SOI, and CP, and how do these experiences influence their engagement and learning outcomes, as explored through qualitative methods?
v. How do quantitative descriptive statistics (means and standard deviations) for student demographics and survey items integrate with qualitative insights (themes and codes) to provide a detailed understanding of SE in online I&P courses?

This chapter focuses on integrating quantitative and qualitative data from surveys and in-depth interviews. Rather than presenting findings separately, it synthesizes these

insights to offer a rich, descriptive, and comprehensive understanding of student experiences, addressing RQ (iv).

The chapter begins with a summary of key quantitative findings from the SEM and Kruskal-Wallis analyses, emphasizing the relationships between AT, SOI, and CP and differences across grade levels. Next, it presents a thematic analysis of qualitative data aligned with the dimensions of AT, SOI, and CP, using student quotes to illustrate experiences and perceptions (addressing RQ iii). The core of the chapter lies in the integrated discussion, explicitly connecting quantitative and qualitative findings to explore convergence and divergence (addressing RQ iv). Finally, the chapter discusses the implications of these findings for the design and delivery of online I&P courses, acknowledges study limitations, and summarizes the chapter's key contributions.

5.2 Demographic Profile of Participants And Adapting I&P Courses Online During the COVID-19 Pandemic

5.2.1 Demographic Profile of Participants

Table 5.1 summarizes the descriptive data for the study, including participant demographics such as academic year and gender. The quantitative analysis is organized according to the research questions for clarity and relevance. A total of 611 participants completed the survey, with all responses fully recorded and no missing data, enhancing the reliability of the dataset.

This demographic overview provides context for understanding patterns in engagement and responses. The absence of missing data further strengthens the validity of

statistical analyses, allowing for a robust examination of relationships between demographic variables and key outcomes.

Two key demographic factors are highlighted: enrollment year and gender distribution. As shown in Figure 5.1, 38.95% of respondents were in their first year, 22.75% in their second year, 16.53% in their third year, and 21.77% in their fourth year. The high proportion of first-year participants may influence the interpretation of certain results, particularly if course completion rates or program satisfaction differ across enrollment cohorts.

Table 5.1: Descriptive Statistics of The Sample

No.	Name	Options	Frequency	Percentage (%)	Cumulative Percentage (%)
1.	Please select your enrolment year:	Year 1（2019）	238	38.95	38.95
2.		Year 2（2020）	139	22.75	61.70
3.		Year 3（2021）	101	16.53	78.23
4.		Year 4（2022）	133	21.77	100.00
5.	Your gender:	1 (Male)	320	52.37	52.37
6.		2 (Female)	291	47.63	100.00
7.	Total		611	—	—

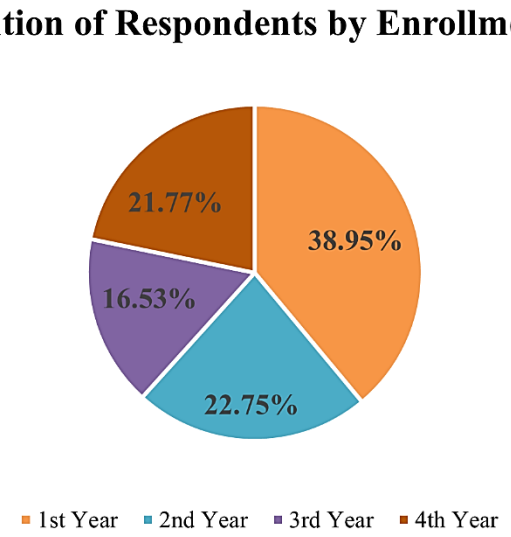


Figure 5.1: Distribution of Respondents by Enrolment Year

In terms of gender, 52.37% of respondents identified as male and 47.63% as female, reflecting a nearly equal distribution (see Figure 5.2). This balance supports meaningful gender-related comparisons, such as examining differences in engagement or performance, in line with the study's objectives.

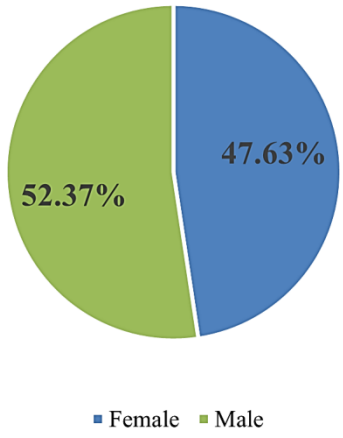


Figure 5.2: Gender Distribution of Respondents

These demographic insights offer an initial overview of the respondent population, providing context for further analyses of how enrollment year and gender may interact with other key variables. Understanding these factors helps contextualize findings and supports accurate interpretation of observed patterns.

5.2.2 Adapting I&P Courses Online During the COVID-19 Pandemic

During the COVID-19 pandemic, online I&P courses in higher vocational colleges underwent significant changes. While all courses included online components, their use varied across institutions. For example, first-year students in the 2020–2021 academic year studied *Mao Zedong Thought and the Theoretical System of Socialism with Chinese Characteristics*, a course designed to enhance students' confidence in socialism with Chinese characteristics and foster patriotism.

To address pandemic challenges, many colleges developed Massive Open Online Courses (MOOCs) and livestreamed classes, with some adopting hybrid models that combined live broadcasts with dedicated learning platforms. Anhui Vocational College, for instance, used a "Livestreaming + Superstar Learning" approach to ensure quality and practical instruction. Platforms such as Superstar Learning, Ding Talk, Cloud Class (ClassIn), WeChat, and Weibo facilitated activities including resource distribution, quizzes, attendance tracking, discussions, polls, and post-class assignments.

Superstar Learning enables resource sharing, online assignments, testing, and interactive discussions, and post-pandemic, it continues to enhance course effectiveness. Ding Talk supports high-definition live broadcasts, interactive discussions, and screen sharing. At Chu Zhou Vocational College, Ding Talk live streams supplemented with Cloud

Class activities demonstrate its key role in real-time communication. Cloud Class, widely used across colleges, tracks SE, awards experience points for attendance, resource review, discussions, and homework, and generates weekly performance reports, supporting personalized learning and seamless instructor–student interaction.

Beyond technology, higher vocational colleges emphasize integrating theory and practice to reflect the experiential nature of I&P courses. Post-class activities foster moral education and holistic student development, designed with both institutional goals and student interests in mind. While online learning dominated during the pandemic, institutions encouraged practical experiences whenever possible to enhance social responsibility and practical skills.

Overall, higher vocational colleges employed diverse delivery models and digital platforms to maintain rich learning resources and instructional quality. By combining theoretical understanding with experiential engagement, institutions reinforced moral and civic education. These pandemic-era adaptations provide valuable insights for improving I&P course design and delivery in the post-pandemic era.

5.3 Quantitative Data Analysis Results

This section presents a thorough examination of the collected quantitative survey data and qualitative interview data, addressing the research questions outlined in Chapter 1. The main goal is to integrate these datasets, showing how combining quantitative correlations with qualitative insights provides a comprehensive understanding of SE. Quantitative analysis included reliability testing, EFA, assessment of univariate normality,

confirmatory factor analysis (CFA), SEM, and non-parametric group comparisons. Qualitative findings provide rich contextual insights.

5.3.1 Reliability Analysis of Instrument Scales

The internal consistency of key constructs was evaluated using Cronbach's alpha (α) and Corrected Item-Total Correlation (CITC), ensuring the reliability of 12 sub-scales corresponding to three broader theoretical constructs: Activity Theory (AT: rules, subject, object, division of labor, community, mediating tools), Social Interaction (SOI: student-teacher, student-student, student-content), and Critical Pedagogy (CP: power relations, critical consciousness, empowerment).

Subfactors under AT included RUL (Rules), SUB (Subject), OBJ (Object), DIV (Division of Labor), COM (Community), and MET (Mediating Tools). Cronbach's alpha values ranged from 0.736 (COM) to 0.862 (SUB), exceeding the 0.70 threshold and indicating reliable measurement of learning activity facets.

The SOI dimension was assessed through SOIST (Student-Teacher), SOISS (Student-Student), and SOISC (Student-Content) interactions, with alpha values ranging from 0.793 (SOISS) to 0.826 (SOIST), demonstrating robust internal consistency and effective measurement of social dynamics in online learning.

For CP, subfactors POR (Power Relations), CRC (Critical Consciousness), and EMP (Empowerment) yielded alpha values between 0.716 (EMP) and 0.808 (CRC). While EMP's alpha is closer to the lower threshold, CITC values indicate that these measures reliably capture power dynamics, critical awareness, and student empowerment. Table 5.2 presents detailed Cronbach's Alpha and CITC values for all items across the sub-scales.

Table 5.2: Reliability Analysis Results (Cronbach's Alpha and CITC for Student Engagement)

No	Title	Name	Original Survey Item No.	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha Coefficient
1	RUL	RUL1	1	0.701	0.803	0.844
2		RUL2	2	0.6	0.823	—
3		RUL3	3	0.628	0.818	—
4		RUL4	4	0.61	0.821	—
5		RUL5	5	0.603	0.822	—
6		RUL6	6	0.6	0.823	—
7	SUB	SUB1	7	0.683	0.837	0.862
8		SUB2	8	0.586	0.848	—
9		SUB3	9	0.611	0.846	—
10		SUB4	10	0.577	0.849	—
11		SUB5	11	0.593	0.848	—

Table 5.2 continued

12		SUB6	12	0.575	0.85	—
13		SUB7	13	0.618	0.845	—
14		SUB8	14	0.633	0.843	—
15	OBJ	OBJ1	15	0.595	0.618	0.739
16		OBJ2	16	0.527	0.695	—
17		OBJ3	17	0.575	0.641	—
18	DIV	DIV1	18	0.629	0.687	0.772
19		DIV2	19	0.522	0.743	—
20		DIV3	20	0.551	0.729	—
21		DIV4	21	0.594	0.707	—
22	COM	COM1	22	0.58	0.629	0.736
23		COM2	23	0.533	0.682	—

Table 5.2 continued

24		COM3	24	0.573	0.636	—
25	MET	MET1	25	0.649	0.706	0.787
26		MET2	26	0.573	0.745	—
27		MET3	27	0.538	0.762	—
28		MET4	28	0.621	0.722	—
29	SOIST	SOIST1	29	0.693	0.77	0.826
30		SOIST2	30	0.63	0.789	—
31		SOIST3	31	0.585	0.802	—
32		SOIST4	32	0.589	0.801	—
33		SOIST5	33	0.61	0.795	—
34	SOISS	SOISS1	34	0.632	0.726	0.793

Table 5.2 continued

35		SOISS2	35	0.603	0.741	—
36		SOISS3	36	0.635	0.724	—
37		SOISS4	37	0.543	0.769	—
38	SOISC	SOISC1	38	0.658	0.744	0.804
39		SOISC2	39	0.57	0.772	—
40		SOISC3	40	0.605	0.761	—
41		SOISC4	41	0.528	0.784	—
42		SOISC5	42	0.581	0.769	—
43	POR	POR1	43	0.615	0.74	0.793
44		POR2	44	0.56	0.758	—
45		POR3	45	0.57	0.755	—
46		POR4	46	0.571	0.755	—

Table 5.2 continued

47		POR5	47	0.548	0.762	—
48	CRC	CRC1	48	0.664	0.739	0.808
49		CRC2	49	0.583	0.778	—
50		CRC3	50	0.644	0.75	—
51		CRC4	51	0.606	0.767	—
52	EMP	EMP1	52	0.552	0.606	0.716
53		EMP2	53	0.536	0.627	—
54		EMP3	54	0.52	0.645	—
Extraction Method: Principal Component Analysis (PCA) These reliability metrics confirm that the instrument consistently measures three						

Overall, the findings highlight the scale's reliability in capturing the multifaceted nature of SE. By maintaining acceptable internal consistency across learning activities, social interactions, and CP constructs, the instrument provides a strong foundation for future analyses of how engagement influences students' experiences and outcomes. Subscales with high reliability (Cronbach's Alpha $\geqslant$ 0.80) include Subject Involvement (SUB), Rules/Regulations (RUL), Social Interaction (teacher, peer, and content), and Critical Thinking/Reflection (CRC). Other factors, such as Personal Orientation (POR), Division of Labor (DIV), Objectives (OBJ), Community (COM), Mediating Tools (MET), and Empowerment (EMP), also demonstrated acceptable reliability (Cronbach's Alpha $\geqslant$ 0.70).

5.3.2 Exploratory Factor Analysis (EFA) of SE Constructs

To identify the factors influencing SE in online I&P courses, an EFA was conducted after confirming the dataset's suitability. EFA seeks to reveal underlying latent constructs by examining the correlations among observed variables:

i. **Kaiser-Meyer-Olkin (KMO) and Bartlett's Test:**

The Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity were used to assess the data's sampling adequacy and sphericity, respectively.

Table 5.3: Factor Analysis: KMO and Bartlett's Test

KMO and Bartlett's Test		
KMO Sampling Adequacy Measure:		.922
Bartlett's Test of Sphericity	Approximate Chi-square	12453.607
	Degrees of Freedom	1431
	Significance (p-value)	.000

As shown in Table 5.3, a KMO index of 0.922 indicates high sampling adequacy, supporting the appropriateness of factor extraction. Bartlett's test of sphericity (χ^2 = 12,453.607, df = 1,431, $p < 0.001$) confirms significant correlations among variables. These results demonstrate that the data are suitable for factor analysis, providing a solid basis for exploring the latent constructs underlying SE in online I&P courses.

The internal consistency of key constructs was evaluated using Cronbach's alpha (α) and CITC, ensuring the reliability of the 12 sub-scales corresponding to the three broader constructs: Activity Theory (AT: rules, subject, object, division of labor, community, mediating tools), Social Interaction (SOI: student-teacher, student-student, student-content), and Critical Pedagogy (CP: power relations, critical consciousness, empowerment).

ii. **Extraction and Rotation Methods: Principal Component Analysis (PCA):**

Principal Component Analysis (PCA) was employed as the data extraction method to reduce a large set of variables into a smaller, more manageable number of components while preserving the majority of the data's variance. Varimax rotation with Kaiser normalization, an orthogonal rotation method, was applied to achieve a clearer and more

interpretable factor structure by maximizing the variance of loadings within each factor. The rotation converged after seven iterations. PCA was chosen because its objective—data reduction and identification of underlying factors explaining maximum variance—aligns with the study's aims, providing a solid foundation for subsequent CFA and SEM.

iii. **Factor Retention and Total Variance Explained:**

Factors were retained using the eigenvalue > 1.0 criterion, complemented by theoretical justification based on the conceptualization of SE, resulting in 12 distinct factors.

As shown in Table 5.4, these 12 factors collectively explain 59.991% of the total variance, an acceptable level for social science research. This indicates that the extracted factors effectively capture a substantial portion of the variability in SE, providing a comprehensive representation of its underlying dimensions.

Table 5.4: Total Variance Explained by Factor Analysis Components

No/Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.528	21.349	21.349	11.528	21.349	21.349	4.463	8.264	8.264
2	4.452	8.244	29.593	4.452	8.244	29.593	0.545	6.565	14.830
3	2.856	5.288	34.882	2.856	5.288	34.882	0.110	5.759	20.589
4	2.006	3.714	38.596	0.006	0.714	38.596	0.857	0.290	25.879
5	1.817	3.366	41.961	0.817	0.366	1.961	0.846	5.269	31.148
6	1.706	3.159	45.120	0.706	0.159	5.120	0.624	0.859	6.007
7	1.524	2.822	47.943	0.524	2.822	47.943	0.516	4.660	0.667
8	1.495	2.768	50.711	0.495	0.768	50.711	0.403	0.450	5.118
9	1.379	2.553	53.264	0.379	0.553	3.264	0.391	0.427	9.545

Table 5.4 continued

10	1.289	2.387	55.651	0.289	0.387	5.651	0.924	0.563	3.108
11	1.184	2.193	57.844	0.184	0.193	7.844	0.883	0.486	6.594
12	1.159	2.147	59.991	0.159	0.147	9.991	0.834	0.396	9.991
13	0.816	1.511	61.502						
14	0.792	1.466	62.968						
15	0.743	1.376	64.344						
16	0.726	1.345	65.689						
17	0.702	1.300	66.989						
18	0.699	1.294	8.283						
19	0.691	1.208	9.563						
20	0.670	1.241	0.804						
21	0.657	0.217	2.022						

Table 5.4 continued

22	0.631	1.169	3.190						
23	0.629	1.164	4.354						
24	0.623	1.154	5.508						
25	0.612	0.134	6.642						
26	0.596	0.104	7.746						
27	0.573	0.061	8.808						
28	0.552	0.021	79.829						
29	0.540	1.000	0.829						
30	0.529	0.979	1.808						
31	0.526	0.973	2.781						
32	0.520	0.963	3.745						
33	0.509	0.942	4.687						

Table 5.4 continued

34	0.497	0.920	5.607						
35	0.487	0.902	6.508						
36	0.475	0.880	7.388						
37	0.468	0.867	8.255						
38	0.450	0.833	9.088						
39	0.445	0.824	9.913						
40	0.440	0.815	0.728						
41	0.425	0.788	1.516						
42	0.417	0.772	2.288						
43	0.417	0.772	3.060						
44	0.391	0.725	3.785						
45	0.389	0.721	4.506						

Table 5.4 continued

46	0.379	0.701	5.207						
47	0.360	0.666	5.873						
48	0.347	0.643	6.516						
49	0.337	0.624	7.141						
50	0.335	0.621	7.762						
51	0.319	0.590	8.352						
52	0.310	0.547	8.926						
53	0.295	0.546	9.472						
54	0.285	0.528	00.000						
Extraction Method: PCA									

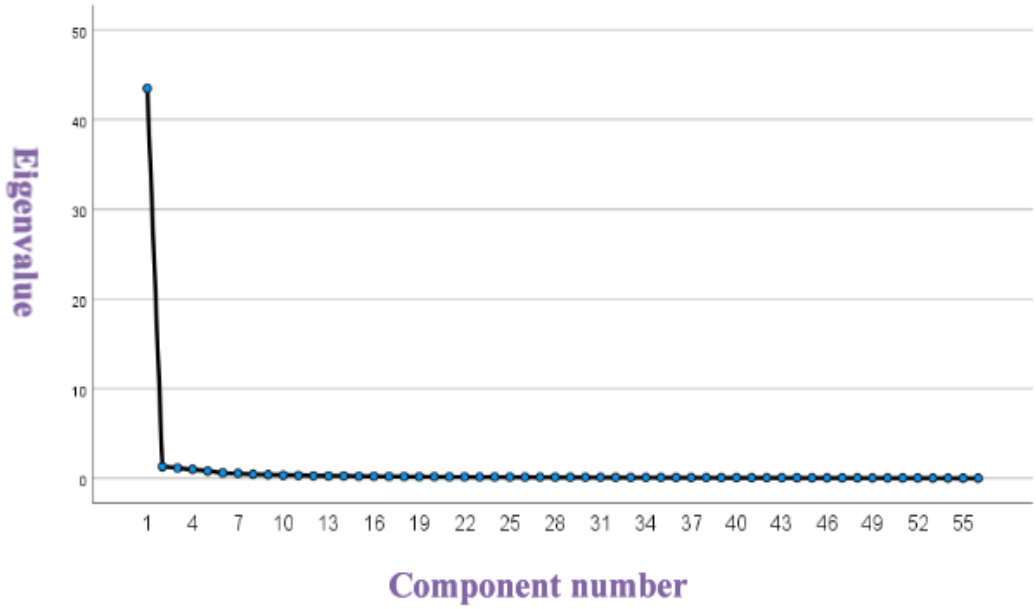


Figure 5.3: Scatter Plot Showing the Total Variance Explained by the Components

Based on Table 5.3 and Figure 5.3, the 12 extracted eigenvalues account for a substantial portion of variance, with the cumulative variance reaching 59.991% after rotation. This indicates that these factors effectively capture the data's variability. Future analyses can focus on these high-variance factors to better understand the underlying structure and characteristics of SE.

iv. **Rotated Component Matrix and Factor Interpretation:**

Table 5.5 presents the rotated component matrix, showing each item's loading on its respective factor. Varimax orthogonal rotation was applied, assuming that the underlying dimensions of SE in online I&P courses are uncorrelated. This method maximizes the variance of squared loadings within each factor, facilitating clear interpretation by linking each item to a single factor.

All items loaded strongly on their primary factors, with loadings consistently above 0.50, and no significant cross-loadings were detected. This indicates a clear and stable factor structure, confirming that the survey items effectively represent the hypothesized dimensions of SE and that the constructs are conceptually independent.

The EFA identified twelve distinct factors, each reflecting a unique dimension of SE. These results strongly support the study's conceptual model, demonstrating that SE can be reliably measured through these twelve theoretical dimensions. The factors are interpreted as follows:

i. *Student Subject (SUB)*: Captures students' agency, goals, and internal motivation within learning activities.

ii. *Rules (RUL)*: Reflects the impact of explicit and implicit regulations, norms, and guidelines shaping the online learning environment.

iii. *Student-Teacher Interaction (SOIST)*: Represents engagement dynamics between students and instructors, including communication, feedback, and support.

iv. *Student-Content Interaction (SOISC)*: Covers ways students interact with course materials, resources, and intellectual challenges.

v. *Power Relations (POR)*: Addresses authority and influence distribution, affecting student voice and autonomy.

vi. *Critical Consciousness (CRC)*: Relates to students' capacity to critically analyze and reflect on course content and broader societal issues.

vii. *Student-Student Interaction (SOISS)*: Captures collaborative and communicative exchanges among peers.

viii. *Division of Labor (DIV)*: Pertains to the allocation of tasks, responsibilities, and roles within the online learning activity.

ix. *Mediating Tools (MET)*: Covers technological and symbolic tools facilitating learning and interaction.

x. *Empowerment (EMP)*: Reflects students' perceived ability to influence their learning processes and outcomes.

xi. *Community (COM)*: Represents sense of belonging, shared identity, and collective engagement.

xii. *Object (OBJ)*: Refers to the ultimate purpose or outcome of the collective activity as perceived and pursued by students.

These twelve factors provide a comprehensive and empirically supported framework for understanding the multifaceted nature of SE in online I&P courses.

Table 5.5: Rotated Component Matrix

Item Label	**Original Survey Item No.**	**1 SUB**	**2 RUL**	**3 SOIST**	**4 SOISC**	**5 POR**	**6 CRC**	**7 SOISS**	**8 DIV**	**9 MET**	**10 EMP**	**11 SOM**	**12 OBJ**
SUB1	7	.783	—	—	—	—	—	—	—	—	—	—	—
SUB7	13	.676	—	—	—	—	—	—	—	—	—	—	—
SUB8	14	.666	—	—	—	—	—	—	—	—	—	—	—
SUB3	9	.659	—	—	—	—	—	—	—	—	—	—	—
SUB2	8	.650	—	—	—	—	—	—	—	—	—	—	—
SUB4	10	.647	—	—	—	—	—	—	—	—	—	—	—
SUB5	11	.624	—	—	—	—	—	—	—	—	—	—	—
SUB6	12	.597	—	—	—	—	—	—	—	—	—	—	—
RUL1	1	—	.800	—	—	—	—	—	—	—	—	—	—
RUL3	3	—	.675	—	—	—	—	—	—	—	—	—	—
RUL4	4	—	.670	—	—	—	—	—	—	—	—	—	—

Table 5.5 continued

RUL2	2	—	.661	—	—	—	—	—	—	—	—	—	—
RUL6	6	—	.653	—	—	—	—	—	—	—	—	—	—
RUL5	5	—	.648	—	—	—	—	—	—	—	—	—	—
SOIST1	29	—	—	.811	—	—	—	—	—	—	—	—	—
SOIST2	30	—	—	.724	—	—	—	—	—	—	—	—	—
SOIST5	33	—	—	.705	—	—	—	—	—	—	—	—	—
SOIST4	32	—	—	.701	—	—	—	—	—	—	—	—	—
SOIST3	31	—	—	.691	—	—	—	—	—	—	—	—	—
SOISC1	38	—	—	—	.796	—	—	—	—	—	—	—	—
SOISC3	40	—	—	—	.729	—	—	—	—	—	—	—	—
SOISC2	39	—	—	—	.674	—	—	—	—	—	—	—	—
SOISC5	42	—	—	—	.647	—	—	—	—	—	—	—	—
SOISC4	41	—	—	—	.579	—	—	—	—	—	—	—	—
POR1	43	—	—	—	—	.765	—	—	—	—	—	—	—

Table 5.5 continued

POR2	44	—	—	—	—	.685	—	—	—	—	—	—	—
POR4	46	—	—	—	—	.676	—	—	—	—	—	—	—
POR3	45	—	—	—	—	.676	—	—	—	—	—	—	—
POR5	47	—	—	—	—	.656	—	—	—	—	—	—	—
CRC1	48	—	—	—	—	—	.785	—	—	—	—	—	—
CRC3	50	—	—	—	—	—	.770	—	—	—	—	—	—
CRC4	51	—	—	—	—	—	.710	—	—	—	—	—	—
CRC2	49	—	—	—	—	—	.695	—	—	—	—	—	—
SOISS1	34	—	—	—	—	—	—	.794	—	—	—	—	—
SOISS3	36	—	—	—	—	—	—	.713	—	—	—	—	—
SOISS2	35	—	—	—	—	—	—	.712	—	—	—	—	—
SOISS4	37	—	—	—	—	—	—	.678	—	—	—	—	—
DIV1	18	—	—	—	—	—	—	—	.813	—	—	—	—
DIV4	21	—	—	—	—	—	—	—	.693	—	—	—	—

Table 5.5 continued

DIV3	20	—	—	—	—	—	—	—	.666	—	—	—	—
DIV2	19	—	—	—	—	—	—	—	.612	—	—	—	—
MET1	25	—	—	—	—	—	—	—	—	.754	—	—	—
MET4	28	—	—	—	—	—	—	—	—	.704	—	—	—
MET2	26	—	—	—	—	—	—	—	—	.652	—	—	—
MET3	27	—	—	—	—	—	—	—	—	.650	—	—	—
EMP1	52	—	—	—	—	—	—	—	—	—	.782	—	—
EMP2	53	—	—	—	—	—	—	—	—	—	.747	—	—
EMP3	54	—	—	—	—	—	—	—	—	—	.691	—	—
COM1	22	—	—	—	—	—	—	—	—	—	—	.747	—
COM2	23	—	—	—	—	—	—	—	—	—	—	.681	—
COM3	24	—	—	—	—	—	—	—	—	—	—	.680	—
OBJ1	15	—	—	—	—	—	—	—	—	—	—	—	.778
OBJ3	17	—	—	—	—	—	—	—	—	—	—	—	.726

Table 5.5 continued

OBJ2	16	—	—	—	—	—	—	—	—	—	—	—	.604
Extraction Method: PCA Rotation Method: Varimax with Kaiser Normalization													
Convergence: Achieved after 7 iterations.													

5.3.3 Factors Influencing Student Engagement in Online I&P Courses

The twelve extracted factors provide a clear framework explaining much of the variance in the data. Each factor represents a distinct dimension of SE—such as peer interaction, instructor feedback, and self-regulated learning—offering a detailed understanding of how students participate in online coursework. These findings highlight the multidimensional nature of engagement and highlight areas that practitioners can target when designing or evaluating online I&P courses.

While the factor structure partially aligns with previous research (Young & Bruce, 2011; Mucundanyi, 2019), observed differences suggest that contextual variables—such as educational settings, technological infrastructure, or student demographics—may influence engagement patterns. Further confirmatory factor analysis is recommended to assess the stability of these factors across different institutional contexts, providing guidance for more targeted strategies to enhance SE.

5.3.4 Synthesis of Key Factors and Practical Recommendations for Enhancing SE in Online I&P Courses

The twelve factors identified highlight the multifaceted nature of SE in online I&P courses. While course structure and rules provide a foundation, sustained engagement relies heavily on meaningful interactions—with course content, peers, and instructors—and on fostering student agency and purpose. To enhance engagement, educators and administrators should consider the following strategies:

i. *Promote Active Engagement*: Connect students' personal goals to broader course objectives to boost motivation and sustained participation.

ii. *Ensure Transparent Rules and Expectations*: Clearly define and consistently enforce guidelines to create a stable, predictable learning environment that supports effective learning.

iii. *Strengthening Teacher Facilitation*: Prioritize course scheduling, provide timely feedback, and maintain proactive classroom management to ensure smooth course flow and respectful interactions.

iv. *Foster Peer Collaboration*: Incorporate group projects, discussion forums, and peer feedback to enhance social cohesion, critical thinking, and teamwork.

v. *Leverage Technology Effectively*: Use intuitive platforms and offer guidance to minimize technical barriers, allowing students to focus on learning rather than navigation challenges.

vi. *Encourage Empowerment and Critical Thinking*: Involve students in decision-making, respect their perspectives, and challenge them to critically assess content. Empowered learners are more likely to remain engaged and participate in broader civic activities.

By integrating these strategies, online I&P courses can evolve from simple knowledge delivery into rich environments that promote reflection, collaboration, and meaningful civic engagement.

5.3.5 Validity Analysis

i. **Convergent Validity Analysis:**

This section assesses the measurement model for the latent constructs of AT, SOI, and CP. It examines how the observed variables—RUL, SUB, OBJ, DIV, COM, MET (AT); SOIST, SOISS, SOISC (SOI); and POR, CRC, EMP (CP)—serve as indicators for their respective constructs. Table 5.6 presents unstandardized and standardized factor loadings, along with standard errors, t-values, and significance levels. All standardized loadings exceed the 0.60 threshold and are statistically significant ($p < 0.001$), confirming strong measurement relationships for each construct.

For AT, component loadings are solid: rule awareness (RUL = 0.762), subject engagement (SUB = 0.849), objectives (OBJ = 0.838), division of labor (DIV = 0.784), community (COM = 0.868), and mediating tools (MET = 0.854). These contribute to an Average Variance Extracted (AVE) of 0.558 and a Composite Reliability (CR) of 0.883, indicating excellent convergent validity and internal consistency.

For SOI, loadings include teacher-student interaction (SOIST = 0.671), student-student interaction (SOISS = 0.914), and student-content interaction (SOISC = 1.144). The AVE is 0.543, and CR is 0.780. Although SOIST is slightly below the ideal 0.70 threshold, it remains meaningful, confirming its relevance for measuring social engagement.

For CP, power relations (POR = 0.743), critical consciousness (CRC = 1.143), and empowerment (EMP = 0.890) demonstrate strong loadings. AVE is 0.521, and CR is 0.765, confirming that the construct captures reflective and empowering aspects of the learning environment.

All AVE values exceed 0.50 (AT = 0.558, SOI = 0.543, CP = 0.521), and CR values range from 0.765 to 0.883, confirming high internal consistency and convergent validity (Hair et al., 2018).

The second-order construct, SE, was also assessed. Standardized loadings from SE to first-order constructs are AT = 0.644, CP = 0.821, and SOI = 0.708. The CR of SE is 0.770, and AVE is 0.530, meeting recommended thresholds (CR > 0.70, AVE > 0.50), demonstrating satisfactory internal consistency and convergent validity for the higher-order construct.

In summary, the convergent validity analysis (Table 5.6) confirms that AT, SOI, and CP are reliable and valid measures of SE in online I&P courses. These strong psychometric properties provide a solid foundation for subsequent analyses of discriminant validity, model fit indices, and the refinement of teaching strategies aimed at enhancing SE and promoting deeper, critical learning.

Table 5.6: Convergent Validity Analysis

No	Theory	Component	Unstandardized Loading	S.E.	C.R.	P	Standardized Loading	AVE	CR
1.	AT	RUL	1	—	—	—	0.762	0.558	0.883
2.		SUB	0.849	0.073	11.659	***	0.761		
3.		OBJ	0.838	0.075	11.163	***	0.758		
4.		DIV	0.784	0.072	10.928	***	0.703		
5.		COM	0.868	0.077	11.319	***	0.757		
6.		MET	0.854	0.075	11.432	***	0.74		
7.	SOI	SOIST	1	—	—	—	0.671	0.543	0.78
8.		SOISS	0.914	0.104	8.799	***	0.737		
9.		SOISC	1.144	0.124	9.217	***	0.798		
10.	CP	POR	1	—	—	—	0.743	0.521	0.765
11.		CRC	1.143	0.121	9.459	***	0.745		
12.		EMP	0.89	0.104	8.545	***	0.676		
13	SE	AT	0.436	0.044	9.906	***	0.644	0.530	0.770

Table 5.6 continued

14		SOI	0.356	0.040	8.964	***	0.708		
15		CP	0.469	0.048	9.814	***	0.821		

ii. **Discriminant Validity Analysis:**

Table 5.7 presents the correlations among the three constructs—AT, SOI, and CP—with the square roots of their respective AVE values displayed on the diagonal. This allows for the assessment of discriminant validity by comparing each construct's shared variance with other constructs to the variance it explains in its own indicators.

Table 5.7: Discriminant Validity Analysis

No	Theory	SE	AT	SOI	CP
1.	SE	0.728	—	—	—
2.	AT		0.747	—	—
3.	SOI		0.348	0.737	—
4.	CP		0.393	0.406	0.722
Note: The numbers on the diagonal are the square roots of the AVE (Average Variance Extracted).					

Discriminant validity was assessed using the Fornell-Larcker (1981) criterion, which states that a construct's square root of AVE should exceed its correlations with other constructs. The results are summarized as follows:

i. *SE:* Square root of AVE = 0.728; higher than correlations with AT (0.644) and SOI (0.708), but lower than correlation with CP (0.821).

ii. *AT*: Square root of AVE = 0.747; exceeds correlations with SOI (0.348) and CP (0.393).

iii. *SOI*: Square root of AVE = 0.737; exceeds correlations with AT (0.348) and CP (0.406).

iv. *CP*: Square root of AVE = 0.722; exceeds correlations with AT (0.393) and SOI (0.406).

The analysis indicates that AT and SOI demonstrate good discriminant validity, as their correlations with other constructs are well below their AVE square roots. This confirms that these constructs capture distinct aspects of SE in online I&P courses, both conceptually and empirically.

However, there is a potential discriminant validity issue between SE and CP due to their high correlation (0.821). This suggests substantial conceptual overlap, implying that in the context of vocational education, SE is strongly expressed through critical reflection, empowerment, and awareness of power dynamics. While this challenges the full independence of SE and CP, it highlights the central role of CP components in shaping overall engagement. Despite this overlap, each latent variable uniquely contributes to explaining variance, supporting the robustness of the model and offering detailed insight into the multidimensional nature of SE.

5.3.6 Fit Indices: Second Order Model

i. **Measurement Model – CFA:**

This analysis tests a second-order factor model, in which a single higher-order latent factor—Overall SE—underlies three first-order latent constructs: AT, SOI, and CP. Each first-order construct is measured by its respective observed indicators: RUL, SUB, OBJ, DIV, COM, MET for AT; SOIST, SOISS, SOISC for SOI; and POR, CRC, EMP for CP. This

modeling approach is particularly useful when multiple subdimensions reflect a unifying theoretical concept.

Table 5.8 and Figure 5.4 present the second-order CFA results. The model demonstrates excellent goodness of fit:

i. CMIN/DF = 1.175 (<3), indicating minimal discrepancy relative to model complexity.

ii. RMSEA = 0.017 (<0.05), suggesting a close fit to the data.

iii. GFI = 0.914 and AGFI = 0.906 (>0.90), reflecting strong absolute fit.

iv. Incremental fit indices—IFI = 0.979, CFI = 0.979, TLI = 0.978—all exceed the 0.90 benchmark, demonstrating that the proposed model explains substantially more variance than a baseline model (Hu & Bentler, 1999).

These results confirm that the second-order model provides a robust and theoretically coherent representation of overall SE in online I&P courses.

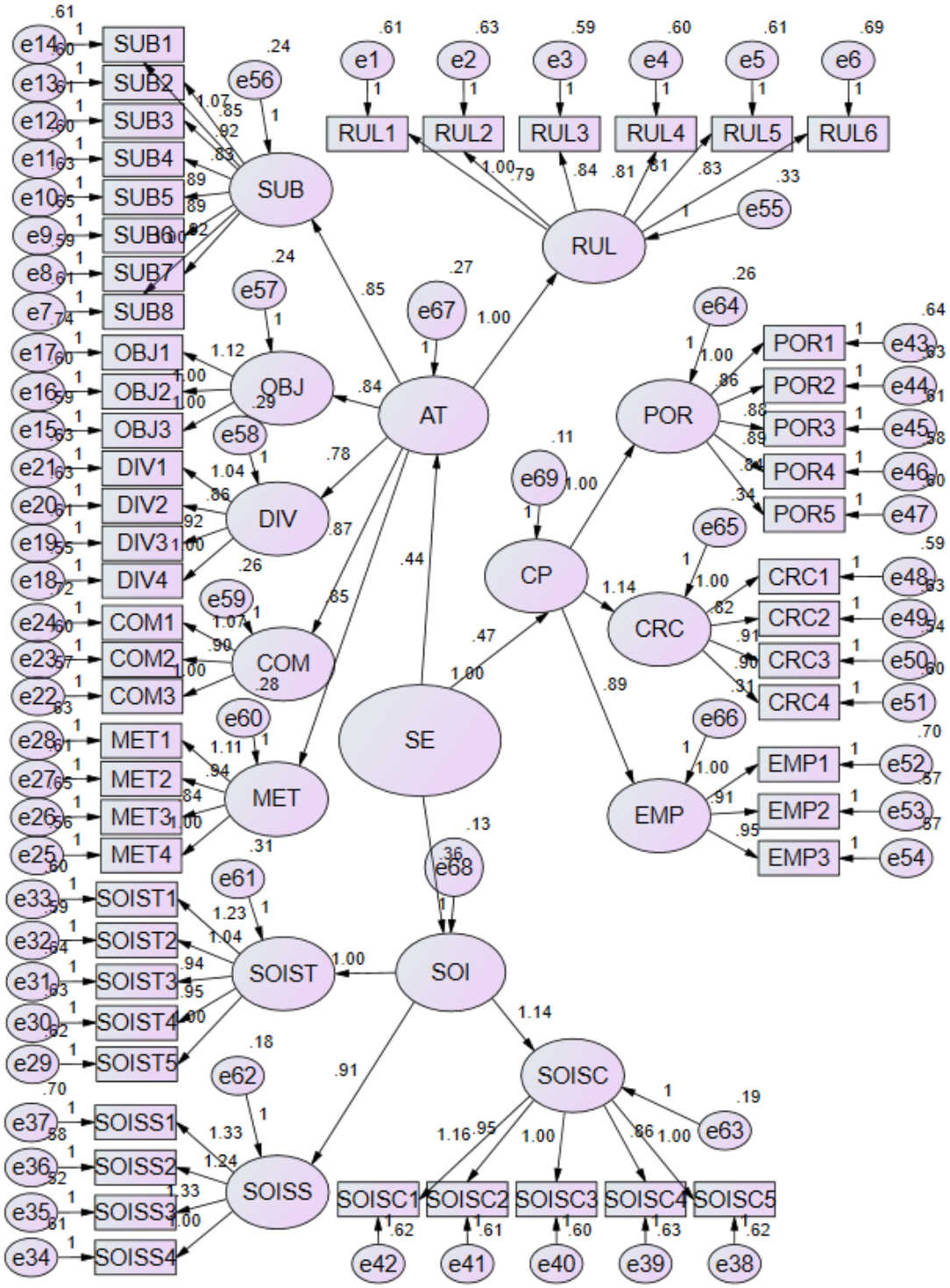


Figure 5.4: Second Order Confirmatory Factor Analysis

Table 5.8: Fit Indices

No	Fit Indices	CMIN/DF	RMSEA	GFI	AGFI	IFI	CFI	TLI
1.	Criteria	<3	<0.05	>0.9	>0.9	>0.9	>0.9	>0.9
2.	Value	1.175	0.017	0.914	0.906	0.979	0.979	0.978

The key fit indices indicate that the second-order CFA model provides an excellent representation of SE in online I&P courses. The CMIN/DF value of less than 3 suggests minimal model residuals, indicating that the observed data closely fit the hypothesized structure. The RMSEA of 0.017 is well below the 0.05 threshold, signifying an excellent approximate fit. Both GFI (0.914) and AGFI (0.906) exceed the 0.90 cutoff, reflecting a strong absolute fit, while the incremental fit indices—CFI (0.979), IFI (0.979), and TLI (0.978)—surpass the 0.90 benchmark, highlighting strong incremental fit and confirming the model's superiority over a baseline specification. Collectively, these results demonstrate that the proposed second-order model robustly captures the underlying structure of SE.

ii. **Structural Path Analysis Results:**

The structural path analysis further validated the second-order model by examining the standardized factor loadings from the higher-order latent variable, SE, to its three first-order constructs: AT, CP, and SOI. All loadings were statistically significant ($p < 0.001$) and exceeded the recommended threshold of 0.60, confirming strong convergent validity for the second-order construct. The loading from SE to CP was the highest (0.821, CR = 9.814), indicating that CP contributes most substantially to overall engagement, followed by SOI (0.708, CR = 8.964) and AT (0.644, CR = 9.906). These results demonstrate that while each dimension meaningfully represents the higher-order factor, their relative contributions differ.

The findings highlight the central role of pedagogical empowerment and social interaction in shaping vocational students' engagement in online I&P courses. Although AT remains important for structuring activity-based engagement, the critical and dialogic aspects inherent in CP and SOI exert a stronger influence within the online learning environment.

Table 5.9: Standardized Loadings from Second-Order Factor SE to First-Order Constructs

Type	Standardized Estimate	Standard Error	Critical Ratio	p-value
SE→AT	0.644	0.044	9.906	***
SE→CP	0.821	0.048	9.814	***
SE→SOI	0.708	0.040	8.964	***

5.3.7 Structural Model Fit Assessment

To comprehensively test the study's structural assumptions and proposed hypotheses, a second-order structural equation model was constructed and analyzed (Figure 5.5). This model incorporates a higher-order latent construct, SE, which influences three first-order latent variables: AT, CP, and SOI. Additionally, the model specifies direct paths from AT and CP to SOI, allowing for the examination of both direct and mediated effects on social engagement.

The second-order structural equation model was used to test the following hypotheses:

i. H2: SE positively influences AT.

ii. H3: SE positively influences CP.

iii. H4: SE positively influences SOI.

This hierarchical structure allows for the examination of both the direct effects of the higher-order SE construct on its first-order dimensions and the relative contributions of AT, CP, and SOI to overall engagement in online I&P courses.

Table 5.10 presents the model fit indices for the second-order structural equation model based on the AMOS output. The model demonstrates excellent overall fit, with a CMIN/DF ratio of 1.175, well below the recommended threshold of 3. The RMSEA value of 0.017, accompanied by a 90% confidence interval of 0.013 to 0.020 and a PCLOSE of 1.000, further confirms the model's close fit to the observed data. Incremental fit indices also indicate strong model adequacy, with both the CFI and IFI reaching 0.979, and the TLI at 0.978, all surpassing the conventional 0.90 threshold. Although the NFI (0.876) and RFI (0.869) are slightly below 0.90, they remain acceptable given the model's complexity. The PGFI of 0.838 and other parsimony indices suggest that the model achieves a favorable balance between goodness-of-fit and simplicity. Collectively, these results indicate a strong model fit, validating the structural framework and supporting the continuation of hypothesis testing.

Table 5.10: Model Fit Indices

No.	Index Category	Index Name	Fit Criterion	Test Result
1.	Absolute Fit Indices	GFI	>0.9	0.914
2.		AGFI	>0.9	0.906
3.		RMSEA	<0.05	0.017
4.	Incremental Fit Indices	NFI	>0.9	0.876
5.		IFI	>0.9	0.979
6.		CFI	>0.9	0.979
7.		RFI	>0.9	0.869
8	Parsimonious Fit Indices	CMIN/df	<3	1.175
9.		PGFI	>0.5	0.838

This model structure is illustrated in Figure 5.5, showing the hierarchical influence of SE on its three first-order dimensions: AT, CP, and SOI. While the NFI (0.876) and RFI (0.869) fall slightly below the conventional 0.90 benchmark, the exceptionally low RMSEA (0.017) and high CFI and IFI values (both 0.979) strongly support the model's overall adequacy. All structural paths in the model were freely estimated, and Table 5.11 presents the standardized and unstandardized coefficients, standard errors, critical ratios (C.R.), significance levels (p), and the outcomes of the tested hypotheses.

Table 5.11: Structural Path Estimates

Path	Standardized Estimate	Standard Error	Critical Ratio	p-value	Hypothesis
SE→AT	0.644	0.044	9.906	***	H2
SE→CP	0.821	0.048	9.841	***	H3
SE→SOI	0.708	0.040	8.964	***	H4

The higher-order factor, SE, significantly influences all three first-order constructs, with the strongest effects on CP ($\beta = 0.821$) and SOI ($\beta = 0.708$). This suggests that overall engagement is primarily expressed through critical consciousness and interactive behaviors.

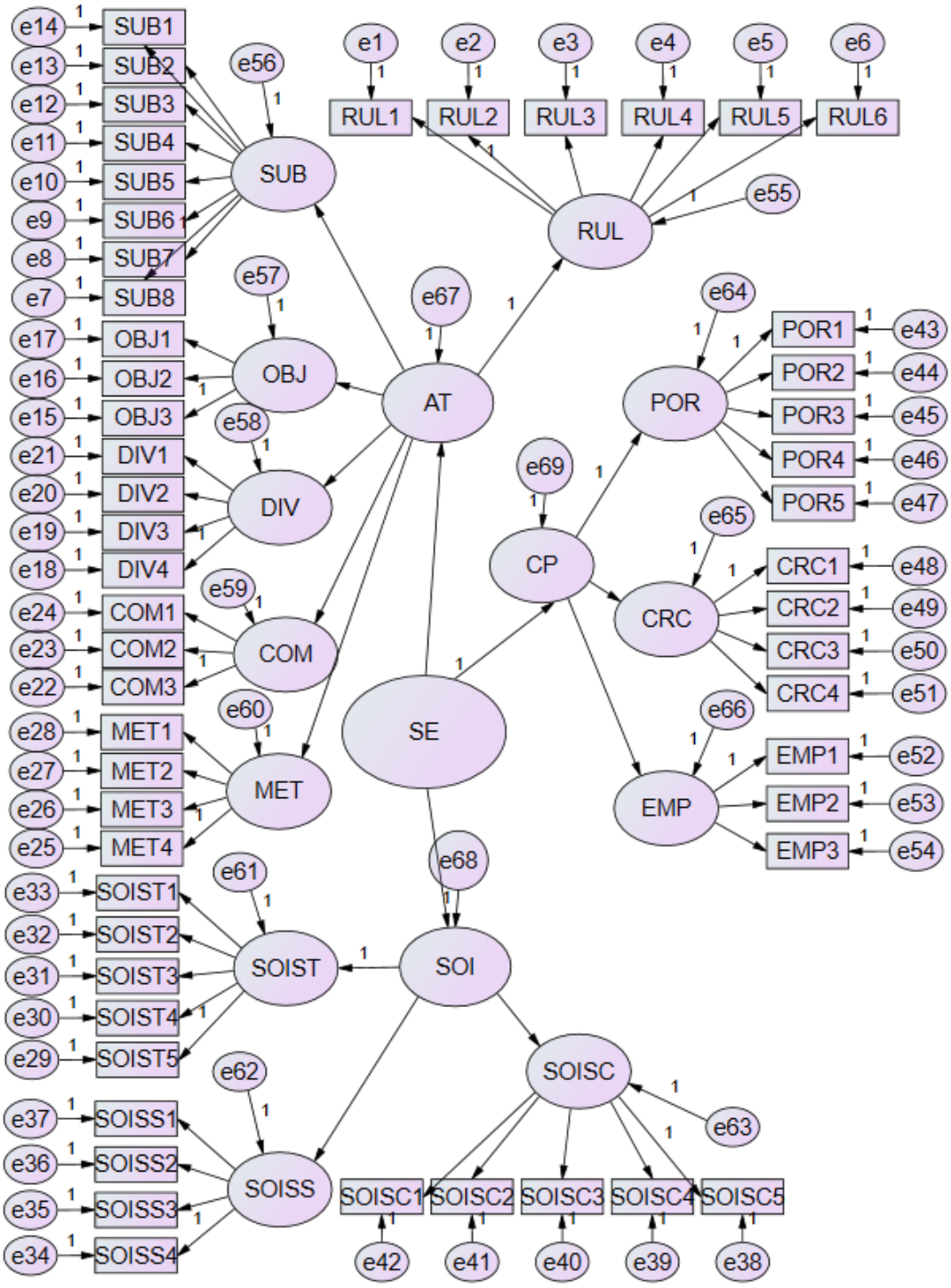


Figure 5.5: Second-Order Structural Equation Model Analysis

5.3.8 Addressing Research Question 1: Correlational Relationships between AT, CP, and SOI

Research Question 1 (RQ1) asks: *What are the correlational relationships between the first-order latent variables of AT, SOI, and CP, and their relationships with the higher-order latent factor, in the context of online I&P courses within higher vocational colleges, as determined by SEM?*

To answer RQ1, the SEM analysis was examined, focusing on the path coefficients and significance levels among the first-order latent variables (AT, SOI, CP) and their connections to the higher-order latent factor, SE.

As shown in Table 5.12, the path analysis indicates that the second-order factor SE positively predicts all three first-order components. Specifically, the standardized coefficient from SE to CP is the highest at 0.821, indicating that CP is the strongest predictor of overall SE. The path from SE to SOI is also substantial at 0.708, followed by SE to AT at 0.644. All paths are highly significant ($p < 0.001$).

Table 5.12: Path Analysis

Path	**Standardized Estimate**	**Standard Error**	**Critical Ratio**	**p-value**
SE→AT	0.644	0.044	9.906	***
SE→CP	0.821	0.048	9.841	***
SE→SOI	0.708	0.040	8.964	***

The standardized coefficients indicate that SE positively influences all three first-order constructs. Specifically, SE → AT has a coefficient of 0.644 ($p < 0.001$), suggesting a significant and substantial positive effect; although slightly lower than CP and SOI, this confirms that AT principles—including tools, rules, and division of labor—play a foundational role in shaping SE. SE → SOI is 0.708 ($p < 0.001$), indicating a strong positive influence and highlighting the importance of collaborative and interactive activities as integral components of overall engagement. Finally, SE → CP has the highest coefficient at 0.821 ($p < 0.001$), demonstrating that CP is the most central and influential dimension of the engagement construct, consistent with the theoretical framework emphasizing critical reflection and empowerment.

These results illustrate that while all three theoretical dimensions are essential, their contributions vary in magnitude. CP and SOI emerge as particularly influential, highlighting the importance of fostering critical thinking and peer interaction in online I&P courses. At the same time, AT provides the structural and contextual foundation for meaningful engagement. Future research could investigate how these dimensions interact to produce a holistic engagement experience.

5.3.9 Addressing RQ2: Differences in SOI Across Grade Levels

RQ2 investigates whether significant differences exist in student SOI, specifically its components—SOIST, SOISS, and SOISC—across different enrollment years (first, second, and third year) in online I&P courses, as measured by the Kruskal-Wallis test. To address this question and provide a broader exploratory understanding of potential differences across enrollment years, the Kruskal-Wallis test was conducted for all measured constructs and their

dimensions across the 2019, 2020, and 2021 enrollment years, along with a combined "other year" group. This analysis considers the impact of academic maturity, curriculum exposure, and institutional changes on SE.

Table 5.13 presents the analysis of student performance across enrollment years using Kruskal-Wallis tests. Focusing on RQ 2, the results for SOI and its components (SOIST, SOISS, SOISC) did not show statistically significant differences at the 0.05 level across the enrollment years (SOI: $H = 5.163$, $p = 0.16$; SOIST: $H = 5.178$, $p = 0.159$; SOISS: $H = 7.309$, $p = 0.063$; SOISC: $H = 5.661$, $p = 0.129$). Therefore, Hypothesis H3, which posits significant differences in overall student SOI across different year groups, is not supported by these findings.

Beyond RQ2, the exploratory analysis across other components also revealed no statistically significant differences at the 0.05 level for most measures. However, an examination of the mean ranks from exploratory analyses indicated that students admitted in September 2020 exhibited higher mean ranks across several measures, including SOIST, SOISS, and SOISC, which are components of SOI. Similarly, students from the 2021 enrollment years showed tendencies for higher mean ranks in rule clarity (RUL), subject comprehension (SUB), course objectives (OBJ), and use of mediating tools (MET), which relate to the AT framework.

Although these observed patterns were not statistically significant in the overall Kruskal-Wallis tests, they suggest that detailed differences may exist across enrollment years. Therefore, future research should focus on identifying the specific factors contributing to these variations, particularly the impact of the 2020 enrollment cohort. The consistent patterns observed across multiple components—especially in the contexts of AT, SOI, and

CP—warrant further qualitative investigation to determine whether each enrollment year could benefit from tailored pedagogical strategies based on their observed strengths.

Table 5.13: Comparison of Different Admissions using the Kruskal-Wallis test

No	Component	Details	N	Mean	Kruskal-Wallis H	df	Sig.
1	RUL	Enrollment in September 2021	238	301.61	2.800	3	0.423
2		Enrolled in September 2020	139	321.39	—	—	—
3		Enrolled in September 2019	101	314.30	—	—	—
4		Enrolled in Other years	133	291.48	—	—	—
5	SUB	Enrollment in September 2021	238	309.39	3.466	3	0.325
6		Enrolled in September 2020	139	322.99	—	—	—
7		Enrolled in September 2019	101	298.66	—	—	—
8		Enrolled in Other years	133	287.75	—	—	—
9	OBJ	Enrollment in September 2021	238	311.70	4.998	3	0.172
10		Enrolled in September 2020	139	323.48	—	—	—
11		Enrolled in September 2019	101	299.50	—	—	—

Table 5.13 continued

12		Enrolled in Other years	133	282.48	—	—	—
13	DIV	Enrollment in September 2021	238	309.90	5.531	3	0.137
14		Enrolled in September 2020	139	326.76	—	—	—
15		Enrolled in September 2019	101	299.32	—	—	—
16		Enrolled in Other years	133	282.40	—	—	—
17	COM	Enrollment in September 2021	238	311.18	3.916	3	0.271
18		Enrolled in September 2020	139	319.50	—	—	—
19		Enrolled in September 2019	101	305.06	—	—	—
20		Enrolled in Other years	133	283.33	—	—	—
21	MET	Enrollment in September 2021	238	309	3.887	3	0.274
22		Enrolled in September 2020	139	321.95	—	—	—
23		Enrolled in September 2019	101	305.79	—	—	—

Table 5.13 continued

24		Enrolled in Other years	133	284.12	—	—	—
25	SOIST	Enrollment in September 2021	238	310.99	5.178	3	0.159
26		Enrolled in September 2020	139	323.44	—	—	—
27		Enrolled in September 2019	101	303.57	—	—	—
28		Enrolled in Other years	133	280.68	—	—	—
29	SOISS	Enrollment in September 2021	238	309.07	7.309	3	0.063
30		Enrolled in September 2020	139	329.24	—	—	—
31		Enrolled in September 2019	101	305.22	—	—	—
32		Enrolled in Other years	133	276.80	—	—	—
33	SOISC	Enrollment in September 2021	238	309.45	5.661	3	0.129
34		Enrolled in September 2020	139	325.87	—	—	—
35		Enrolled in September 2019	101	305.15	—	—	—

Table 5.13 continued

36		Enrolled in Other years	133	279.71	—	—	—
37	POR	Enrollment in September 2021	238	305.68	7.83	3	0.05
38		Enrolled in September 2020	139	330.97	—	—	—
39		Enrolled in September 2019	101	311.34	—	—	—
40		Enrolled in Other years	133	276.42	—	—	—
41	CRC	Enrollment in September 2021	238	310.76	6.852	3	0.077
42		Enrolled in September 2020	139	328.40	—	—	—
43		Enrolled in September 2019	101	300.33	—	—	—
44		Enrolled in Other years	133	278.38	—	—	—
45	EMP	Enrollment in September 2021	238	307.51	7.133	3	0.068
46		Enrolled in September 2020	139	330.08	—	—	—
47		Enrolled in September 2019	101	305.56	—	—	—

Table 5.13 continued

48		Enrolled in Other years	133	278.46	—	—	—
49	AT	Enrollment in September 2021	238	309.42	2.776	3	0.427
50		Enrolled in September 2020	139	320.46	—	—	—
51		Enrolled in September 2019	101	302.40	—	—	—
52		Enrolled in Other years	133	287.50	—	—	—
53	SOI	Enrollment in September 2021	238	311.47	5.163	3	0.16
54		Enrolled in September 2020	139	323.38	—	—	—
55		Enrolled in September 2019	101	303.57	—	—	—
56		Enrolled in Other years	133	279.89	—	—	—
57	CP	Enrollment in September 2021	238	308.75	6.989	3	0.072
58		Enrolled in September 2020	139	329.53	—	—	—
59		Enrolled in September 2019	101	305.15	—	—	—

Table 5.13 continued

60		Enrolled in Other years	133	277.14	—	—	—

5.4 Qualitative Research Findings (Addressing RQ3: Students' Experiences and Perceptions of AT, SOI, and CP)

This section addresses RQ3: *"What are students' experiences and perceptions of the interplay between AT, SOI, and CP within online courses, and how do these experiences inform their engagement and learning outcomes?"*

To explore this question, qualitative data were collected through in-depth interviews with 30 undergraduate students (15 male and 15 female) across freshman, sophomore, and junior cohorts, representing diverse disciplinary backgrounds and specialization goals. The findings are organized according to key themes aligned with the theoretical framework of AT, SOI, and CP, as identified through a thematic analysis of the interview data.

This structured approach provides a clear and comprehensive understanding of the complex interplay of factors influencing SE in online I&P courses. In reporting the qualitative findings, the numbers following the students' names indicate their year of enrollment; for example, Student Yang Yuqin (20) — where "20" denotes enrollment in 2020.

5.4.1 Infrastructure of Online I&P Courses

The AT framework highlights how structural and cultural factors within online I&P courses shape students' learning experiences. Key elements include rules, mediating tools (technology), division of labor, community, and the student's role as a subject pursuing specific goals. Together, these components create an environment that can either facilitate or impede SE. Additionally, elements of CP, such as power relations, critical awareness, and empowerment, while directly influencing engagement, are also embedded within this

structure, shaping how students perceive and interact with the foundational elements of the course.

i. **Rules & Guidelines (RUL):**

Clear rules and assigned roles strongly support a structured learning environment, fostering accountability and focus, which are essential for sustained SE. Students observed that well-communicated guidelines and defined role expectations—such as discussion leader or group facilitator—enhanced their sense of responsibility. Conversely, unclear role distribution often led to confusion and disengagement, particularly during group tasks.

Interaction protocols established by instructors, such as structured discussion boards and scheduled peer feedback sessions, encouraged active participation and meaningful discussions. Strict attendance policies also promoted time management and accountability. Student Yang Yuqin (20) remarked, "Strict attendance policies make students more conscious of their schedules and help maintain order," illustrating how structured rules enhance consistent engagement. Similarly, Student Wu Yuting (20) observed, "A well-organized class allows me to concentrate and actively participate," highlighting the link between clarity and attentive engagement.

Enforcing participation rules, such as keeping cameras on and muting microphones unless speaking, ensures attentiveness and active involvement. First-year students reported stricter policies, including random roll calls and chat-based questions, with Student Wang Shua (21) commenting, "These methods help us stay engaged, accountable, and present in the virtual classroom." Junior and sophomore students noted more relaxed camera policies, reflecting increased trust in students' autonomy.

Overall, instructors who establish clear rules at the beginning of the semester—including guidelines for camera use, punctuality, assignments, and penalties—promote accountability and maintain an organized learning environment that supports steady engagement. Regular reminders via email and in-class announcements further help prevent confusion about due dates and expectations.

ii. **Subject Involvement (SUB) & Self-Regulation:**

Students' psychological states, self-efficacy, motivation, and capacity for self-regulation are essential in shaping learning outcomes and cognitive processes, directly influencing engagement levels. Mindset and self-regulation emerged as key factors affecting academic engagement, with students emphasizing the importance of self-directed learning and effective time management. Their dedication to academic programs was evident in consistent attendance and self-structured study plans, reflecting high behavioral engagement. The shift to online learning due to COVID-19 further highlighted the need for active participation and adaptability, with students noting the importance of maintaining steady academic progress. For example, Student Zhang Yazhen (21) viewed these courses as an "inevitable choice" for earning her degree and securing scholarships, demonstrating instrumental motivation.

Prior experience with online learning also influenced self-regulation. Students with prior exposure reported greater independence and less reliance on instructors, which promoted self-directed engagement. Student Liu Yanchun (20) explained, "Online courses taught me various self-study methods... Although I can no longer see my teacher face-to-face, I feel more independent than before," reflecting increased autonomous engagement. Similarly, Student Li Ling (20) emphasized personal accountability: "Without a professor

reminding me of deadlines in person, I have to organize all my assignments and exams myself," illustrating the direct link between self-regulation and proactive engagement. Early exposure to online learning fostered a stronger sense of personal responsibility.

While online learning allowed some students to progress at their own pace and explore content in depth, it often limited interactions with peers and professors, requiring strong self-management skills. Academic seniority also influenced experiences: freshmen generally required more technical guidance, whereas sophomores faced challenges with self-discipline despite greater autonomy. Across cohorts, students consistently agreed that self-regulation and personal responsibility are crucial for academic success and sustained engagement in online learning.

iii. **Community:**

The role of community within online I&P courses emerged as a crucial component of SE, representing the collective of individuals participating in the activity system. A strong sense of community fosters a supportive environment that enhances both social and emotional engagement. While some students experienced belonging through structured peer discussions and group projects, others struggled with feelings of isolation, particularly in asynchronous learning environments.

The study found that intentionally designed collaborative activities—such as structured peer debates, group reflections, and case-based discussions—strengthened the sense of community and improved learning outcomes. Student Zhang Yazhen (21) highlighted this connection, stating, "I miss the physical interaction, but when we have structured online group work, it does make me feel more connected to my classmates and the course," demonstrating how collaboration enhances relational engagement.

Before the pandemic, group discussions and team projects were central to students' routines, with spontaneous in-person exchanges highly valued. The shift to online learning disrupted these dynamics; however, students adapted by leveraging digital tools for collaboration. Student Li Ling (20) noted, "We often use WeChat groups to discuss assignments and help each other out, which keeps us in touch," reflecting proactive efforts to maintain peer engagement despite the virtual format.

iv. **Mediating Tools & Technology:**

A stable and well-integrated technological infrastructure is essential for effective online learning, as it directly influences the accessibility and fluidity of SE. Platforms such as ClassIn and MOOCs improved coordination and communication, enabling smoother interactions. However, technological inconsistencies—such as unstable internet connections and usability issues—were reported as barriers, disrupting synchronous discussions and reducing active participation. Students emphasized the importance of reliable, user-friendly platforms. For example, Student Li Ling (20) noted, "My internet connection is often unstable, which makes it hard to participate in live classes," illustrating how technical issues can hinder behavioral engagement. Conversely, Student Chen Ming (21) appreciated adaptive video resolution, stating, "The ability to adjust video quality when my network is bad is beneficial; it prevents me from missing out," demonstrating how technological flexibility supports continuous engagement.

Students also valued digital tools such as curated libraries, prerecorded lectures, and interactive sessions. Student Ge Wanjun (21) revisited videos to grasp complex theories, while Student Fan Chaoqian (21) praised real-time whiteboards during lectures, remarking,

"The interactive whiteboard makes the abstract concepts easier to visualize and understand," highlighting how effective tools enhance cognitive engagement.

The pandemic-driven shift to online learning required students to adapt to virtual platforms. Some leveraged these tools effectively; for instance, Student Zhang Yazhen (21) appreciated asynchronous lectures, noting, "I can pause and rewatch parts I don't understand, which is better for my learning pace," reflecting enhanced self-regulated engagement. Similarly, Student Wang Shua (21) found online simulators and breakout rooms helpful for collaborative tasks: "The breakout rooms allowed us to discuss freely, just like in a physical classroom, and the simulators made complex topics tangible," demonstrating how interactive tools facilitate collaborative engagement.

Despite these benefits, interviews indicated that many I&P courses do not fully utilize interactive technologies or update content to reflect current realities, missing opportunities to maximize engagement. Therefore, technological improvements—including adaptive bandwidth settings, user-friendly platforms, and regularly updated interactive content—are essential for ensuring accessibility and robust online SE.

v. **Division of Labor (DIV):**

An effective division of labor enhances collaboration, reduces redundancy, and fosters accountability in online I&P courses, resulting in more organized and meaningful group participation. When tasks align with individual strengths and interests, group efficiency increases, and members engage more deeply. Well-structured teams with defined roles—such as Team Leader, Data Collector, Literature Reviewer, PPT Creator, and Report Writer—ensure smooth project management. As Student Huang Rong (19) reflected, "Knowing my specific role made it easier to focus and contribute effectively without

confusion," highlighting how clearly defined responsibilities promote focused engagement in collaborative activities. Organized task distribution not only improves teamwork and efficiency but also leads to higher-quality academic outcomes, ultimately enhancing overall engagement in project-based learning within online I&P courses.

vi. **Power Relations (POR):**

CP emphasizes power relations, critical awareness, and empowerment within the educational context, encouraging students to critically analyze societal issues and engage meaningfully. Power dynamics in online classrooms significantly shape students' experiences and their willingness to participate actively. Some participants reported feeling hesitant to challenge instructors' viewpoints due to perceived hierarchical structures, which could limit open expression and critical thinking. Conversely, others valued opportunities for open discussion provided by anonymous forums, suggesting that thoughtful interaction design can mitigate hierarchical effects and promote more equitable participation. Student Liu Yanchun (20) reflected on instructor authority: "Sometimes, it's hard to express a different opinion if the teacher has a strong view; you feel like you might get penalized," illustrating how power imbalances can suppress active engagement.

vii. **Critical Awareness (CRC) & Empowerment (EMP):**

The development of critical consciousness—students' awareness of their position within academic discussions—varied according to how instructors facilitated debates and encouraged independent thinking, directly influencing intellectual and civic engagement. Courses that incorporated real-world socio-political case studies helped students develop a stronger sense of empowerment and engagement with the material. While most students

acknowledged the importance of I&P education for moral and civic growth, many found the content overly abstract.

Student Li Mengya (19) praised teachers who used debates to foster critical thinking: "They make us question, not just listen. It's not just about memorizing facts, but about forming your ideas," demonstrating enhanced cognitive and participatory engagement. Student Zhao Ziqi (19) noted a rise in social responsibility during the pandemic but felt the courses did not fully tap into this awareness: "The crisis showed real-world civic engagement, but lessons didn't always tap into that emotional depth. We wanted to discuss how we could help, but the course content stayed abstract," highlighting a missed opportunity for practical civic engagement.

I&P courses also aim to foster social responsibility, empathy, and civic participation. Student Huang Rong (19) reflected on her community service projects: "Seeing my efforts make a tangible impact on others made me more aware of the obligations each citizen shares, and it also made me more empathetic," illustrating growth in prosocial engagement. These courses also develop critical thinking, debate abilities, and skills to apply ideological frameworks to contemporary issues. Student Zhao Ziqi (19) highlighted an online group debate on artificial intelligence and job markets: "Initially, I struggled to propose original ideas, but repeated debates taught me how to view issues from different angles and defend my stance effectively," reflecting increased argumentative and critical participation.

By systematically improving content relevance, resource organization, clarity of objectives, and assessment strategies, online I&P courses can become more engaging and impactful, ultimately shaping students into responsible, critically engaged citizens and maximizing their potential for transformative engagement.

5.4.2 Social Interaction and SE

Social interaction encompasses how students engage with instructors, peers, and course content, profoundly influencing overall online learning engagement and outcomes. The quality and nature of these interactions are key drivers of student participation and connectedness within the virtual environment.

i. **Student-Teacher Interaction (SOIST):**

In virtual learning environments, instructors take on multiple roles—facilitators, organizers, and evaluators—to foster intellectual growth and sustained engagement. Effective teachers adapt their strategies to create interactive and motivating experiences, combining lecturing with facilitation and discussion leadership to energize online classrooms. A first-year student, Yang Yuqin (20), reflected on her instructor's shift from passive slide recitation to experiential activities: "My former ideological and political course teacher once took us to rehearse an activity of college students teaching I&P courses. Let's participate in a college competition. It can be said that these words left a deep impression on me, that is, to take myself into the era at that time to learn and understand ideological and political courses," highlighting how immersive experiences foster deep emotional and cognitive engagement.

Moving from passive lecturing to active facilitation significantly increased class participation, encouraging students to contribute and think critically. Student Wang Shua (21) emphasized that direct interaction with instructors made learning more compelling: "When the teacher tells us their own experiences, it's more engaging," showing how relatable content boosts interest-driven participation.

While assessment is essential, overly strict grading can reduce enthusiasm. Students emphasized the need for transparent and flexible grading standards, feedback aligned with learning goals, and evaluations that inspire improvement to support sustained academic motivation. During live online sessions, instructors often employed flexible management strategies, offering multiple ways for students to participate—such as speaking or typing in chat—to create a more inclusive and dynamic environment. Clear classroom expectations, punctuality, and proper microphone etiquette further maintained a structured and respectful learning space, positively influencing student behavior and engagement.

ii. **Student-Student Interaction (SOISS):**

Maintaining respectful discourse and avoiding inappropriate remarks or personal attacks during discussions fosters an inclusive and constructive learning environment, which is essential for active peer engagement. Student Wu Yuting (20) emphasized the importance of a positive classroom atmosphere: "I prefer classes where discussions are respectful, and everyone feels comfortable sharing," highlighting how respect supports participation. A respectful climate encourages students to contribute insights without fear of criticism, enhancing critical thinking and promoting deeper understanding of I&P concepts. Student Zhao Ziqi (19) also noted the benefits of diverse perspectives: "When my classmates share different viewpoints, it makes me think more deeply about the topic," illustrating how peer interactions nurture cognitive development and engagement.

iii. **Student-Content Interaction (SOISC):**

Students consistently emphasized the importance of connecting foundational concepts to contemporary social contexts in online I&P courses, which is vital for fostering meaningful cognitive and emotional engagement. Student Wu Yuting (20) highlighted the

impact of relevant examples: "The part I am more involved in is that the teacher brought some practical cases in the course of teaching, which will make me more impressed," demonstrating how real-world content enhances emotional engagement. Similarly, Student Li Mengya (19) suggested incorporating case studies or economic principles to better understand social phenomena: "When the content is connected to real-life cases, it's easier to grasp," showing its effect on comprehension and interest. Student Wang Shua (21) praised the integration of current events, stating, "Real-life integration boosts both my interest and the application of learned values," while Student Fang Zhiyou (20) noted that analyzing factual legal disputes "transformed an abstract theory into something tangible," illustrating increased intellectual involvement. Students generally agreed that exploring social controversies and evolving policies enhances critical thinking and ethical awareness. Student Zhang Yazhen (21) recommended that instructors "adjust the course content promptly" to maintain relevance, sustaining ongoing engagement.

Many students also advocated for more practical applications, including role-playing and real-world case studies. For instance, Student Chen Ming (21) suggested simulated healthcare scenarios, and Student Fan Chaoqian (21) proposed structured discussions on macroeconomic responses to the pandemic. Their perspectives reflect a shared desire for courses that go beyond theory to promote experience-based learning, which enhances behavioral and cognitive engagement. Outdated materials and insufficient practical components were noted as barriers, with recommendations for timely case studies, multimedia assignments, and interactive discussion boards.

Online I&P courses aim to cultivate knowledge, skills, and affective attitudes. Students reported gaining a solid theoretical foundation, with Student Ge Wanjun (21)

praising video lectures and reading materials for expanding her understanding of contemporary political systems. Animated demonstrations and case analyses clarified complex ideas effectively. However, some students struggled to apply theoretical knowledge to real-world issues. Student Huang Rong (19) commented, "I learned plenty of theory, but still struggle with connecting it to real-world phenomena," highlighting a need for more practical engagement. Overall, students emphasized that interactive learning strategies, including case studies, simulations, and enhanced teacher-student communication, are crucial for maximizing engagement in online I&P courses.

5.4.3 Overarching Themes and Integrated Insights

The integration of qualitative findings reveals several overarching themes that bridge AT, SOI, and CP, all converging on the central construct of SE. First, the design and management of the online learning environment are critical. This encompasses not only the technological infrastructure but also the clarity of rules, roles, and course structure, which directly influence SE, self-regulation, and accountability.

Second, the relevance and applicability of course content to real-world issues are essential for fostering deeper cognitive and emotional engagement. Students consistently seek connections between theoretical concepts and contemporary societal challenges, highlighting the need for dynamic curriculum adaptation.

Third, meaningful interaction—both student-teacher and student-student—is vital for creating a supportive community and mitigating feelings of isolation in online settings, thereby enhancing social engagement. Finally, fostering student agency and critical

consciousness emerges as a key outcome, shaped by opportunities for open discussion, critical examination of power dynamics, and engagement with socio-political case studies.

These integrated insights highlight the importance of a holistic approach to online I&P course design, one that prioritizes accessibility, collaboration, relevance, and empowerment to maximize SE and learning outcomes.

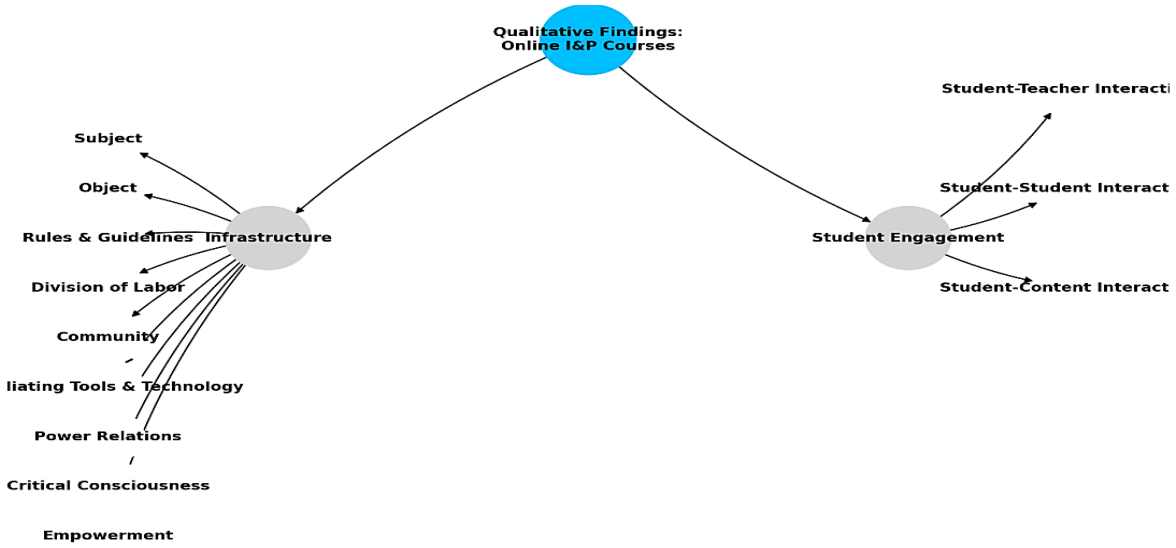


Figure 5.6: Concept Map of Qualitative Findings

5.5 Data Integration (Addressing RQ4: Integrating Quantitative and Qualitative Findings)

RQ4 asks: *"How do the quantitative descriptive statistics (means and standard deviations) for individual student demographic characteristics and survey items integrate with the qualitative insights (themes and codes) into students' experiences and perceptions, providing a detailed understanding of SE in online I&P courses?"* This question seeks to combine the earlier quantitative and qualitative findings to generate a comprehensive view of SE.

The integration examines how statistical relationships identified through SEM analyses are reflected in students' lived experiences and perceptions. For instance, while high Likert-scale scores indicated overall satisfaction with course structures, in-depth interviews revealed areas where students felt that interactive opportunities could be expanded and technical support made more accessible. Table 5.14 synthesizes these findings by presenting numerical results alongside corresponding qualitative insights, providing a cohesive and detailed picture of student experiences.

By integrating means, standard deviations, and qualitative codes, this approach not only confirms patterns observed in the quantitative data but also enriches the interpretation with contextualized experiences. This dual perspective offers both theoretical insights into eLearning engagement and practical guidance for enhancing online I&P course design and implementation, ensuring that SE strategies are informed by both statistical trends and detailed experiential accounts.

Table 5.14: Joint Display of Quantitative Descriptive Statistics and Qualitative Data

No	Quantitative Variables	Quantitative Participants	Mean	Qualitative Codes Categories	Number of Codes	Interpretation
1	Please select your enrollment year	611	2.21 (0.57)	Course Task Clarity	3	Students found course tasks generally clear (high quantitative mean), though qualitative feedback suggested minor refinements for clearer assignment instructions.
2	Your gender	611	1.48 (0.51)	Course Content Difficulty	3	Quantitative scores showed moderate difficulty, but qualitative feedback highlighted specific topics needing clearer explanations or simpler language.
3	Please rate each of the following items: —1. The tasks of the online I&P course are clear.	611	4.55 (0.68)	Teacher's Teaching Style	3	High quantitative satisfaction with task clarity was supported by qualitative praise for teachers' clear, structured delivery, though some desired more varied instructional methods.

Table 5.14 continued

4	The rules of the online I&P course are clear.	611	4.54 (0.70)	Teacher Student Interaction	3	Students' strong agreement on clear course rules was reinforced by qualitative feedback highlighting the value of consistent teacher communication, with some requesting more real-time interaction.
5	My teacher is consistent and fair in enforcing the course rules.	611	4.57 (0.58)	Quality of Learning Materials	6	The high mean for fair rule enforcement matched qualitative praise for teachers' equitable approach, though some students wanted more varied, engaging supplementary materials.
6	I am well aware of the rules for submitting assignments in online learning (such as deadlines, format requirements, etc.).	611	4.54 (0.56)	Student Engagement	6	High quantitative awareness of assignment rules was supported by qualitative feedback valuing clear guidelines for active participation, with suggestions for more creative application opportunities.

Table 5.14 continued

7	I do not miss online learning courses without a reason.	611	4.62 (0.55)	Opportunities for Student Interaction	4	The high attendance rate indicated strong commitment, while qualitative feedback called for more varied, structured peer and group interaction opportunities.
8	I stay focused and fully engaged in online learning activities.	611	4.55 (0.50)	Learning Feedback Mechanism	7	While engagement was high, qualitative feedback—though less frequent—highlighted the need for more timely, constructive, and personalized feedback to enhance learning.
9	I actively participate in online I&P learning activities and strive to complete online learning tasks.	611	4.58 (0.71)	Abundance of Learning Resources	7	High active participation scores were supported by qualitative appreciation for accessible resources, with some students requesting a broader range of supplementary materials.

Table 5.14 continued

10	Recognizing the advantages of online I&P learning enhances my learning outcomes.	611	4.57 (0.97)	Course Design Rationality	3	Strong agreement on online learning's advantages was echoed in qualitative praise for flexibility, with some suggesting design tweaks for smoother flow and reduced cognitive load.
11	I actively ask questions during class discussions in the online I&P course to seek answers.	611	4.50 (0.67)	Course Evaluation Method	3	High question-asking rates were supported by qualitative feedback showing students felt comfortable seeking clarification, though some wanted more varied and flexible assessments beyond traditional tests.
12	I invest considerable effort in online learning for the I&P course.	611	4.46 (0.66)	Learning Autonomy	8	High reported effort aligned with qualitative feedback valuing self-directed learning and pacing control, though some students sought more choice in learning activities.

Table 5.14 continued

13	I am confident that I perform well and achieve good grades in the online I&P course.	611	4.51 (0.71)	Student Classroom Engagement	4	High confidence in performance matched qualitative feedback on active participation, with suggestions to enhance interactive elements for greater engagement.
14	The flexibility of online learning allows me to effectively balance my studies and other responsibilities.	611	4.52 (0.83)	Technical Support	6	Agreement on flexibility's benefits was echoed in qualitative feedback, though concerns about inconsistent or slow technical support highlighted the need for faster, more accessible assistance.
15	I believe that online learning has increased my sense of control over my self-directed learning.	611	4.52 (0.65)	Online Learning Experience	5	Quantitative data affirmed students' strong sense of control in self-directed learning, while qualitative feedback suggested adding more dynamic, less passive content to enhance the online experience.

Table 5.14 continued

16	I set personal goals for the online I&P course to guide my activities during sessions.	611	4.53 (0.60)	Assignments and Assessments	5	High quantitative goal-setting was supported by qualitative feedback on students' proactive learning, with calls for more varied and creative assignments.
17	I have effectively achieved my course learning objectives, such as mastering knowledge and enhancing skills, through online learning.	611	4.52 (0.82)	Sources of Learning Motivation	6	Strong agreement on achieving objectives aligned with qualitative feedback on intrinsic motivation, though some wanted clearer links between content and real-world applications for greater relevance.
18	The tools used in online learning (such as LMS, video conferencing) help me complete my learning tasks.	611	4.51 (0.63)	Innovative Teaching Methods	9	High ratings for helpful tools were tempered by qualitative suggestions to use them in more varied and innovative ways to boost engagement.

Table 5.14 continued

19	I am able to effectively participate and express my opinions in discussions and interactions in online courses.	611	4.47 (0.68)	Effectiveness of Teacher Guidance	7	High scores for participation and opinion expression were backed by qualitative praise for teacher-led discussions, with suggestions for more structured debates.
20	I believe that interaction and collaboration with other students in online learning are beneficial to my studies.	611	4.49 (0.69)	Classroom Atmosphere	3	Strong agreement on peer interaction benefits was echoed qualitatively, with some students wanting a more supportive and less intimidating atmosphere.

Table 5.14 continued

21	I think the current division of labor in online learning (such as teachers, students, technical support) effectively supports the smooth progress of the course.	611	4.52 (0.85)	Course Attractiveness	7	High satisfaction with division of labor was reported, though qualitative feedback noted a lack of novelty, suggesting the course could be more engaging.
22	I am very satisfied with the technical support services of the online learning platform.	611	4.52 (0.80)	Learning Pressure	7	High satisfaction with technical support was reported, but qualitative feedback cited specific issues and related stress, suggesting a need for smoother support.
23	I believe they have a positive impact on my learning experience.	611	4.52 (0.65)	Student Peer Communication	6	Students generally agreed on course benefits, with qualitative feedback highlighting the value of peer communication and suggesting more structured opportunities to support it.

Table 5.14 continued

24	My teachers' support and feedback in online classes are timely and helpful.	611	4.54 (0.72)	Ease of Using Learning Platforms	3	Quantitative scores reflected timely and helpful teacher support, while qualitative feedback noted occasional platform navigation issues that hindered learning ease.
25	I prefer online learning because it allows me to create and expand my social circle.	611	4.43 (0.64)	Social Interaction	5	Online learning helps expand social circles and enhances social experience.
26	Online learning courses are interesting and interactive due to the opportunities for interacting with other students and building a sense of community.	611	4.50 (0.74)	Cultivation of Critical Thinking	3	High quantitative agreement on course interest and interactivity was supported by qualitative feedback calling for more targeted activities to foster deeper critical thinking.

Table 5.14 continued

27	I know how to solve common technical problems that may arise during online learning.	611	4.47 (0.53)	Improvement in social Political Awareness	5	High quantitative self-efficacy in technical problem-solving was complemented by qualitative feedback highlighting increased social and political awareness, with students requesting more discussions on current affairs.
28	I am familiar with commonly used online communication tools such as email, forums, and video conferencing.	611	4.50 (0.53)	Value Formation	8	High quantitative familiarity with communication tools was complemented by qualitative feedback showing positive effects on value formation, with students requesting more diverse perspectives to expand their understanding.

Table 5.14 continued

29	The online learning platform provides a medium for me to discuss my ideas.	611	4.49 (0.86)	Application of Real-World Cases	4	High quantitative agreement that the platform supported idea discussion was observed, while qualitative feedback emphasized students' desire for more frequent and direct application of course concepts to real-world situations.
30	The digital learning interface is simple, user-friendly, and easy to navigate.	611	4.51 (0.72)	Space for Discussion	9	High quantitative satisfaction with the user-friendly interface was noted, while qualitative feedback suggested adding more dynamic spaces for informal discussions and collaborative learning.
31	The online I&P course schedule provided by the teacher is well-organized.	611	4.52 (0.58)	Openness of Classroom	8	High quantitative agreement on well-organized schedules was supported by qualitative feedback valuing classroom openness, though some students wanted more flexibility to accommodate personal needs.

Table 5.14 continued

32	My teacher is active in online class discussions, effectively engaging students.	611	4.52 (0.54)	Diverse Learning Methods	9	Strong quantitative agreement on active teacher engagement in discussions was reinforced by qualitative feedback, with suggestions to incorporate more diverse teaching methods to suit different learning styles.
33	When I ask questions, the teacher usually responds in a timely manner.	611	4.52 (0.62)	Course Adaptability	7	High quantitative agreement on timely teacher responses was complemented by qualitative feedback emphasizing the need for course content to align with current events and student interests to enhance relevance.

Table 5.14 continued

34	I can contact my teacher anytime when I need help and get assistance.	611	4.52 (0.52)	Course Satisfaction	3	High quantitative confidence in contacting teachers aligned with overall course satisfaction in qualitative feedback, though some students suggested more proactive instructor check-ins.
35	My teacher can effectively handle inappropriate interactions in the online classroom.	611	4.52 (0.86)	Teacher Encouragement for Engagement	5	High quantitative agreement on managing inappropriate interactions was consistent, while qualitative feedback suggested more explicit teacher encouragement to enhance engagement.
36	I actively reach out to classmates to discuss course content.	611	4.49 (0.92)	Knowledge Retention	7	High quantitative reports of reaching out to classmates were noted, with qualitative data suggesting more activities to support long-term retention of course knowledge.

Table 5.14 continued

37	I am happy to help my classmates in the online classroom.	611	4.50 (0.64)	Understanding of Social Issues	4	High quantitative willingness to help classmates was observed, complemented by qualitative feedback calling for deeper discussions on contemporary social issues.
38	I am willing to share and exchange my online learning experiences and insights with other students.	611	4.51 (0.54)	Course Engagement	4	High quantitative willingness to share insights was observed, while qualitative feedback suggested that course engagement could improve with more interactive platforms and structured discussions.
39	I strive to collaborate with classmates to learn together and solve problems.	611	4.51 (0.56)	Development of Learning Habits	5	High quantitative commitment to collaboration was noted, while qualitative feedback emphasized developing consistent learning habits and suggested more self-assessment tools.

Table 5.14 continued

40	I frequently engage in online discussions with classmates about the course content.	611	4.50 (0.77)	Expression of Personal Opinions	4	High quantitative frequency of online discussions was supported by qualitative data showing students valued sharing opinions, though some wanted more diverse perspectives included.
41	I submit the assigned online class assignments on time.	611	4.54 (0.51)	Quality of Interaction	7	High quantitative on-time assignment submission was evident, but qualitative feedback suggested interactions could be improved with more substantive and constructive exchanges.
42	I regularly visit the course website to check for the latest learning materials and notifications.	611	4.50 (0.66)	Teacher's Guidance Approach	7	High quantitative website-checking regularity was noted, and qualitative feedback praised proactive and supportive teacher guidance.

Table 5.14 continued

43	I have a strong interest in the materials for the online ideological and political course.	611	4.47 (0.67)	Online Teaching Management	7	High quantitative interest in course materials was observed, while qualitative feedback suggested streamlining online teaching management for a smoother learning experience.
44	I study the online course materials promptly.	611	4.50 (0.70)	Discussion Environment	9	High quantitative promptness in studying materials was supported by qualitative feedback emphasizing the value of a supportive discussion environment, with suggestions for more focused moderation.
45	My teacher has strong online teaching skills and classroom management abilities.	611	4.53 (0.61)	Classroom Concentration	4	High quantitative agreement on teacher skills was observed, with qualitative feedback indicating that effective classroom management aided student concentration, despite some online-specific distractions.

Table 5.14 continued

46	I have a voice in shaping course content and activities of the online course.	611	4.46 (0.76)	Learning Burden	7	High quantitative sense of having a voice was reported, while qualitative feedback noted concerns about learning burden and suggested improvements in pacing and workload management.
47	In online teaching, my teacher respects our individuality while also setting strict requirements for us.	611	4.54 (0.64)	Team Collaboration Opportunities	8	High quantitative agreement on respectful yet strict teaching was reported, with qualitative feedback highlighting the need for clearer and more effective team collaboration opportunities.
48	In online classes, students have equal opportunities to express their opinions.	611	4.47 (0.82)	Equal Participation	6	Students perceive online classes as providing equal opportunities for expression, which enhances overall class engagement.

Table 5.14 continued

49	The course content reflects my own experiences and perspectives.	611	4.49 (0.93)	Learning Gains	7	High quantitative agreement that course content reflects real experiences was observed, though qualitative feedback suggested learning could improve with more practical, hands-on application.
50	This course has increased my awareness of social and political issues.	611	4.52 (0.82)	Classroom Freedom	3	High quantitative agreement on increased awareness was observed, while qualitative feedback suggested that more structured opportunities for open debate could further enhance it.
51	This course has helped me establish a correct worldview, outlook on life, and values	611	4.53 (0.92)	Teacher's Incentive Mechanism	5	High quantitative agreement on value formation was observed, supported by qualitative data highlighting the effectiveness of the teacher’s incentive mechanisms.

Table 5.14 continued

52	I am encouraged to question the information presented in the course.	611	4.48 (0.55)	Knowledge Application Ability	7	High quantitative encouragement to question information was evident, with qualitative data highlighting students' desire for more opportunities to apply theory to practice, enhancing knowledge application.
53	I frequently analyse the information presented in class.	611	4.49 (0.97)	Summary of Learning Experience	9	High quantitative frequency of information analysis was noted, with qualitative feedback suggesting more regular opportunities for summarizing learning experiences to strengthen understanding.
54	I enjoy participating in I&P practice activities after taking this course.	611	4.51 (0.95)	Future Course Suggestions	5	High quantitative enjoyment of practice activities was observed, with qualitative feedback offering specific suggestions to improve future course design and content.

Table 5.14 continued

55	My input is valued in class decisions.	611	4.48 (0.96)	Overall Course Evaluation	6	High quantitative agreement on valued input was observed, with qualitative feedback offering a positive overall course evaluation while highlighting areas for improvement.
56	My teacher created an online learning environment that allows me to actively interact with my classmates.	611	4.53(0.63)	Course Content	7	High quantitative agreement on an interactive learning environment was observed, with qualitative feedback noting the environment's conduciveness but suggesting more engaging course content.

5.6 Chapter Summary

Chapter 5 presented a comprehensive analysis of SE in online I&P courses by integrating quantitative and qualitative findings. The quantitative analysis, using SEM, demonstrated how AT, SOI, and CP collectively shape overall SE. Complementing this, the qualitative analysis provided in-depth insights from student interviews, highlighting the importance of well-structured courses, effective technological tools, and content relevance to real-world contexts. Students also emphasized the value of social interaction and the role of CP in fostering critical thinking, self-expression, and meaningful participation.

The integration of quantitative and qualitative data offered a richer, more detailed understanding of student experiences. These insights inform potential improvements in online I&P courses, including enhanced feedback systems, more engaging and relevant content, and interactive learning environments. Continued research on AT, SOI, and CP can further refine strategies to support student development, ultimately cultivating empowered, critically minded learners and active global citizens.

CHAPTER 6

DISCUSSION

6.1 Introduction

This chapter provides a detailed synthesis and interpretation of the key findings from both the quantitative and qualitative analyses of this study. Grounded in a comprehensive theoretical framework encompassing Activity Theory (AT), Social Interaction Theory (SOI), and Critical Pedagogy (CP), the discussion elucidates the significant implications of our results in addressing the research questions. Rather than merely describing the findings, this chapter critically examines how the observed statistical relationships and comprehensive student perceptions contribute to a comprehensive and contextual understanding of online SE in Ideological and Political (I&P) courses within Chinese higher vocational education.

The chapter begins by briefly restating the overall purpose of the study and the research questions, followed by an outline of the discussion's structure. It then summarizes the main research findings and provides a detailed analysis of how these findings relate to the research questions, the theoretical framework, and existing literature. Furthermore, the chapter highlights the unique contributions of this study to the current body of knowledge, offers practical recommendations for teaching, and proposes concrete directions for future research. This organized approach ensures a thorough review of the findings while clearly articulating the study's theoretical and practical significance.

6.2 Summary of Key Findings

This study adopted a convergent parallel mixed-methods approach to comprehensively explore the complexities of SE in online I&P courses within higher vocational colleges:

6.2.1 Key Findings from Quantitative Analysis

SEM revealed significant positive influences of AT and CP on SOI, with AT exhibiting the most pronounced effect. SOI, in turn, showed a significant positive impact on SE, indicating that a well-structured learning environment with effective tool utilization, combined with pedagogical strategies that foster critical thinking and empowerment, can effectively promote student interaction and enhance overall engagement in online I&P courses. Furthermore, a higher-order factor comprising AT, SOI, and CP demonstrated a significant positive influence on SE, underscoring the synergistic importance of these theoretical frameworks. Kruskal-Wallis tests showed no statistically significant differences among students of different grade levels (first, second, and third year) across various SOI components (student-teacher interaction, student-student interaction, student-content interaction), suggesting that interaction patterns in online learning may be relatively stable across year levels. However, some trends indicated that first-year students faced more challenges in specific interaction dimensions.

6.2.2 Key Findings from Qualitative Analysis

Qualitative interviews provided rich insights into students' experiences, yielding two core themes: Building and Impact of Infrastructure in Online I&P Courses and Promoting SOI and SE. Regarding infrastructure, students highlighted the importance of clear course rules, high-quality learning materials, stable technical support, and the teacher's role in structural design. Elements of CP, including power relations, critical awareness, and empowerment, significantly shaped how students engaged with these structures. In terms of social interaction, the quality of student-teacher, student-student, and student-content interactions was crucial for engagement. Students expressed a desire for authentic, meaningful interactions and course designs that connected abstract content to real-life contexts. Collectively, these findings demonstrate that SE is a multifaceted and dynamic phenomenon, shaped by environmental structures, individual agency, and the quality of interactions.

6.3 Discussion of Findings with Research Questions, Theoretical Framework, and Literature

This section is the core of this chapter, delving into the meaning of each research finding and explicitly connecting them to the research questions, the study's theoretical framework (AT, SOI, CP), and relevant literature.

6.3.1 Discussion of Findings for Research Question (RQ) 1

RQ 1: What are the interrelationships among the first-order latent variables of AT, SOI, CP, and their connections to the higher-order latent factor in the context of online I&P courses within higher vocational colleges, as determined by SEM?

The SEM analysis revealed significant positive relationships between AT and CP with SOI, as well as a significant positive relationship between SOI and SE. AT exerted the most substantial impact on SOI, indicating that a well-structured online learning environment—with clear rules, practical mediating tools (e.g., learning platforms, resources), and organized tasks—can significantly facilitate student interaction in I&P courses. This aligns with Engeström's (1987) AT, which emphasizes that the coordinated functioning of subjects, objects, tools, rules, community, and division of labor is essential for achieving shared goals. When these elements are effectively organized, they provide a strong foundation for interaction; for example, clear task instructions and accessible online tools reduce communication barriers and foster collaboration. These findings also resonate with Salmon's (2004) five-stage model of online learning, which highlights that structured tools and rules are foundational for developing an interactive learning environment.

CP similarly demonstrated a significant positive effect on SOI, confirming Freire's (1970) advocacy for challenging traditional power structures, fostering critical thinking, and empowering students to stimulate deeper interaction. Students who feel free to express opinions and question authority in a safe, open environment are more motivated to engage in meaningful interactions with instructors and peers. This aligns with Hooks' (1994) concept of "education as the practice of freedom," where authentic dialogue emerges when students act as co-creators of knowledge rather than passive recipients. Pedagogical strategies such as anonymous discussion boards or debate-based activities provide platforms for students to articulate critical insights, enhancing both the depth and authenticity of social interaction.

Further, SEM results confirmed that SOI positively influenced overall SE, suggesting that higher-quality interactions—whether with teachers, peers, or content—lead to increased engagement. This supports Garrison, Anderson, and Archer's (2000) CI framework, which

posits that meaningful interaction among Cognitive Presence, Teaching Presence, and Social Presence is essential for deep learning. Similarly, Moore's (1989) theory of interaction emphasizes that learner-learner, learner-instructor, and learner-content interactions are vital for successful distance education. These results not only reinforce foundational theories but also contextualize them specifically within online I&P courses in Chinese higher vocational colleges.

Integration with qualitative findings further contextualizes these relationships. Students' high satisfaction with clear course tasks (quantitative mean = 4.55) corresponded with qualitative feedback praising teachers' structured guidance, supporting the importance of the "rules" element of AT in fostering positive interactions. Students also emphasized the value of open discussion spaces and critical, real-world content, confirming CP's role in enhancing SOI by promoting meaningful and reflective engagement. Collectively, these findings indicate that AT, CP, and SOI are intrinsically linked and work together to drive SE in online I&P courses.

6.3.2 Discussion of Findings for RQ 2

RQ 2: Are there significant differences in SOI—specifically in SOIST, SOISS, and SOISC—across different grade levels (first, second, and third year) in online I&P learning environments, as analyzed using the Kruskal-Wallis test?

The Kruskal-Wallis test results indicated no statistically significant differences among students of different grade levels in the three SOI components: SOIST, SOISS, and SOISC. This suggests that the overall nature of interaction experiences in online I&P courses—whether with teachers, peers, or content—does not fundamentally change with students' academic year. This finding contrasts with some studies, such as Mucundanyi

(2019), which found that learner characteristics, including grade level, may influence online interaction patterns. It may also imply that the standardized design and teaching methods employed in online learning environments mitigate the effect of grade differences on students' perceptions of interaction.

The non-significant findings in this study align with certain domestic research; for example, some studies have suggested that the convenience of online learning may overshadow differences in learning habits caused by traditional grade divisions, resulting in similar interaction frequencies and perceptions among students across different grades (Wang & Hsu, 2008).

However, despite the lack of statistical significance, qualitative findings revealed delicate differences and emerging trends that offer additional insights. For instance, in qualitative interviews, first-year students expressed a stronger need for technical support and clearer guidance compared to higher-grade students, sometimes reporting challenges in adapting to online learning tools and interaction norms. This may explain why, although overall interaction levels are similar, students new to online learning may experience higher adaptation costs in certain interaction areas.

Higher-grade students (second and third year) likely have developed stronger self-regulation skills and online learning strategies, enabling them to demonstrate greater independence in interaction—for example, by organizing WeChat group discussions on learning content without guidance. This qualitative observation aligns with Schunk's (2012) theory of self-regulated learning, which theorizes that learners' metacognitive and behavioral strategies develop with experience, allowing them to adapt more effectively to various learning environments, including online interactions.

The combination of these non-significant quantitative results with subtle qualitative differences suggests that SOI components may be more influenced by environmental factors such as course design, teaching strategies, and platform features, rather than by students' inherent grade-level characteristics. Online course designers and instructors should therefore focus on providing universally accessible interaction mechanisms and support systems, rather than tailoring designs solely based on grade level. Additionally, the qualitative data highlight that even if average levels show no significant differences, individual and within-group experiential differences exist, warranting targeted attention—especially in providing comprehensive online learning support for lower-grade students.

Table 6.1: Differences in Student Interaction Across Grade Levels in Online I&P Course**s**

No.	Sub-Questions	Findings
1.	Do the three grade levels show significant variation in teacher-student interaction?	No statistically significant differences in the frequency or types of SOIST across first, second, and third-year students. Descriptive data revealed uniformity. Qualitative results showed consistent engagement across communication modes (e.g., email vs. discussion boards).
2.	Do the three grade levels differ significantly in student-student interaction?	No significant differences in SOISS. Mean scores for SOISS lagged behind SOIST and SOISC. Reduced on-campus activities may affect students' sense of connection, but social media and informal channels maintain peer relationships, especially for seniors.

Table 6.1 continued

3.	Do the three grade levels show significant variation in student-content interaction?	No statistically significant differences in SOISC across grade levels. Self-reported patterns were consistent, but further research, such as behavioral tracking, could offer more refined insights. Qualitative data suggests underlying drivers for engagement, and future research may consider a more multifaceted model of self-regulated learning.

6.3.3 Discussion of Findings for RQ 3

RQ 3: How do students perceive and experience the interplay between AT, SOI, and CP within online I&P courses? Additionally, how do these experiences influence their engagement and learning outcomes, as explored through qualitative methods?

This section analyzes the qualitative research findings to address RQ 3. The data revealed a range of interrelated factors shaping SE and learning experiences, which can be organized into two overarching themes:

i. **Building and Impact of Infrastructure in Online I&P Courses:**

The infrastructure of online I&P courses serves as the foundation of students' learning activities. It encompasses not only the material dimension of technological tools but also elements from AT—such as rules, subjects, division of labor, and community—alongside considerations from CP, including power relations, critical awareness, and empowerment. Together, these elements form the structural environment that shapes student participation and learning.

Qualitative findings highlighted that clearly defined rules and explicitly assigned roles (e.g., discussion group leader, group coordinator) are essential for creating a structured learning environment. This supports the rules element of AT, which provides behavioral norms and reduces uncertainty, thereby enhancing responsibility and focus. For example, strict attendance policies and interaction protocols were seen by students as mechanisms for maintaining order and engagement—particularly for first-year students adapting to online learning. These findings are consistent with Means et al. (2014), who found that clear structural frameworks improve student success in online learning by helping learners maintain direction in otherwise unstructured environments.

As subjects in the learning activity, students' psychological states, self-efficacy, motivation, and self-regulation abilities directly influence their engagement. The data indicated that successful adaptation to online learning requires strong self-directed learning and time management skills. Students with prior online experience demonstrated greater independence, while those lacking such experience needed more external guidance. This finding reflects AT's emphasis on the active role of the subject in managing resources to meet the challenges posed by the object of learning and mediating tools. It also aligns with Pintrich's (2000) model of self-regulated learning, which highlights the importance of individual beliefs and strategies for performance in autonomous learning environments.

The construction of community in online learning is critical for social and emotional engagement. While students generally missed face-to-face interaction, purposefully designed collaborative tasks (e.g., structured group discussions, case analyses) fostered belonging and enhanced learning outcomes. This mirrors AT's concept of community as a collective sharing an activity system, where a strong sense of belonging provides emotional support and facilitates cooperation. These findings further support Cleveland-Innes and

Campbell's (2012) emphasis on social presence as a determinant of learning satisfaction and deep learning, with effective community building significantly enhancing that presence.

A stable, user-friendly technological infrastructure is a vital mediating tool for sustaining online learning activities. Platforms such as ClassIn and MOOCs were found to improve coordination and accessibility. However, technical issues—such as unstable internet connections—were reported as direct barriers to engagement. Digital features like adaptive video resolution, pre-recorded lectures, and interactive whiteboards significantly boosted cognitive engagement. These findings align with Vygotsky's (1978) view of tools as essential mediators in human activity, with the quality of these tools directly influencing the success of the learning process.

An effective division of labor within team projects improved collaboration efficiency and strengthened accountability. When tasks matched members' strengths and interests, both productivity and engagement increased. This reflects AT's notion that clear roles and responsibilities optimize collective efforts in achieving the object of learning. It also supports Johnson and Johnson's (1999) cooperative learning principle of positive interdependence, where well-defined responsibilities encourage shared commitment and collaborative success.

Power dynamics in the online classroom shaped students' willingness to participate and the forms that participation took. Some students hesitated to challenge teachers' views due to perceived hierarchies, which limited open expression and critical dialogue. Anonymous discussion forums were reported to mitigate these effects by enabling more equitable participation. This aligns with CP's focus on power relations, which emphasizes designing learning environments that dismantle hierarchical barriers to foster authentic

dialogue. The findings here support Freire's (1970) critique of "banking education," where unidirectional knowledge transfer suppresses student agency.

Students' critical awareness—their recognition of their positionality in academic discourse—was strongly shaped by how teachers facilitated debate and encouraged independent thinking. Courses that integrated real-world socio-political cases promoted a stronger sense of empowerment and civic engagement. While I&P education is inherently tied to moral and civic development, overly abstract content was found to reduce participation. In contrast, debates that encouraged students to form their own perspectives enhanced both cognitive and participatory engagement. This reflects CP's aim of fostering the capacity to critically analyze social issues and take informed action (Giroux, 1988). When I&P content connects with students' lived experiences and contemporary social realities, it is more likely to cultivate transformative engagement.

ii. **Promoting Social Interaction and Student Engagement:**

Social interaction in online learning encompasses students' engagement with teachers, peers, and course content. These interactions profoundly shape overall engagement and learning outcomes in virtual environments, with high-quality interaction being essential for fostering participation, connection, and motivation.

In online learning environments, teachers take on multiple roles—as facilitators, organizers, and evaluators. Effective instructors adapt their teaching strategies to create interactive and motivating experiences, shifting from passive lecturing to active guidance and discussion leadership to boost participation. Students reported that direct interaction with teachers—especially when instructors shared personal experiences—made learning more engaging and effective. Transparent and flexible grading criteria, along with

constructive feedback, were viewed as critical for sustaining academic motivation. Furthermore, teachers' flexible management in synchronous classes, including offering diverse avenues for participation, contributed to a more inclusive and dynamic environment. These findings align with Anderson's (2003) concept of *Teaching Presence*, which emphasizes the instructor's role in designing, facilitating, and directing cognitive and social processes to foster effective interaction and investment in learning.

Respectful peer communication—free from inappropriate remarks—was identified as essential for creating an inclusive and constructive environment that supports engagement. A respectful atmosphere encouraged students to share insights without fear of criticism, thereby enhancing critical thinking and promoting a deeper understanding of I&P concepts. Students valued exposure to diverse perspectives, which prompted them to think more deeply and develop richer interpretations of course material. These observations are consistent with Vygotsky's (1978) sociocultural theory and the concept of ZPD, which suggests that learners can achieve higher levels of understanding through collaboration. Ensuring etiquette in online discussion platforms and providing teacher guidance were identified as crucial for maintaining the quality of peer interaction.

Students consistently emphasized the importance of linking fundamental concepts in online I&P courses with contemporary societal contexts, viewing this connection as key to meaningful cognitive and emotional engagement. They criticized outdated materials and the lack of integration with current social developments, noting that real-world examples substantially improved both understanding and emotional investment. Many called for a shift beyond theoretical instruction toward experiential, application-oriented learning, suggesting tools such as case studies, simulations, and multimedia assignments. While students recognized the value of the courses in developing theoretical understanding and analytical

skills, they also reported challenges in applying concepts to real-world issues. This indicates that engagement can be strengthened through interactive learning opportunities and closer integration of theory with practice. These findings align with Dewey's (1938) experiential learning theory, which emphasizes "learning by doing" and connecting education to lived experiences. When course content resonates with students' realities, both cognitive relevance and emotional commitment are significantly enhanced.

6.4 Integration of Quantitative and Qualitative Findings (Comprehensive) (addressing RQ4)

RQ 4: How do the quantitative descriptive statistics (means and standard deviations) for individual student demographic characteristics and survey items align with the qualitative insights (themes and codes) into students' experiences and perceptions, providing a detailed understanding of SE in online I&P courses?

This section will explicitly discuss how the quantitative and qualitative findings inform and complement each other, offering a more comprehensive view of SE. The mixed-methods design of this study aimed to provide a multi-faceted perspective on SE in online I&P courses by combining quantitative and qualitative data. The results from both approaches showed convergence, divergence, and complementarity in several areas, collectively building a deeper understanding of the complex phenomenon.

6.4.1 Convergence

The quantitative analysis revealed a strong positive influence of AT on SOI, a relationship well supported by qualitative findings. In interviews, students consistently emphasized that clear course structures, explicit task instructions, and reliable technological

platforms—representing AT's "rules" and "mediating tools"—were essential for active participation. For example, clear task descriptions and user-friendly platforms were credited with enabling smoother engagement in online discussions and collaborative activities, aligning closely with the quantitative evidence of AT's positive impact on SOI.

Similarly, the significant positive effect of SOI on SE observed in the quantitative data was mirrored in qualitative accounts. Students described how meaningful student-teacher and student-student interactions fostered a sense of belonging, reduced isolation, and stimulated deeper cognitive engagement, ultimately increasing overall involvement. This is consistent with the critical role of social presence outlined in Garrison et al.'s (2000) CI framework.

The qualitative interviews also validated the quantitative trend that most students maintained a positive level of engagement during pandemic-driven remote learning. When asked about Question 24 (whether participants endorsed the quantitative findings on engagement in online I&P courses), most interviewees agreed that the metrics accurately reflected their experiences. They indicated that, despite the challenges of online learning, sufficient structural support—clear rules, effective mediating tools, and strong SOI—enabled them to sustain engagement.

Finally, both datasets reinforced the central importance of social interaction. The strong desire for meaningful connections expressed in interviews paralleled the quantitative finding of SOI's substantial influence on engagement, highlighting the need for online I&P course designs that actively promote rich, sustained interaction to meet students' social and emotional needs and strengthen their motivation to learn.

6.4.2 Divergence

The quantitative analysis found no statistically significant differences in SOI dimensions across grade levels. However, qualitative findings revealed indirect but meaningful variations in how students of different grades adapted to online learning and interaction. For example, first-year students encountered more challenges with technical operations and self-regulation, while upper-year students demonstrated greater autonomy. This divergence—between "no statistical significance" in the survey data and clear experiential differences in interviews—suggests that while overall averages may appear similar, practical contexts may require differentiated support strategies for distinct grade groups. It also cautions against overlooking individual differences hidden behind aggregate results.

Although engagement levels appeared comparable across grades in the quantitative data, interviews highlighted rich personal narratives and emotional fluctuations that standard surveys often fail to capture. In response to Q24, students stated that quantitative tools overlook the discomfort, anxiety, or confusion triggered by technical challenges—particularly among lower-year students unfamiliar with online platforms. These unmeasured factors could reduce motivation and confidence, highlighting the limitations of relying solely on numerical indicators to assess engagement.

Responses to Q25 reinforced this gap. Students emphasized aspects such as self-regulation, reliance on social support networks, adaptability to new environments, and evolving professional identity—especially among second-year students balancing academic demands with aspirations to become teachers. A single numerical score cannot adequately capture the psychological pressures of managing multiple roles. This finding resonates with

AT's focus on the subject's agency within a learning system and with CP's emphasis on empowerment and individual development.

When asked Q26 and Q27 about alignment with quantitative trends, most students reported gradually adapting to online learning by leveraging both peer and instructor resources to balance academic and personal demands. Yet a minority expressed distrust of technology, concern over the loss of "authenticity," or skepticism toward the long-term value of distance education. These divergences were often shaped by academic stage, prior learning experiences, familiarity with online tools, and the collaborative culture of peer groups. Within the AT framework, this suggests that even when subjects share the same object (online I&P courses) and mediating tools (technology platforms), differing internal contradictions and external contexts can lead to varied actions and outcomes.

6.4.3 Complementarity

The qualitative data provided rich explanatory depth to the quantitative results, illuminating the why and how behind the patterns revealed in the statistical models. For example, while the SEM analysis indicated a positive influence of CP on SOI, qualitative interviews revealed the specific mechanisms driving this effect. Students described being more willing to engage in deep, sustained interaction—such as anonymous discussions—when teachers encouraged critical thinking, created open discussion spaces, and supported challenges to prevailing viewpoints. In this way, CP fosters SOI by reshaping "power relations" and cultivating "critical awareness."

Similarly, while quantitative analysis demonstrated that a higher-order factor comprising AT, SOI, and CP positively influenced engagement, qualitative accounts vividly illustrated how these theoretical elements converge in practice. Students spoke of

disengagement when course content felt abstract or "dry," and of heightened motivation when real-world cases and simulations connected theory to practice. These narratives offered concrete, lived examples of the theoretical model at work, deepening the interpretation of statistical relationships.

Quantitative tools can position students along an engagement continuum, but they often miss the deeper psychological and contextual dynamics shaping behaviors. Qualitative data uncovered factors such as preferences for face-to-face learning, evolving time management strategies, and the development of self-efficacy and adaptability. These examples demonstrated how CP—by empowering students to voice opinions and engage critically—stimulates meaningful discussion and interaction. When students were encouraged to interrogate content and articulate their perspectives, engagement shifted from passive compliance to active investment, reflecting both critical awareness and altered classroom power dynamics.

Interview data also shed light on informal leadership within online learning communities, as students used digital platforms to coordinate group tasks, share resources, and assume peer-support roles. This extends the understanding of SOI beyond formal teacher–student exchanges to include self-organized networks that sustain engagement and belonging. Within AT, this reflects the "division of labor" and "community" dimensions, where learners collaborate toward shared goals, distributing responsibilities to maintain momentum in the learning process.

These insights highlight the value of mixed-methods research. Quantitative data offers a broad, generalizable overview of SE patterns, informing policy and course design. Qualitative inquiry adds narrative depth, capturing the diversity of experiences, emotional

landscapes, and social dynamics that shape learning outcomes—particularly in subjects like I&P, where issues of social responsibility, professional identity, and peer relationships are central. For instance, responses to Q24–Q27 revealed the distinctive context of pandemic-driven mandatory online learning, where some students developed over-reliance on technology while others grew resistant to it. Recognizing such contextual finer details is essential when considering the transferability of findings.

Overall, these complementary findings highlight that SE in online I&P courses is multi-dimensional and dynamic, shaped by the interplay of technological infrastructure, course design, teaching strategies, and social interaction. Focusing on a single factor risks oversimplifying this complexity. By integrating the convergences, divergences, and complementarities revealed through both quantitative and qualitative data (as summarized in Table 5.12, Chapter 5), this study provides a robust foundation for designing more engaging, inclusive, and effective online I&P learning experiences.

6.5 Study's Contribution

This mixed-methods investigation makes several original contributions to the literature on SE in online I&P courses within Chinese higher vocational colleges:

i. *Filling a critical research gap*: As outlined in Chapter 2, prior research on SE in online I&P courses at Chinese higher vocational institutions has been fragmented, lacking a comprehensive and systematic analysis of the phenomenon and its underlying factors. This study directly addresses that void by integrating quantitative and qualitative data to present a detailed, contextualized portrait of engagement and its determinants in this specific educational setting.

ii. *Introducing and validating a unified theoretical framework*: This research innovatively combines AT, SOI, and CP into a single analytical model. The framework was empirically tested through both SEM-based quantitative analysis and in-depth qualitative inquiry, demonstrating its explanatory power for the Chinese online I&P context. The findings clarify how AT and CP influence SOI and, in turn, enhance engagement—providing an integrated, theory-driven understanding of multi-dimensional engagement in online I&P courses.

iii. *Providing actionable, evidence-based recommendations*: The study identifies key priorities for improving online I&P course design and delivery: strengthening digital infrastructure, enhancing teacher–student and peer-to-peer interaction, aligning content with real-world issues, and embedding opportunities for critical thinking. These recommendations address the gap—highlighted in previous literature—for "specific and contextualized pedagogical strategies" tailored to Chinese higher vocational I&P education.

iv. *Re-centering the role of CP*: The findings highlight CP's importance in fostering critical reflection, challenging entrenched power structures, and empowering students toward deeper engagement. This expands the pedagogical discourse around I&P courses, demonstrating CP's potential as a driver of both social awareness and academic involvement—an area largely overlooked in existing scholarship.

v. *Serving as a methodological case study*: By successfully integrating quantitative modeling with qualitative thematic analysis, this research illustrates the benefits of a mixed-methods approach for examining complex educational phenomena. It validates theoretical relationships while providing detailed, context-rich

explanations—offering a methodological blueprint for future inquiries into engagement in similarly complex learning environments.

6.6 Implications

The findings of this study have important implications for both theory and practice.

6.6.1 Theoretical Implications

The findings of this study contribute important theoretical insights AT, SOI, and CP, particularly within the context of Chinese online I&P education:

i. *Strengthening AT's explanatory power in online learning*: This study affirms the crucial role of AT elements—such as rules, mediating tools, and community—in shaping effective online learning environments. The results show that robust structural support (clear rules, reliable platforms, supportive communities) directly enhances social interaction, broadening AT's applicability in digital learning contexts. This supports Salmon's (2004) assertion that infrastructure underpins online participation, while extending AT's use beyond technology-focused perspectives to a more holistic view of the activity system.

ii. *Deepening the multi-dimensional understanding of SOI*: By examining the interplay between student–teacher, student–student, and student–content interactions, this study provides fresh empirical evidence of interaction's central role in fostering engagement. While quantitative findings revealed no significant grade-level differences, qualitative data highlighted the importance of interaction quality, urging researchers to focus on its qualitative dimensions and mechanisms. These findings

reinforce and extend Moore's (1989) interaction theory, showing how interaction takes on distinctive forms within China's cultural and educational context.

iii. *Highlighting CP's transformative potential in I&P education*: The results demonstrate that CP elements—such as shifts in power relations, critical awareness, and empowerment—can significantly enhance both social interaction and engagement. This provides strong support for CP's application in I&P courses, pointing to the need for pedagogical designs that encourage critical questioning, open dialogue, and real-world relevance. The findings resonate with Freire (1970) and Giroux (1988), emphasizing CP's role in cultivating socially aware and critically engaged citizens in ideologically significant courses.

iv. *Demonstrating the value of theoretical integration*: By successfully combining AT, SOI, and CP into a unified model, this study illustrates the advantages of a multi-theory approach in explaining complex educational phenomena. The strong influence of the higher-order factor on engagement suggests that future research should adopt similarly integrated models when examining learning environments where technological systems, social structures, and critical reflection intersect. This approach offers a robust framework for analyzing other complex educational systems.

6.6.2 Practical and Pedagogical Implications

The findings of this study translate into concrete recommendations for enhancing the design and delivery of online I&P courses. These implications are relevant to educators, instructional designers, institutional leaders, and students:

i. Optimize Online Learning Infrastructure:

a. *Clarify rules and roles*: Establish clear learning expectations, task requirements, and group role assignments at the outset. Reinforce these through consistent communication and reminders to strengthen responsibility and sustained engagement.

b. *Enhance platform efficiency*: Invest in stable, intuitive LMS and reliable network infrastructure. Provide accessible technical support to minimize participation barriers caused by technical issues.

c. *Ensure resource quality*: Curate and maintain high-quality, accessible, and regularly updated learning materials—text, video, and multimedia—that align with course objectives and student needs.

ii. Enhance Interaction Across All Dimensions:

a. *Student–teacher interaction*: Employ varied strategies such as timely feedback, personalized guidance, and live Q&A sessions to foster an open, responsive learning environment.

b. *Student–student collaboration*: Integrate meaningful, structured group projects, online debates, and collaborative tasks that promote peer learning and mutual support.

c. *Student–content engagement*: Design content that is relevant and timely, incorporating current social issues, real-world case studies, and practical applications. Encourage critical reading and analytical discussion to help students connect theory with practice.

iii. Apply CP Principles:

a. *Encourage critical dialogue*: Create a safe, inclusive online space for diverse perspectives, using tools like anonymous forums or structured debates to lower participation barriers and foster open discussion.
b. *Foster critical awareness and empowerment*: Integrate problem-based, real-world case studies to prompt analysis of social justice issues, power relations, and systemic challenges, strengthening students' agency and problem-solving abilities.
c. *Provide empowering feedback*: Deliver constructive, timely, and developmental feedback that supports critical thinking, builds self-efficacy, and motivates ongoing improvement.

iv. *Strengthen Teacher Professional Development*: Offer ongoing training in online pedagogy, interaction facilitation, and CP approaches. Equip educators to manage digital platforms effectively, design engagement-oriented activities, and address the unique challenges of online I&P education.

6.7 Limitations of the Study

While this study offers valuable insights into SE in online I&P courses, several limitations should be acknowledged:

i. *Sample scope and representativeness*: The research sample primarily comprised students from Chinese higher vocational colleges, with a relatively modest sample size. This limits the generalizability of the findings to other contexts, such as undergraduate or postgraduate programs, and to online I&P courses in different cultural or institutional settings. Future research should expand the sample scope and diversity to enhance the applicability of results.

ii. *Data collection constraints*: Although the study employed a mixed-methods design, the quantitative data relied on self-reported questionnaires, which are susceptible to social desirability bias and subjective interpretation. The qualitative component, while rich in detail, was based on a limited number of interviews, potentially leaving some experiential distinctions unexplored.

iii. *Cross-sectional design limitations*: The use of a cross-sectional design provided a snapshot of SE but could not capture changes over time. Longitudinal studies are needed to track the evolution of engagement patterns and the dynamic factors influencing them.

iv. *Operational complexity of the theoretical framework*: Integrating AT, SOI, and CP provided a robust analytical lens, but their conceptual complexity posed challenges for operationalization and measurement. Refining measurement instruments and indicators for these constructs would strengthen future applications of this model.

6.8 Recommendations for Future Research

Drawing on the findings and acknowledging the limitations of this study, several promising directions for future research emerge:

i. *Broaden research scope and sample diversity*: Future studies should include students from a wider range of higher vocational colleges and extend to other types of higher education institutions (e.g., undergraduate universities, graduate programs). Expanding into different disciplinary areas beyond I&P courses would help assess the universality and transferability of the present study's conclusions.

ii. *Adopt longitudinal research designs*: Tracking SE over longer periods—such as an entire semester or academic year—would provide insights into developmental

trajectories and temporal fluctuations. Longitudinal approaches could also clarify the causal pathways through which AT, SOI, and CP elements shape engagement over time.

iii. *Incorporate teacher perspectives*: This study focused primarily on student perceptions. Including teacher perspectives through surveys, interviews, or focus groups could reveal their experiences, strategies, and challenges in online I&P course delivery, as well as their interpretations of AT, SOI, and CP in practice. Such data would provide a more holistic view of the teaching–learning ecosystem.

iv. *Conduct pedagogical intervention studies*: Building on the present findings, future research could design, implement, and rigorously evaluate targeted interventions—such as platform optimizations, enhanced interaction structures, or critical thinking–oriented activities—using experimental or quasi-experimental methods. This would allow for more direct testing of specific strategies to boost engagement and learning outcomes.

v. *Undertake cross-cultural comparative studies*: Comparative research across different cultural contexts could explore how AT, SOI, and CP function in shaping online engagement under varying socio-cultural norms and educational traditions. Particular attention should be given to how cultural values influence perceptions of social interaction, authority, and critical dialogue.

vi. *Refine theoretical construct measurement*: Future work should aim to develop more precise and context-sensitive instruments for operationalizing key constructs within AT, SOI, and CP. This would improve the accuracy of measurement, facilitate cross-study comparability, and deepen understanding of how these theoretical elements interact in online learning environments.

6.9 Conclusion of the Discussion Chapter

This chapter has provided a comprehensive synthesis of the quantitative and qualitative findings, interpreted through the combined lenses of AT, SOI, and CP. The analysis highlights the crucial role of clear and well-structured course infrastructure, high-quality and purposeful social interaction, and pedagogical approaches that cultivate critical thinking and empower learners. Together, these elements emerged as essential drivers of SE in online I&P courses within Chinese higher vocational colleges.

The study contributes to both theory and practice by revealing the detailed interplay between structural, social, and critical dimensions of engagement, offering a richer understanding of the complexities inherent in this educational context. Furthermore, it advances actionable strategies for educators, course designers, and institutions to create more engaging, effective, and holistic online learning environments.

Ultimately, by continuously examining and refining these key factors, online I&P education can better equip students to become critically minded, socially responsible, and actively engaged citizens—capable of thoughtful participation in both academic and societal discourse.

CHAPTER 7

CONCLUSION

This study investigates how university students enrolled in Ideological and Political (I&P) courses adapted to and engaged with the rapid shift to online learning during the COVID-19 pandemic, and examines the impact of this large-scale instructional change on their overall learning experience. It focuses on how core elements from Activity Theory (AT), Social Interaction Theory (SOI), and Critical Pedagogy (CP)—including rules, subjects, objects, division of labor, community, mediating tools, and modes of social interaction—interact with dimensions such as power relations, critical consciousness, and empowerment. Adopting a mixed-methods design, the research provides an in-depth exploration of students' psychological, technological, and pedagogical experiences during this abrupt transition, offering a comprehensive understanding of the factors shaping engagement in this unique educational context.

7.1 Overview of Key Research Findings

Through the integration of quantitative and qualitative analyses, this study provides in-depth insights into SE in online I&P courses, yielding the following key findings:

7.1.1 Quantitative Findings

SEM results indicated significant relationships among AT, SOI, and CP, and overall SE. Both AT and CP had direct positive effects on SOI, which in turn significantly enhanced SE. These findings highlight the dynamic interplay between structural, social, and critical dimensions in shaping online learning experiences.

Kruskal–Wallis analysis found no statistically significant differences in SOIST, SOISS, or SOISC across first-, second-, and third-year students. However, the 2021 cohort recorded slightly higher mean scores in all three interaction dimensions. This pattern may reflect their stronger adaptability to online environments and more advanced digital communication skills, developed through having most of their learning take place online during the COVID-19 pandemic.

7.1.2 Qualitative Findings

Interviews revealed that students valued clearly articulated course rules, explicit expectations, and well-structured course design as foundational for effective engagement in online learning. Examples included requirements for camera use during synchronous sessions, transparent grading policies for asynchronous tasks, and organized LMS content with clearly presented assignments and deadlines.

Students highlighted the importance of accessible, responsive instructors who build trust and promote empowerment through timely feedback, regular check-ins, and personalized reminders. Peer collaboration—such as group discussions, online debates, and cooperative projects—was seen as highly effective in enhancing motivation and supporting self-directed learning.

While synchronous sessions preserved some benefits of face-to-face instruction, students reported emotional challenges, such as anxiety over being visible on camera, alongside technical difficulties. Strategies perceived as helpful included instructors reassuring students about the limited scope of on-screen visibility and using breakout rooms to create smaller, more private learning spaces.

Students' engagement with course materials depended on clear structure, diversity of presentation formats, and instructor responsiveness. Concise video lectures, interactive quizzes, and well-edited recorded sessions were particularly effective. From a CP perspective, opportunities for open discussion and questioning were seen as essential to fostering deeper engagement with I&P course content.

7.2 Research Contributions and Significance

This study makes a substantive contribution to the growing body of literature on blended and online learning, particularly in the context of rapid, large-scale shifts in instructional delivery prompted by the COVID-19 pandemic. By elucidating the relationships among AT constructs, SOI patterns, and the emancipatory aims of CP, this research advances theoretical understanding of how structural, social, and critical dimensions interact to shape SE in higher education.

Empirically, the study demonstrates that integrating CP principles into online I&P courses can significantly enhance social interaction and overall engagement—thereby addressing a documented gap in research on the pedagogical potential of CP in such contexts. In doing so, it not only validates the relevance of multi-theoretical frameworks in complex educational settings but also provides a robust evidence base for designing more inclusive, dialogic, and critically engaged online learning environments.

7.2.1 Theoretical Implications

This research provides robust empirical evidence for an integrated theoretical framework that unites the structural dimensions of AT, the relational dynamics of SOI, and the emancipatory orientation of CP. By demonstrating how these frameworks intersect, the

study highlights the value of cross-theoretical integration in capturing the multifaceted nature of online SE.

Importantly, the findings affirm the conceptual coherence of SE as a higher-order construct, in which AT, SOI, and CP operate not as isolated domains but as interdependent dimensions of a unified phenomenon. This reinforces the argument that understanding engagement in complex educational contexts—such as online I&P courses—requires a holistic lens that accounts simultaneously for technological infrastructure, interactional quality, and critical-reflective learning processes.

7.2.2 Practical and Pedagogical Implications

The findings yield actionable guidance for educators, instructional designers, and institutional leaders seeking to enhance SE in online I&P courses. They highlight the need for clear and consistent course guidelines, well-structured learning activities, and the intentional cultivation of meaningful social interaction—both between students and instructors and among peers.

Equally important is the integration of critical thinking and reflective dialogue into course design, ensuring that students are not only absorbing content but also engaging with it analytically and contextually. The results suggest that teaching strategies should be responsive to learners' prior online learning experiences and digital competencies, adapting methods to meet students where they are and progressively developing their engagement skills.

By combining structural clarity, interactive opportunities, and critical pedagogical approaches, educators can create online learning environments that foster sustained motivation, deeper understanding, and greater learner agency.

7.3 Conclusion

This study confirms that the COVID-19 pandemic has accelerated the digitization of vocational college education, creating both opportunities and challenges for enhancing SE and improving instructional quality in online I&P courses. To address these challenges, a broader integration of innovative instructional practices, digital tools, and research-based strategies is essential.

By leveraging digital analytics, strengthening digital literacy, and implementing ongoing, multidimensional evaluations, vocational colleges can improve the delivery of I&P courses while supporting students' sustained intellectual and civic development. These efforts will help build a stronger theoretical and practical foundation for future teaching in this field.

Ultimately, the goal is to create dynamic online learning spaces that foster knowledge co-construction, critical reflection, and community building. Drawing on insights from AT, SOI, and CP, such environments can cultivate empowered, critically minded learners who are prepared to engage actively and responsibly in society.

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APPENDICES

Appendix A: Missing Data Analysis

No	Valid	Missing	Minimum	Maximum
Gender	611	0	1	5
RUL1	611	0	1	5
RUL2	611	0	1	5
RUL3	611	0	1	5
RUL4	611	0	1	5
RUL5	611	0	1	5
RUL6	611	0	1	5
SUB1	611	0	1	5
SUB2	611	0	1	5
SUB3	611	0	1	5
SUB4	611	0	1	5
SUB5	611	0	1	5
SUB6	611	0	1	5
SUB7	611	0	1	5
SUB8	611	0	1	5
OBJ1	611	0	1	5
OBJ2	611	0	1	5
OBJ3	611	0	1	5
DIV1	611	0	1	5
DIV2	611	0	1	5
DIV3	611	0	1	5
DIV4	611	0	1	5
COM1	611	0	1	5
COM2	611	0	1	5
COM3	611	0	1	5

MET1	611	0	1	5
MET2	611	0	1	5
MET3	611	0	1	5
MET4	611	0	1	5
SOIST1	611	0	1	5
SOIST2	611	0	1	5
SOIST3	611	0	1	5
SOIST4	611	0	1	5
SOIST5	611	0	1	5
SOISS1	611	0	1	5
SOISS2	611	0	1	5
SOISS3	611	0	1	5
SOISS4	611	0	1	5
SOISC1	611	0	1	5
SOISC2	611	0	1	5
SOISC3	611	0	1	5
SOISC4	611	0	1	5
SOISC5	611	0	1	5
POR1	611	0	1	5
POR2	611	0	1	5
POR3	611	0	1	5
POR4	611	0	1	5
POR5	611	0	1	5
CRC1	611	0	1	5
CRC2	611	0	1	5
CRC3	611	0	1	5
CRC4	611	0	1	5
EMP1	611	0	1	5
EMP2	611	0	1	5
EMP3	611	0	1	5

Appendix B: Development of Qualitative Questionnaire Items and Their Theoretical Foundations

No	Items Original Source(Conceptual Basis/Original Question)	Items in this Study	Theoretical Linkages and Quantitative Construct	Author(s)/ Year
1	How active do you think you are when participating in online settings (reading other responses in discussions, collaborative work)? (eg)	What online learning tools do you frequently use in your online classes?	AT: MET; SOI: SOISC. Quantitative Link: MET	Liu (2021)
2	Describe situations in which your classmates have reached out to communicate with you? Would you give some details regarding how responsive your classmates are when you have questions to ask?	How do online learning tools and platforms help you participate in discussions and interactions? (OBJ)	AT: MET, OBJ; SOI: SOISS. Quantitative Link: MET, OBJ	Liu (2021)
3	What specific rules/procedures do your interaction instructors use to manage teaching?How do your instructors enforce these	How do you perceive the clarity of tasks and rules in online political education courses? Are the rules enforced fairly by the teacher? How do these factors affect	AT:RUL; CP:POR. Quantitative Link: RUL, POR	Liu (2021)

	rules/procedures consistently?	your learning participation? (RUL)		
4	How do technology and online tools enhance your learning experience? Can you discuss specific technologies or applications you have, or those you have seen used by your teachers/classmates, and how they support your online learning process.	How do you evaluate the impact of interacting and collaborating with other students on your online learning participation? Do the division of labor and technical support in online learning help you better engage in the course? (DIV)	AT: DIV, MET; SOI: SOISS. Quantitative Link: DIV, MET, SOISS	Cheng (2024)
5	I understand how to troubleshoot common technical issues that may arise during online learning. I am familiar with common online communication tools like email, discussion forums, and video conferencing.	How do you rate your ability to solve technical problems in online learning and use online communication tools? How do these skills affect your learning participation? How does the design of online learning platforms and interfaces enhance your learning experience? (MED)	AT:MET;SOI: SOISC. Quantitative Link: MET, SOISC	Leaston (2024)
6	Students use optional online resources to explore topics in more depth. In online teaching, the teacher encourages me to share differing viewpoints or	How has this course increased your awareness of social and political issues? How do you analyze and question information in online learning? (CRC)	CP:CRC, POR. Quantitative Link: CRC, POR	Martin & Bolliger (2018); Zhan

	experiences. In online learning, I am able to critically evaluate the teacher's viewpoints and raise questions.			g (2023)
7	Describe how your instructors respond to your questions? (Could be assignment requirements, technology issues, or something you are struggling to learn) Through what media? How do you think the question being solved?Would you give me an example of a time when your instructor gave you feedback in some other form (zoom call or etc.)	How do you evaluate the impact of your teacher's support and feedback in online courses on your learning participation? How has online learning helped you expand your social circle and increased your interest and interaction in learning? (COM)	AT:COM;SOI :SOIST. Quantitative Link: COM, SOIST	Liu (2021)
8	In online teaching, the teacher makes appropriate adjustments based on our suggestions and needs regarding the course,and enjoy interacting in my class.	In online classes, do your opinions get valued by the teacher? How does the online learning environment created by the teacher affect your interactions with classmates? (EMP)	CP: EMP, POR; SOI: SOIST,SOISS . Quantitative Link: EMP, POR, SOIST, SOISS	Liu (2021); Yang (2023)
9	In online teaching, the teacher sets strict	How do you evaluate the impact of your teacher's skills	CP:POR, EMP; AT:	Marti n &

	requirements while respecting our personalities./all students have equal opportunities to express their opinions./The teacher can formulate strategies for improvement or adjustment based on the cognitive, behavioral, and emotional states or changes of student groups or individuals, through methods such as learning guidance, resource recommendations, and adjustments to learning paths./Students search for and select applicable materials based on their interests.	and classroom management in online teaching on your learning participation? How much input do you have in shaping course content and activities? How does the teacher balance respecting individuality while setting requirements and ensuring equal opportunities for all students to express their opinions? (POW) ·	RUL.Quantitative Link: POR, EMP, RUL	Bolliger (2018); Tian (2021); Zhang (2023)
10	What courses have you enrolled in this semester?	Can you share which courses you chose to take this semester?	AT: OBJ. Quantitative Link: OBJ	Liu (2021)
11	How many courses are incorporating online learning components (asynchronous or synchronous lessons)? And what are they?	During and after the COVID-19 pandemic, how many of the courses you selected included online learning elements (whether	AT: OBJ. Quantitative Link: OBJ.	Liu (2021)

		asynchronous learning or synchronous live sessions)?		
12	Tell me about any online courses you have taken before Covid-19? How do you think those courses helped you engage with online aspects of your courses in this semester?	Before the COVID-19 outbreak, did you have any experience with online courses? Do you think these early online learning experiences helped you participate in online courses this semester? If so, in what specific ways, such as improving your self-directed learning skills, technical skills, or time management abilities?	AT:SUB; SOI: SOISC. Quantitative Link: SUB, SOISC	Liu (2021)
13	Why did you choose to take the courses you have enrolled in when you became aware that they would contain online learning components?	What motivated you to continue taking these courses when you learned they would include online learning components? Was it due to an interest in the course content, adaptability to the online learning mode, or other personal reasons?	AT:SUB,OBJ. Quantitative Link: SUB, OBJ	Liu (2021)
14	What specific rules/procedures do your interaction instructors use to manage teaching?	What specific rules or procedures did your teacher implement to effectively manage teaching activities?	AT: Rules (RUL). Quantitative Link: RUL	Liu (2021)

15	How do your instructors enforce these rules/procedures consistently?	How did your teacher consistently enforce these rules or procedures to ensure order and quality in teaching?	AT: Rules (RUL); CP: POR. Quantitative Link: RUL, POR	Liu (2021)
16	Describe how your instructors respond to your questions? (Could be assignment requirements,or something you are struggling to learn) Through what media? How do you think the question being solved?	How does your teacher respond to your various questions (such as assignment requirementsor learning challenges)? Through which mediums do they provide answers? How do you feel about this process and the responses?	SOI:SOIST;AT:MET. Quantitative Link: SOIST, MET	Liu (2021)
17	Could you tell me about a time when an instructor helped you solve a problem you were having with online aspects of a class? (Similarly, would you tell me about a time when you reached out for help and you were frustrated that the problem wasn't getting solved, or wasn't getting solved in a timely manner?)	Can you tell me about an instance where a teacher helped you solve a problem encountered in an online course? Similarly, can you share a time when you felt frustrated because a problem wasn't resolved or wasn't resolved promptly?	SOI:SOIST;AT: COM. Quantitative Link: SOIST, COM	Liu (2021)

18	Would you describe the organization of the courses designed by your instructors? (well-organized? Easy to find materials?)	How does your teacher design the course structure, including whether it is clearly organized and whether the learning materials are easy to find and use?	AT:OBJ; SOI: SOISC. Quantitative Link: OBJ, SOISC	Liu (2021)
19	Would you elaborate on your instructors' written feedback on works you have submitted?	Please elaborate on the written feedback your teacher provides on your assignments or projects. How has this feedback helped your learning?	SOI:SOIST. Quantitative Link: SOIST	Liu (2021)
20	Would you give me an example of a time when your instructor gave you feedback in some other form (zoom call or etc.)	Besides written feedback, does your teacher provide feedback in other forms (such as ClassIn meetings, instant messaging, etc.)? Please provide examples.	SOI:SOIST; AT: MET. Quantitative Link: SOIST, MET	Liu (2021)
21	Would you comment on your instructors' presence in class discussions (Zoom break-out rooms, enter each room to join discussion? Whole group, small groups)	How would you evaluate your teacher's performance in classroom discussions (such as ClassIn breakout rooms, whole-class or group discussions)? Do they actively participate and effectively guide the discussion?	SOI:SOIST;AT: COM. Quantitative Link: SOIST, COM	Liu (2021)

22	And would you describe on your instructor's presence in online discussion boards? Please describe your student-content.	Describe your teacher's participation in online discussion forums (such as forums, chat rooms, etc.). Do they frequently share insights and answer questions to foster student interaction and learning?	SOI:SOIST,SOISC. Quantitative Link: SOIST, SOISC	Liu (2021)
23	Please describe how you use Canvas? interaction Is it for reading materials, reading syllabus? (frequency)	How do you use platforms like ClassIn? Are they primarily used for reading learning materials or browsing the syllabus?	AT:MET; SOI:SOISC. Quantitative Link: MET, SOISC	Liu (2021)
24	In what way are you using Canvas differently since the Pandemic began?	How has your use of platforms like DingTalk or ClassIn changed or adjusted since the outbreak of COVID-19?	AT: MET. Quantitative Link: MET	Liu (2021)
25	How enthusiastic do you think you are about learning content that is provided online? (such as content accessed in instruction videos, reading materials in Canvas) Why?	How would you assess your enthusiasm for online learning resources, such as instructional videos and reading materials on platforms like DingTalk and ClassIn? Please explain the reasons behind this enthusiasm.	AT:SUB),OBJ;SOI: SOISC. Quantitative Link: SUB, OBJ, SOISC	Liu (2021)

26	Would you contrast your motivation toward learning when using online materials vs face-to-face experiences?	Compare how online learning materials stimulate your motivation compared to face-to-face learning. What are the similarities and differences?	AT:SUB,OBJ. Quantitative Link: SUB, OBJ	Liu (2021)
27	Describe your feelings about participating in class-related Zoom meetings. How have your feelings toward participating in Zoom changed since the Pandemic started?	Share your feelings about participating in class Tencent meetings and discuss whether these feelings have changed since the pandemic began.	AT:MET;SOI: SOISS, SOIST.Quantitative Link:MET,SOISS,SOIST	Liu (2021)
28	In which ways do you think Canvas facilitates your learning? In which ways does it interfere?	Analyze how online learning platforms (DingTalk, ClassIn, Tencent Classroom, Cloud Classroom, Rain Classroom) have facilitated your learning progress and in what ways they may have caused distractions or inconvenience.	AT:MET. Quantitative Link: MET	Liu (2021)
29	What do you like best (most enjoy) about interacting with classmates?	What do you most enjoy or like about interacting with your classmates? Is it academic discussions, teamwork, or other social interactions?	SOI:SOISS. Quantitative Link: SOISS	Liu (2021)

30	Would you tell me about your consistency in completing assignments? (Including all types of online works such as discussion board participation, project submission, reading reflections, etc.? (How much effort do you put into completing every assignment pre or post pandemic?)	How do you persist and complete online learning tasks (such as discussion board participation, project submissions, reading reflections)? Compare how much time and effort you put into these assignments before and after the pandemic.	AT:SUB;SOI: SOISC. Quantitative Link: SUB, SOISC	Liu (2021)
31	How do you think your efforts have paid off in terms of your own learning? Tell me about your experiences with grades Do you think the effort you have put into your courses have resulted in grades you have expected?	How do you feel your academic efforts have paid off in terms of academic achievements? Share your grade experiences and evaluate whether your efforts met your expected academic outcomes.	AT:SUB,OBJ. Quantitative Link: SUB, OBJ	Liu (2021)
32	Please talk about what interactive work interaction you have done with your classmates in class- related Zoom meetings. Tell me about the work you have done with	What forms of interaction activities did you have with your classmates in class Tencent meetings? Additionally, what collaboration and communication took place in online environments like	SOI:SOISS;AT: MET. Quantitative Link: SOISS, MET	Liu (2021)

	your classmates in any online environment (e.g., online discussion boards, collaborative assignments)?	discussion boards or group assignments?		
33	What specific strategies do you use to organize yourself in online aspects of your courses “To-do feature in Canvas? Calendar?	Describe the specific strategies you use to manage and organize your online course learning. For example, do you use the "to-do list" feature or other calendar tools on DingTalk or ClassIn to help plan your studies?	AT:SUB;SOI: SOISC. Quantitative Link: SUB, SOISC	Liu (2021)
34	How active do you think you are when participating in online settings (reading others responses in discussions, collaborative work)?	How would you evaluate your level of activity in participating in online learning settings (such as responding to reading discussions, participating in collaborative tasks)?	AT:SUB;SOI: SOISS. Quantitative Link: SUB, SOISS	Liu (2021)
35	Would you give some details regarding how responsive you are when your classmates have questions for you?	When classmates ask you questions, how do you typically respond? Please describe your approach and attitude in detail.	SOI:SOISS. Quantitative Link: SOISS	Liu (2021)
36	Describe situations in which you have reached out to communicate with your classmates outside of the class? Can you give an	Describe your interactions with classmates outside of the classroom. Can you provide a specific example of how these interactions took place? Were	SOISOISS;AT: COM. Quantitative	Liu (2021)

	example? (Is it related to the course material or persona topics?)	these interactions related to course materials or did they involve personal topics?	Link: SOISS, COM	
37	Describe situations in which your classmates have reached out to communicate with you? Describe some details regarding how responsive your classmates are when you have questions.	How do your classmates maintain contact with you? When you need to ask classmates questions, how do they usually respond? Can you provide some specific details to illustrate this?	SOI:SOISS;AT: COM. Quantitative Link: SOISS, COM	Liu (2021)

Appendix C: Modified Quantitative Items Based on Evaluators′ Comments

No	**Construct /Item**	**Before Evaluators' Comments**	**After Evaluators' Comments**	**Rationale**
1	RUL-1	The tasks and rules of the online political education course are very clear.	The tasks of the online I&P course are clear.	Split original item into RUL-1 (tasks) and RUL-2 (rules) for clarity and specificity.
2	RUL-2	The tasks and rules of the online political education course are very clear.	The rules of the online I&P course are clear.	Separated "tasks" and "rules" to avoid ambiguity and ensure precise measurement.
3	SOI-ST-1	The online political education course schedule provided by the	The online I&P course schedule provided by the	Updated terminology from "political

		teacher is orderly and well-organized.	teacher is well-organized.	education" to "ideological and political" for consistency with course naming.
4	SUB-1	You actively participate in online political education learning activities and strive to complete the online learning tasks.	I actively participate in online I&P learning activities and strive to complete the online learning tasks.	Shifted from second-person ("you") to first-person ("I") to align with standardized survey language.
5	SUB-2	Recognizing the advantages of online political education learning, you enhance your learning outcomes.	Recognizing the advantages of online I&P learning enhances my learning outcomes.	Simplified phrasing and adjusted to first-person perspective for direct respondent engagement.
6	SOI-ST-2	Your teacher is active in online class discussions and can effectively engage students.	My teacher is active in online class discussions, effectively engaging students.	Improved sentence structure for readability and removed redundancy.
7	SUB-3	When you encounter questions during online political education learning, you actively ask questions in class discussions and seek answers.	I actively ask questions during class discussions in the online I&P course to seek answers.	Streamlined wording and emphasized proactive behavior.

8	SOI-ST-3	When you ask questions, the teacher usually responds in a timely manner.	When I ask questions, the teacher usually responds in a timely manner.	Adjusted pronoun to first-person for consistency.
9	RUL-3	Your teacher is consistent and fair in enforcing the course rules.	My teacher is consistent and fair in enforcing the course rules.	Changed "your" to "my" to standardize perspective.
10	SOI-ST-4	You know you can contact your teacher anytime when you need help and get assistance.	I can contact my teacher anytime when I need help and get assistance.	Simplified phrasing and aligned pronouns.
11	SOI-ST-5	You believe the teacher can effectively handle inappropriate interactions in the online classroom.	My teacher can effectively handle inappropriate interactions in the online classroom.	Removed "you believe" to focus on observable actions.
12	SOI-SS-1	You actively reach out to classmates to discuss course content.	I actively reach out to classmates to discuss course content.	Adjusted pronoun to first-person.
13	SOI-SS-2	You are happy to help your classmates.	I am happy to help my classmates.	Standardized perspective.
14	SOI-SS-3	You are willing to share and exchange your online learning	I am willing to share and exchange my online learning experiences and	Aligned pronoun and removed redundancy.

		experiences and insights with other students.	insights with other students.	
15	SOI-SS-4	You strive to collaborate with classmates to learn together and solve problems.	I strive to collaborate with classmates to learn together and solve problems.	Changed to first-person.
16	SOI-SC-2	You complete and submit the assigned online class assignments on time and with care.	I submit the assigned online class assignments on time.	Simplified phrasing by removing redundant "with care."
17	SOI-SC-3	You regularly visit the course website to check for the latest learning materials and notifications.	I regularly visit the course website to check for the latest learning materials and notifications.	Adjusted pronoun.
18	SOI-SC-4	You have a strong interest in the materials for the online political education course.	I have a strong interest in the materials for the online I&P course.	Updated terminology for consistency.
19	SUB-4	You put in a lot of effort in online learning for political education.	I invest considerable effort in online learning for the I&P course.	Rephrased for formality and clarity.
20	MET-1	You know how to solve common technical problems that may arise during online learning	I know how to solve common technical problems that may arise during online	Split into two distinct items (MET-1 and MET-2) to avoid

		and are familiar with commonly used online communication tools such as email, forums, and video conferencing.	learning. I am familiar with commonly used online communication tools such as email, forums, and video conferencing.	compound questions.
21	COM-2	You prefer online learning because it allows you to create and expand your social circle.	I prefer online learning because it allows me to create and expand my social circle.	Adjusted pronoun and phrasing.
22	CRC-1	This course has increased my awareness of social and political issues.	This course has increased my awareness of social and political issues.	Retained original phrasing but categorized under "CRC" construct.
23	EMP-2	My input is valued in class decisions.	My input is valued in class decisions.	Moved to "EMP" construct for thematic alignment.

Appendix D: Modified Qualitative Items Based on Evaluators' Comments

Construct/Item	**Before Evaluators' Comments**	**After Evaluators' Comments**	**Rationale**	**Quantitative Constructs /Items Explored**

				(Examples)
Online Learning Tools	Q1: "What online learning tools do you frequently use... What factors encourage your active participation?"	Q9: "Which online learning tools do you frequently use..." (Simplified to focus on tools only).	Removed repetitive questions (e.g., "participation factors" split into other questions), focused on tool usage to avoid confusion.	MET-1, MET-2, MET-3, MET-4
Engagement Factors	Q1: "What factors encourage your active participation... flexibility, seeking help..."	Q1: "Recall a specific instance when you felt engaged/disengaged... What factors contributed?"	Shifted from abstract questions to specific scenario recall, enhancing depth and empirical evidence.	All quantitative engagement constructs
Course Design Impact	Q3: "How do you perceive the clarity of tasks and rules... How do these affect participation?"	Q3-Q4: "How do course design elements (structure, interactivity) influence your motivation and interest?"	Split questions to focus separately on "motivation" and "interest," clarified research variables for better analytical precision.	RUL-1, RUL-2, OBJ-1, OBJ-2
Instructor Role	Q6: "How do you evaluate the impact of teacher's support... social circle?"	Q5-Q6: "What role does the instructor's style and approach play in engagement?"	Merged repetitive questions (original Q6/Q7), differentiated "teaching style" and "teaching methods," refined exploration of the instructor's role.	SOI-ST (all items)

Pre-COVID Experience	Q12: "Before COVID-19, did you have online course experience...?"	Q7-Q8: "Before COVID-19, did you have online experience? Did it benefit you this semester?"	Merged original Q12 and Q13, simplified flow, directly linked early experience to current engagement.	
Peer Interaction	Q10: "Can you share which courses you chose...?" (Irrelevant to peer interaction)	Q10-Q11: "How do you use tools to communicate with classmates? Are you willing to help classmates online?"	Removed irrelevant question, added inquiry into peer interaction specifics (e.g., communication methods, helping behavior), emphasizing social participation.	SOI-SS (all items), COM-1, COM-2, DIV-1
Feedback and Interaction	Q18-Q20: Multiple questions on feedback formats (written, meetings, etc.).	Q18-Q19: "How does interaction/feedback in online courses compare to expectations?"	Merged repetitive questions, focused on the "expectation gap" in feedback and interaction, reducing redundancy.	SOI-ST (feedback-related), SOI-SC (content interaction)
Technology Impact	Q28: "Analyze how online platforms facilitated learning or caused distractions."	Q22-Q23: "How have technology/tools enhanced your learning? Discuss specific technologies used."	Shifted from open-ended analysis to specific technology tool description, enhancing operational clarity.	MET-1, MET-2, MET-3, MET-4
Longitudinal	Q12: "During/after	Q12-Q13: "How has engagement changed	Removed pandemic-related statistics, added	contextual

Engagement	COVID-19, how many courses included online elements?"	through grades? What factors cause differences among grades?"	longitudinal perspective (grade differences), aligning with research question 2's "group difference analysis."	
Quantitative Alignment	No direct question on alignment with quantitative data.	Q24-Q27: "Do you agree with quantitative findings? Are there aspects missed by quantitative measures? How do experiences align with trends?"	New module (research question 4), directly addressing the integration of qualitative and quantitative data, improving research design rigor.	All quantitative constructs/items
Social Circle Expansion	Q6: "How has online learning helped expand your social circle...?"	Q14: "How has online learning helped you expand your social circle?"	Isolated "social circle expansion" from complex question, separately analyzing its impact on engagement.	COM-1, COM-2
Critical Thinking	Q8: "How has this course increased awareness of social/political issues? How do you analyze information?"	Integrated into Q16-Q17 (benefits/drawbacks of online learning) and Q20 (strategies to improve engagement).	Implicitly incorporated "critical thinking" into course effect analysis, avoiding direct questioning that could lead the response.	CRC-1, CRC-2
Platform Usage	Q23-Q25: "How do you use DingTalk/Classin	Q23: "Discuss specific technologies/applica	Merged platform usage details, focused on tool functionality and	MET (all items)

	? Frequency? Changes post-COVID?"	tions used... How do they support learning?"	learning support, simplified redundant statistical questions (e.g., frequency).	
Assignment Persistence	Q29: "How do you persist in completing tasks? Compare time/effort pre/post-pandemic."	Removed. Focus shifted to engagement strategies (Q31: "Describe strategies to manage learning").	Removed pandemic comparison, focused on learning strategies, avoiding confusion regarding time range.	SUB (all items)
Grade Outcomes	Q30: "How do you feel your efforts paid off in grades? Share grade experiences."	Removed. Integrated into Q24-Q27 (alignment with quantitative outcomes).	Removed direct grade questions, indirectly assessed academic outcomes through qualitative feedback, reducing sensitivity and bias.	indirectly explored via Q24-27

Appendix E: The quantitative questionnaires revised by experts

Construct : **RULES [RUL]**
Definition : The formal and informal guidelines, expectations, and norms governing student behavior and interactions within the online course.
Adapted from : Liu, X. (2021). Student Engagement in Higher Music Education with Online Learning Components: A Mixed Methods Case Study (Order No. 28713234). Available from ProQuest Dissertations & Theses Global. (2572602312).

Wang, Z. (2023). *Research of construction and application of undergraduate online learning power evaluation index system* (Master's thesis, Lanzhou University).

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
RUL -1	*1.The tasks of the online ideological and political course are clear.*						
RUL -2	*2.The rules of the online ideological and political course are clear.*						

RUL -3	*3.My teacher is consistent and fair in enforcing the course rules.*						
RUL -4	*4.I am well aware of the rules for submitting assignments in online learning (such as deadlines, format requirements, etc).*						
RUL -5	*5.I do not miss online learning courses without a reason.*						
RUL -6	*6.I stay focused and fully engaged in online learning activities.*						

Construct : **SUBJECT [SUB]**
Definition : The individual students enrolled in the online ideological and political education course, including their demographic characteristics, prior learning experiences, and motivations for taking the course.
Adapted from : Liu, X. (2021). Student Engagement in Higher Music Education with Online A Mixed Methods Case Study (Order No. 28713234). Available from ProQuest Dissertations & Theses Global. (2572602312)

Ugwu, A. (2024). Exploring the Perceived Effects of Online and Hybrid Learning on the Experiences of Students in Nigerian Universities (Order No. 31148366).

Leaston, J. A. (2024). Digital Learning Dynamics: A Quantitative Analysis of On-Line Education Among Adult Learners in an Urban Community College Environment (Order No. 31295460).

Schumacher, S. C. (2018). Measuring Adult Engagement in Online Education: Instrument Development (Order No. 10813177). Available from ProQuest Dissertations & Theses Global. (2056458161).

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
SUB -1	*7.I actively participate in online ideological and political learning activities and strive to complete the online learning tasks.*						
SUB -2	*8.Recognizing the advantages of online ideological and political learning enhances my learning outcomes.*						
SUB -3	*9.I actively ask questions during class discussions in the online ideological and political course to seek answers.*						
SUB -4	*10.I invest considerable effort in online learning for the ideological and political course.*						
SUB -5	*11.I am confident that I perform well and achieve good grades in the online ideological and political course.*						
SUB -6	*12.The flexibility of online learning allows me to effectively balance my studies and other responsibilities.*						
SUB -7	*13.I believe that online learning has increased my sense of control over my self- directed learning.*						
SUB -8	*14.I set personal goals for the online ideological and political course to guide my activities during sessions.*						

Construct : **OBJECT [OBJ]**
Definition : The ideological and political content, learning objectives, and assessments of the online course.
Adapted from : Leaston, J. A. (2024). Digital Learning Dynamics: A Quantitative Analysis of On-Line Education Among Adult Learners in an Urban Community College Environment (Order No. 31295460).

Ugwu, A. (2024). Exploring the Perceived Effects of Online and Hybrid Learning on the Experiences of Students in Nigerian Universities (Order No. 31148366).

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
OBJ -1	*15.I have effectively achieved my course learning objectives, such as mastering knowledge and enhancing skills, through online learning.*						

OBJ -2	*16.The tools used in online learning (such as LMS, video conferencing) help me complete my learning tasks.*						
OBJ -3	*17.I am able to effectively participate and express my opinions in discussions and interactions in online courses.*						

Construct : DIVISION OF LABOUR [DIV]

Definition : The distribution of responsibilities and tasks between students and the instructor, including the roles and expectations for each.

Adapted from : Chin, P. (2024). Learning to Teach Online: The Impact of COVID-19 on Teaching Secondary Mathematics in Underserved Communities (Order No. 31236658).

Cheng, J. (2024). The Pivot to Online Learning: A Case Study of EFL Student Teachers' Learning Experiences and Perceptions in China (Order No. 31243509).

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
DIV -1	*18.I believe that interaction and collaboration with other students in online learning are beneficial to my studies.*						
DIV -2	*19.I think the current division of labor in online learning (such as teachers, students, technical support) effectively supports the smooth progress of the course.*						
DIV -3	*20.I am very satisfied with the technical support services of the online learning platform.*						
DIV -4	*21.I believe they have a positive impact on my learning experience.*						

Construct : **COMMUNITIES [COM]**

Definition : The social interactions and relationships among students and between students and the instructor within the online learning environment.

Adapted from : Suttle, C. M. (2010). Engagement in online courses (Order No. 3412490). Available from ProQuest Dissertations & Theses Global. (741706670).

Ugwu, A. (2024). Exploring the Perceived Effects of Online and Hybrid Learning on the Experiences of Students in Nigerian Universities (Order No. 31148366).

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
COM -1	*22.My teachers' support and feedback in online classes are timely and helpful.*						
COM -2	*23.I prefer online learning because it allows me to create and expand my social circle.*						
COM -3	*24.Online learning courses are interesting and interactive due to the opportunities for interacting with other students and building a sense of community*						

Construct : **MEDIATING TOOLS [MET]**

Definition : The technological resources and platforms used to facilitate learning, including learning management systems, online textbooks, and communication tools.

Adapted from : Leaston, J. A. (2024). Digital Learning Dynamics: A Quantitative Analysis of On-Line Education Among Adult Learners in an Urban Community College Environment (Order No. 31295460).

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
MET -1	*25.I know how to solve common technical problems that may arise during online learning.*						
MET -2	*26.I am familiar with commonly used online communication tools such as email, forums, and video conferencing.*						
MET -3	*27.The online learning platform provides a medium for me to discuss my ideas.*						
MET -4	*28.The digital learning interface is simple, user-friendly, and easy to navigate.*						

Construct : SOCIAL INTERACTION-STUDENT TEACHER[SOI-ST]

Definition : The communication and relationship between students and the instructor, including the frequency, quality, and nature of interactions.
Adapted from : Liu, X. (2021). Student Engagement in Higher Music Education with Online Learning Components: A Mixed Methods Case Study (Order No. 28713234). Available from ProQuest Dissertations & Theses Global. (2572602312)

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
SOI - ST-1	*29.The online ideological and political course schedule provided by the teacher is well-organized.*						
SOI - ST-2	*30.My teacher is active in online class discussions, effectively engaging students*						
SOI - ST-3	*31.When I ask questions, the teacher usually responds in a timely manner.*						
SOI - ST-4	*32.I can contact my teacher anytime when I need help and get assistance.*						
SOI - ST-5	*33.My teacher can effectively handle inappropriate interactions in the online classroom.*						

Construct : **SOCIAL INTERACTION -STUDENT STUDENT [SOI-SS]**
Definition : The communication and collaboration among students, including the frequency, quality, and nature of interactions.
Adapted from : Liu, X. (2021). Student Engagement in Higher Music Education with Online Learning Components: A Mixed Methods Case Study (Order No. 28713234). Available from ProQuest Dissertations & Theses Global. (2572602312)

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
SOI - SS-1	*34.I actively reach out to classmates to discuss course content.*						
SOI - SS-2	*35.I am happy to help my classmates.*						
SOI - SS-3	*36.I am willing to share and exchange my online learning experiences and insights with other students.*						
SOI - SS-4	*37.I strive to collaborate with classmates to learn together and solve problems.*						

Construct : SOCIAL INTERACTION -STUDENT CONTENT[SOI-SC]
Definition : The engagement of students with the course content, including the depth, breadth, and frequency of interaction.
Adapted from : Liu, X. (2021). Student Engagement in Higher Music Education with Online Learning Components: A Mixed Methods Case Study (Order No. 28713234). Available from ProQuest Dissertations & Theses Global. (2572602312)

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
SOI - SC-1	*38.I frequently engage in online discussions with classmates about the course content.*						
SOI - SC-2	*39.I submit the assigned online class assignments on time.*						
SOI - SC-3	*40.I regularly visit the course website to check for the latest learning materials and notifications.*						
SOI - SC-4	*41.I have a strong interest in the materials for the online ideological and political course.*						
SOI - SC-5	*42.I study the online course materials promptly.*						

Construct : POWER RELATIONS [POR]

Definition : The distribution of authority, influence, and control within the online learning environment, including the relationship between students and instructors, students and peers, and students and the course content

Adapted from : Tian Jun. (2021). Constructing and Empirical Research on the Competency Model for Online Teaching of Primary and Secondary School Teachers (Doctoral dissertation, Central China Normal University).

Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. Online learning, 22(1), 205-222.

Zhang Ling. (2023). A Study on the Caring Behaviors of University Teachers in Online Teaching (Master's thesis, Tianjin Normal University).

Kuo, Y. C., Walker, A. E., Schroder, K. E., & Belland, B. R. (2014). Interaction, Internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses.

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
POR-1	*43.My teacher has strong online teaching skills and classroom management abilities.*						
POR-2	*44.I have a voice in shaping course content and activities of the online course.*						
POR-3	*45.In online teaching, my teacher respects our individuality while also setting strict requirements for us.*						
POR-4	*46.In online classes, students have equal opportunities to express their opinions.*						
POR-5	*47.The course content reflects my own experiences and perspectives.*						

Construct : CRITICAL CONSCIOUSNESS [CRC]

Definition : The development of awareness about the ideological and political underpinnings of the course content, as well as the ability to critically analyze and question dominant narratives and perspectives.

Adapted from : Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment.

Zhang Ling. (2023). A Study on the Caring Behaviors of University Teachers in Online Teaching (Master's thesis, Tianjin Normal University).

Wang, Z. (2023). *Research of construction and application of undergraduate online learning power evaluation index system* (Master's thesis, Lanzhou University).

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
CRC-1	*48.This course has increased my awareness of social and political issues.*						
CRC-2	*49.This course has helped me establish a correct worldview, outlook on life, and values.*						
CRC-3	*50.I am encouraged to question the information presented in the course.*						
CRC-4	*51.I frequently analyze the information presented in class.*						

Construct : EMPOWERMENT [EMP]

Definition : The development of students' sense of agency and capacity to participate actively in shaping their own learning experiences, as well as their ability to apply knowledge to address social and political issues.

Adapted from : Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. Online learning, 22(1), 205-222.

Yang Tao. (2023). A Study on the Impact of Teacher Support on College Students' Learning Engagement in Online Teaching (Master's thesis, Wuhan University of Engineering).

No	Items/Questions	Relevance			Clarity		
		1	2	3	1	2	3
EMP-1	*52.I enjoy participating in ideological and political practice activities after taking this course.*						
EMP-2	*53.My input is valued in class decisions.*						
EMP-3	*54.My teacher created an online learning environment that allows me to actively interact with my classmates.*						

Appendix F: The qualitative questionnaires revised by experts

Research Question 1: What factors are related to student engagement in the remote online teaching of ideological and political education courses?

No	Items/Questions
Q 1	*Can you* recall a specific instance when you felt particularly engaged or disengaged during an online political education course?
Q 2	*What factors contributed to your feelings?*
Q 3	*How do the specific design elements of the course materials and activities, such as their structure, presentation, and interactivity, influence your overall* ***motivation*** *in the course?*
Q 4	*How do the specific design elements of the course materials and activities, such as their structure, presentation, and interactivity, influence your* ***interest*** *in the course?*
Q 5	*What role does the instructor's teaching* ***style*** *play in your engagement?*
Q 6	*What role does the instructor's teaching* ***approach*** *play in your engagement?*
Q 7	*Before the COVID-19 outbreak, did you have any experience with online courses?*
Q 8	*Do you think these early online learning experiences benefited you in participating in online courses this semester? If so, in what ways?*
Q9	*Which online learning tools do you frequently use in your online courses? (e.g., assignment submission boxes, grade books, quizzes, rubrics, discussion forums, calendars, blogs, announcements, recorded lectures/videos, interactive text readings, etc.)*
Q10	*Please describe how you use online learning tools and platforms to communicate with your classmates about study-related matters.*
Q 11	*When your classmates have questions, are you willing to help them through online tools or platforms, and if so, how?*

Research Question 2: Are there unique differences in overall student engagement among grades in the remote online teaching of ideological and political education courses?

No	Items/Questions
Q12	*How has your engagement in online political education courses changed as you have progressed through your studies?*

Q13	*What factors do you think contribute to the differences in engagement among students in different grades?*
Q14	*How has online learning helped you **expand your social circle**?*
Q15	*How has online learning helped you i**ncreased your interest and interaction in the course**?*

Research Question 3: What are the participants' perspectives and attitudes toward student engagement in the remote online teaching of ideological and political education courses?

No	Items/Questions
Q16	*What are the **benefits** of online learning for ideological and political education, compared to traditional face-to-face instruction*
Q17	*What are the **drawbacks** of online learning for ideological and political education, compared to traditional face-to-face instruction*
Q18	*How does the level of **interaction** you receive in online courses compare to your expectations?*
Q19	*How does the level of **feedback** you receive in online courses compare to your expectations?*
Q20	*What specific strategies or techniques could be used to improve student engagement in online political education courses?*
Q21	*Does the division of labor and technical support in online learning help you better participate in the course?*
Q22	*How have technology and online tools enhanced your learning experience?*
Q23	*Can you discuss specific technologies or applications you use, or tools you see your teachers/classmates using, and how they support your online learning process?*

Research Question 4: To what extent might the quantitative and qualitative findings align or diverge?

No	Items/Questions
Q24	*Based on your own experiences, do you agree with the findings of quantitative studies on student engagement in online political education courses?*
Q25	*Are there any aspects of your engagement that you believe are not captured by quantitative measures?*
Q26	*How do your **personal experiences** align with or differ from the broader trends identified in quantitative research?*
Q27	*How do your **perspectives** align with or differ from the broader trends identified in quantitative research?*

Appendix G: Visual inspections of histograms, boxplots, and Q-Q plots

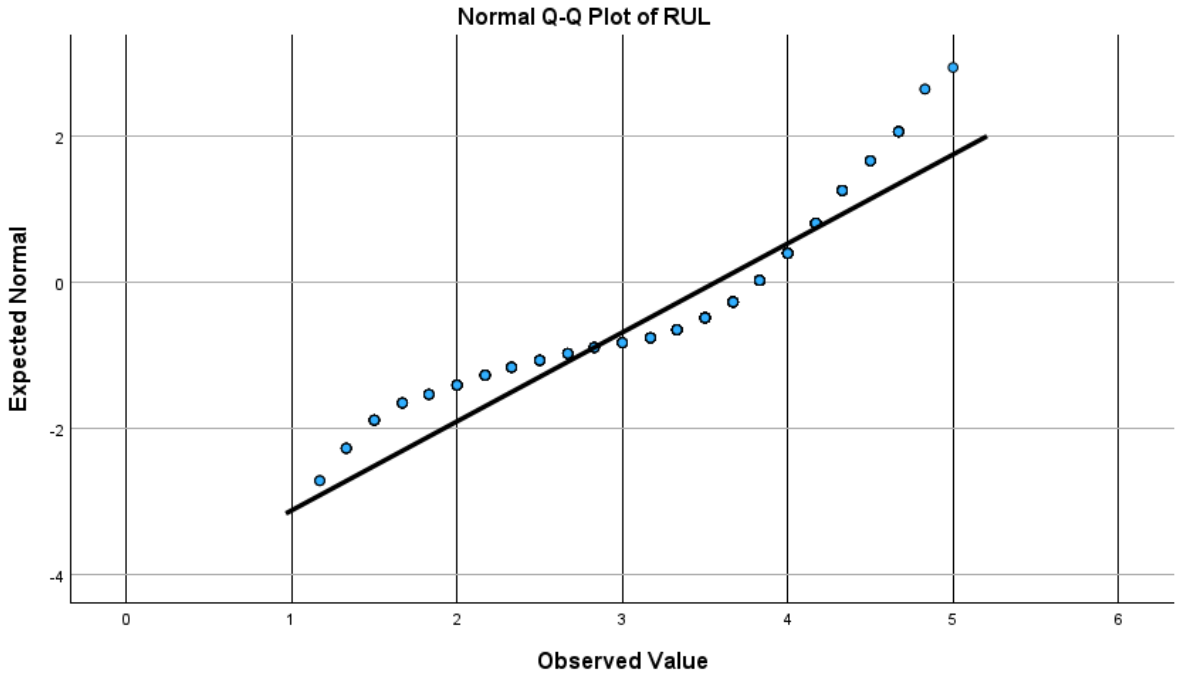


Figure 1: Normal Q-Q Plot of RUL (Chapter4)

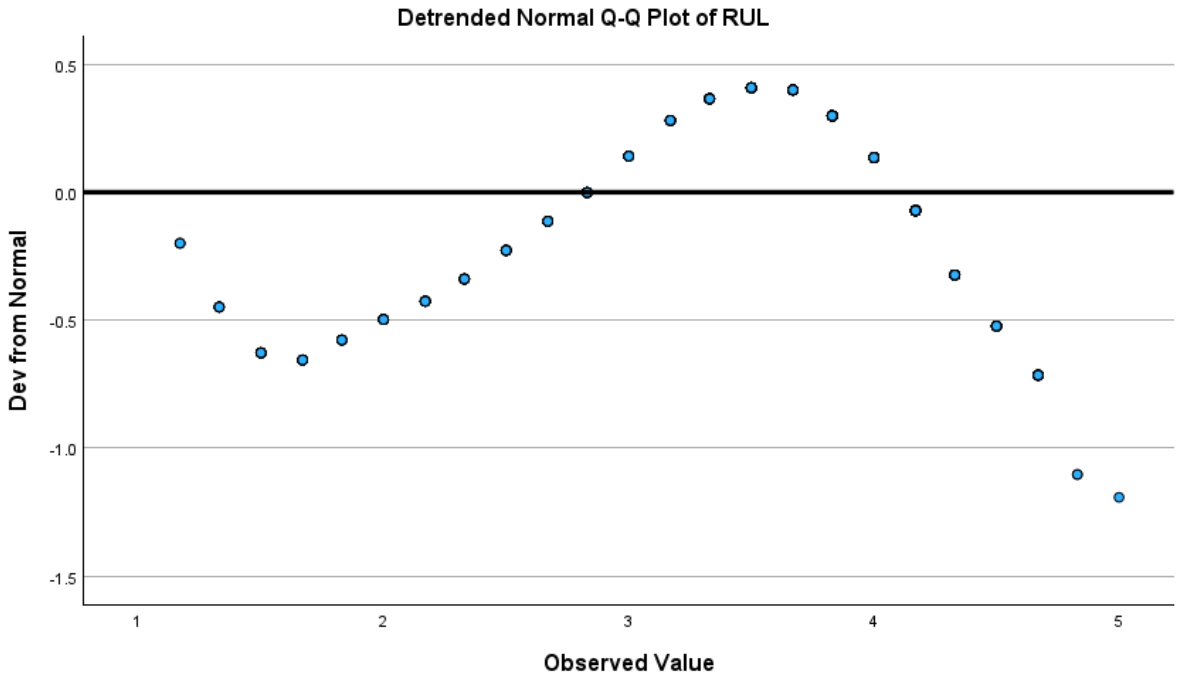


Figure 2: Detrended Normal Q-Q Plot of RUL (Chapter4)

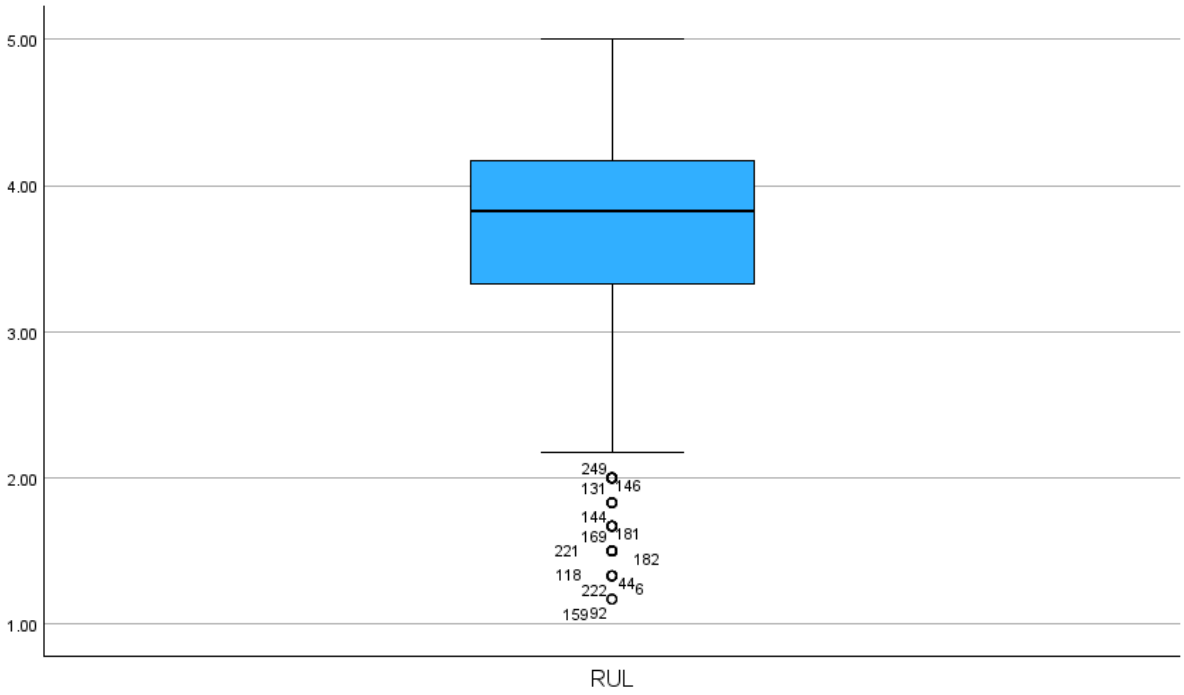


Figure 3: Boxplot of RUL Variable Showing Outliers (Chapter4)

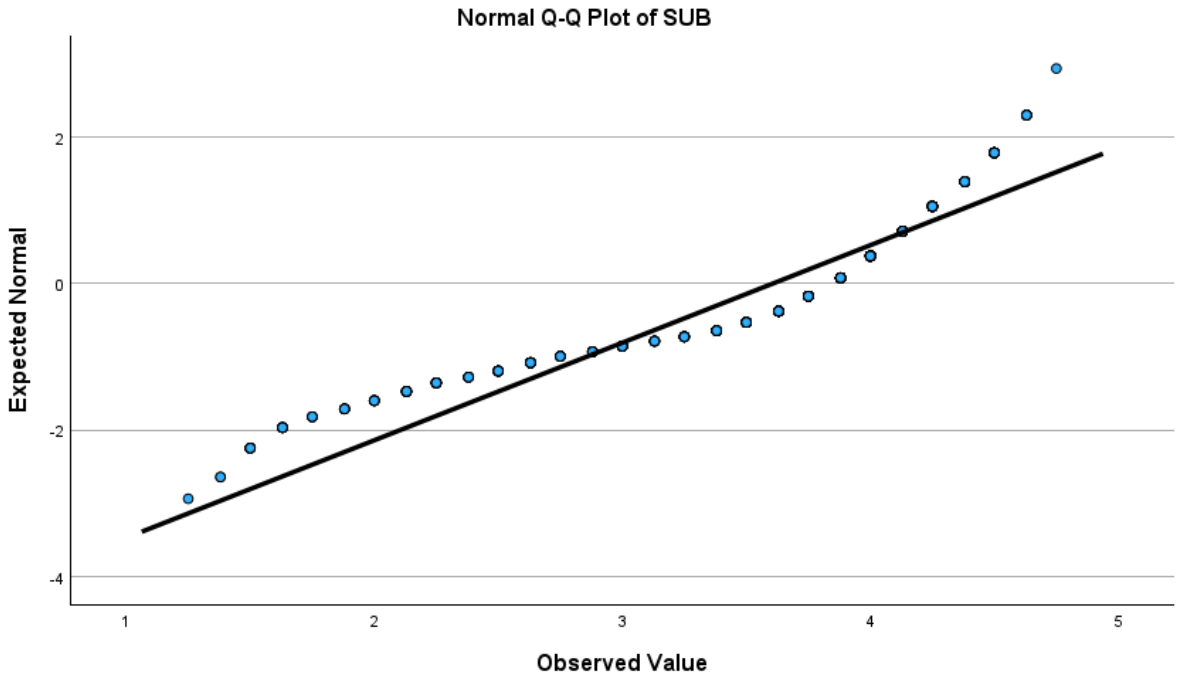


Figure 4: Normal Q-Q Plot of SUB (Chapter4)

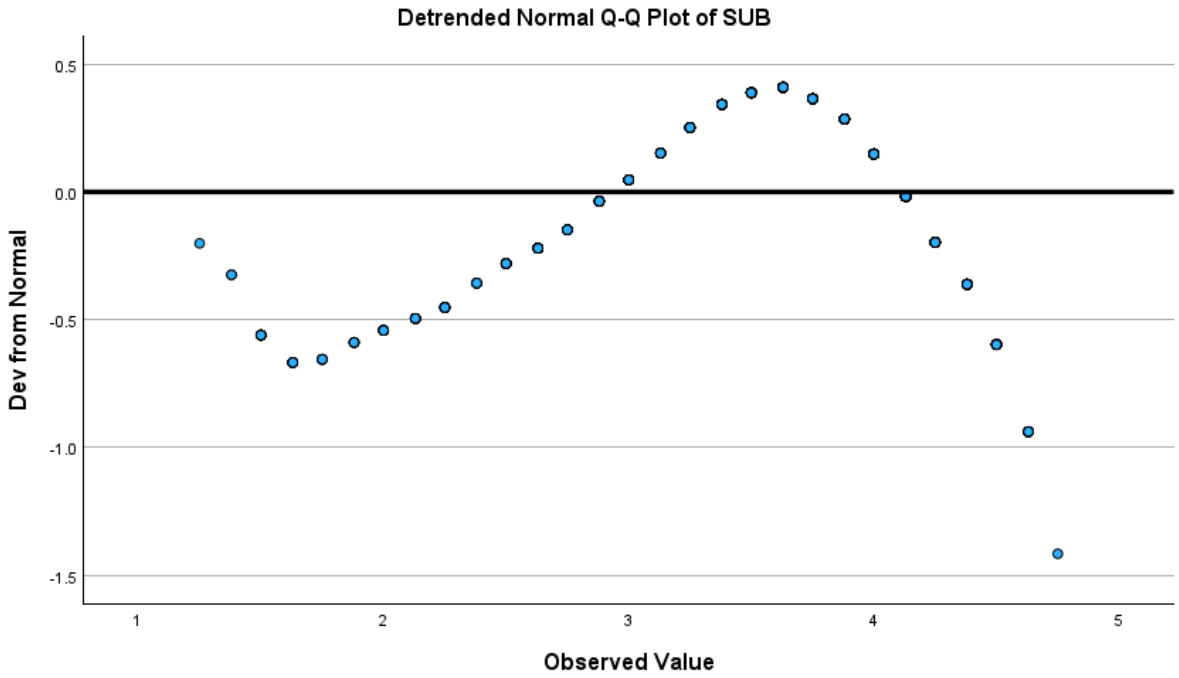


Figure 5: Detrended Normal Q-Q Plot of SUB (Chapter4)

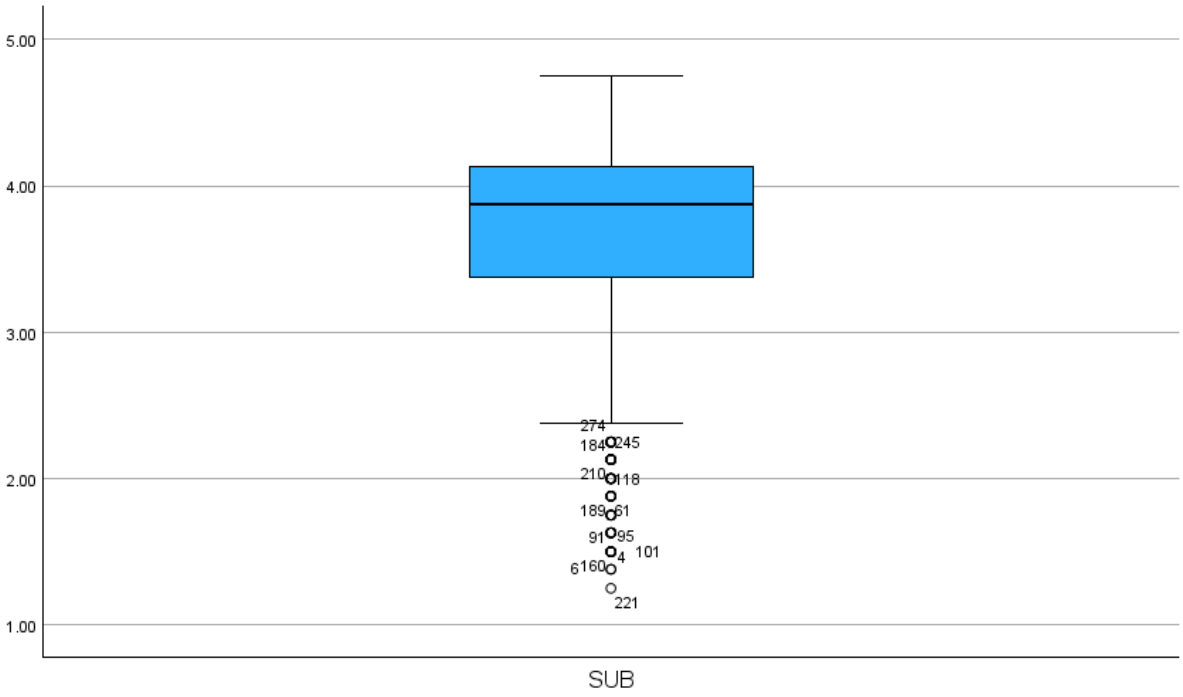


Figure 6: Boxplot of SUB Variable Showing Outliers (Chapter4)

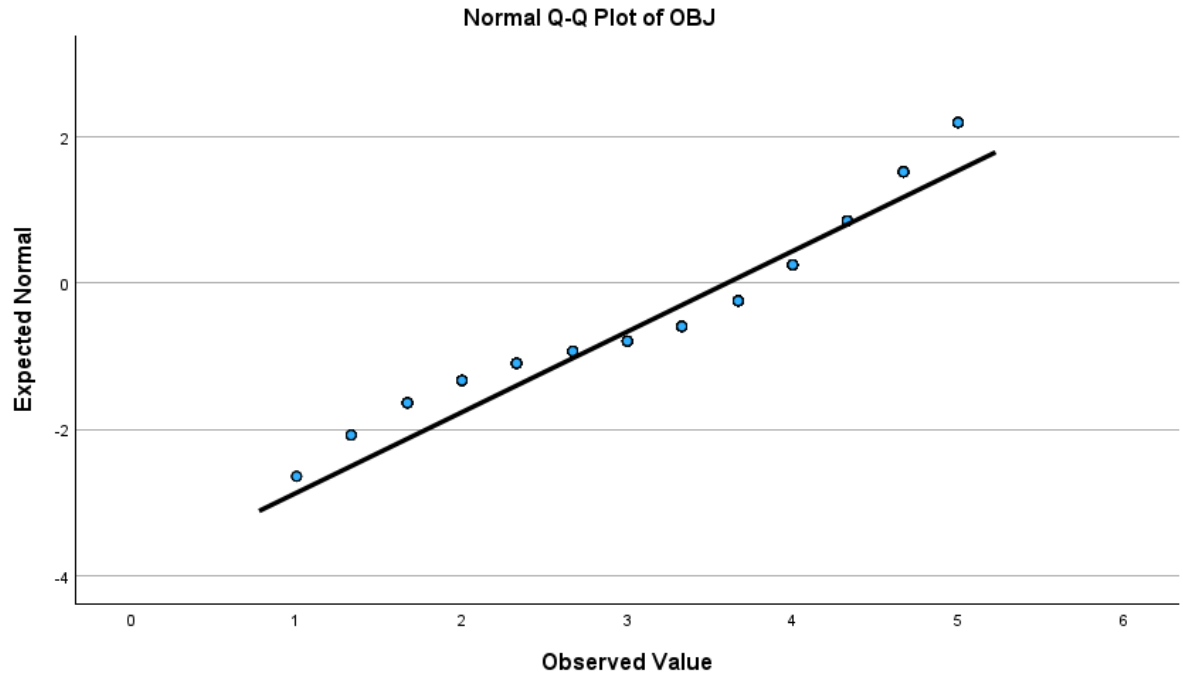


Figure 7: Normal Q-Q Plot of OBJ (Chapter4)

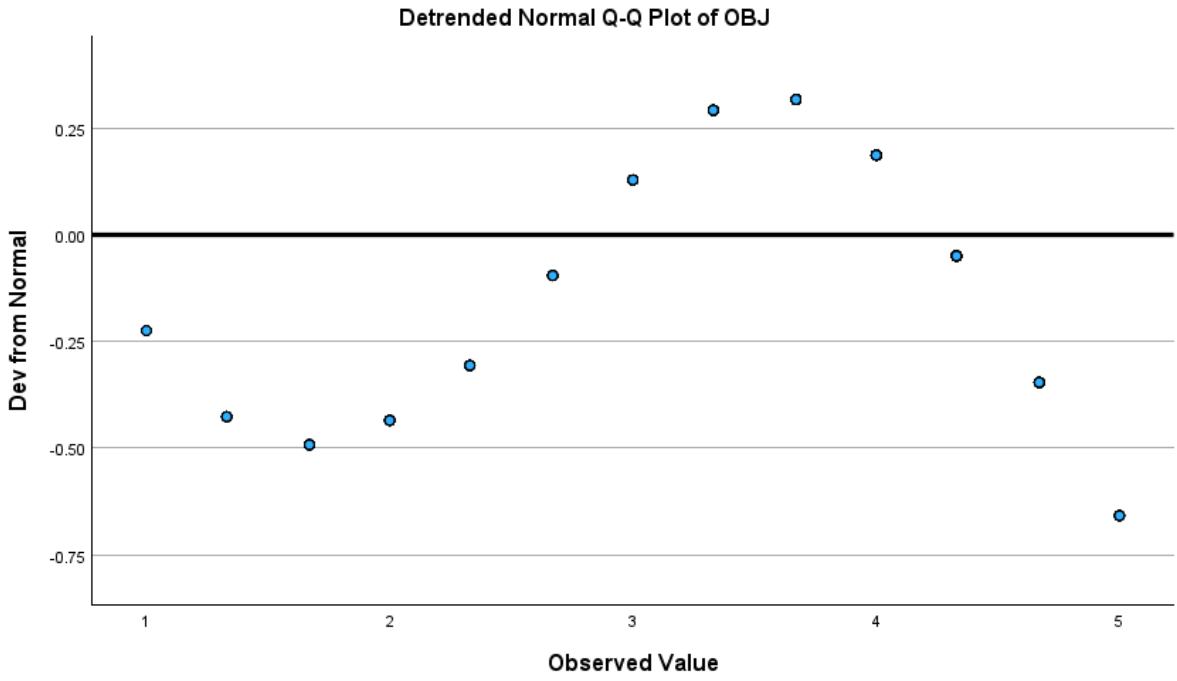


Figure 8: Detrended Normal Q-Q Plot of OBJ (Chapter4)

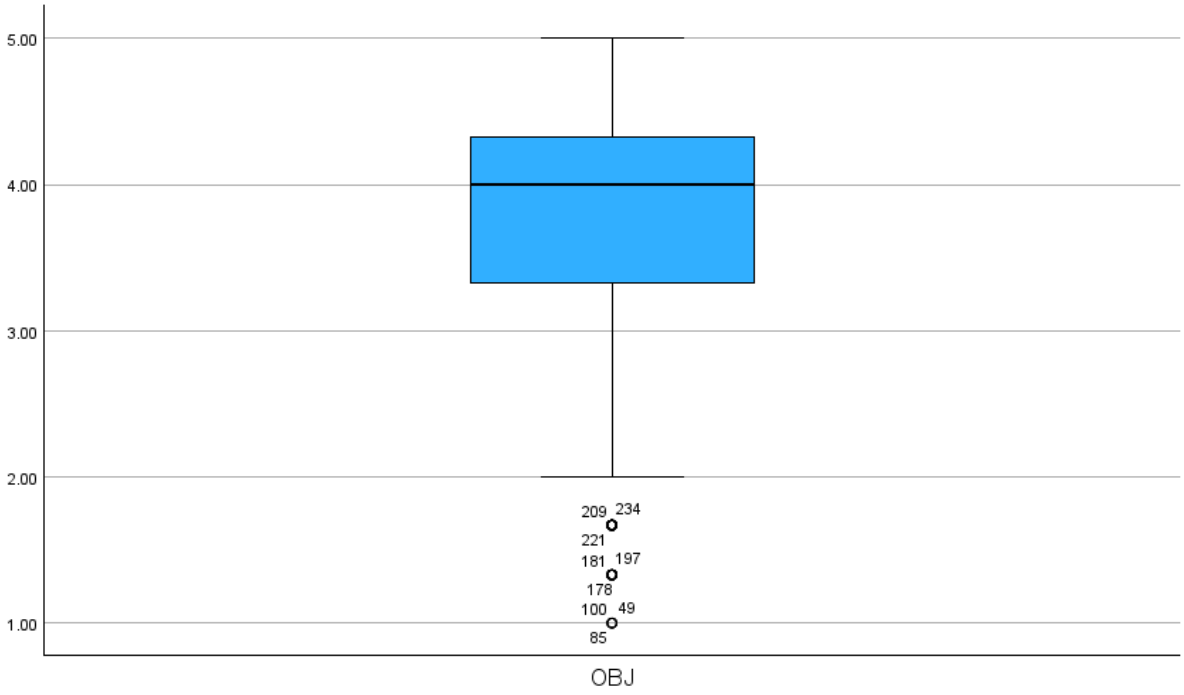


Figure 9: Boxplot of OBJ Variable Showing Outliers (Chapter4)

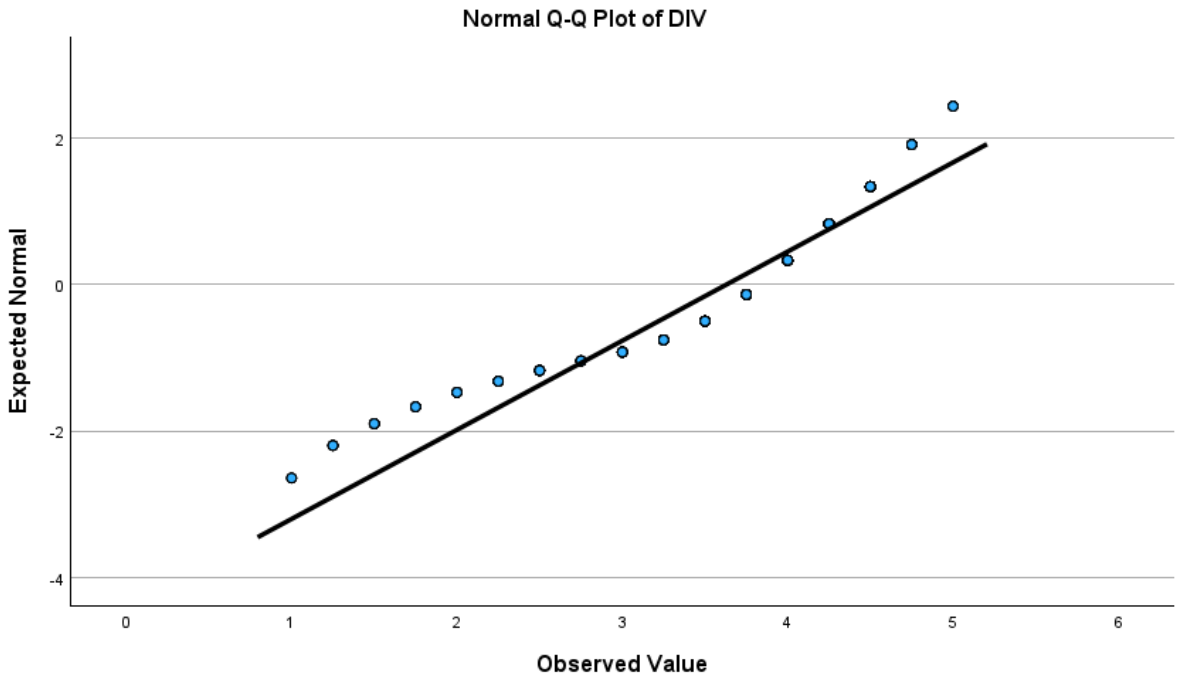


Figure 10: Normal Q-Q Plot of DIV (Chapter4)

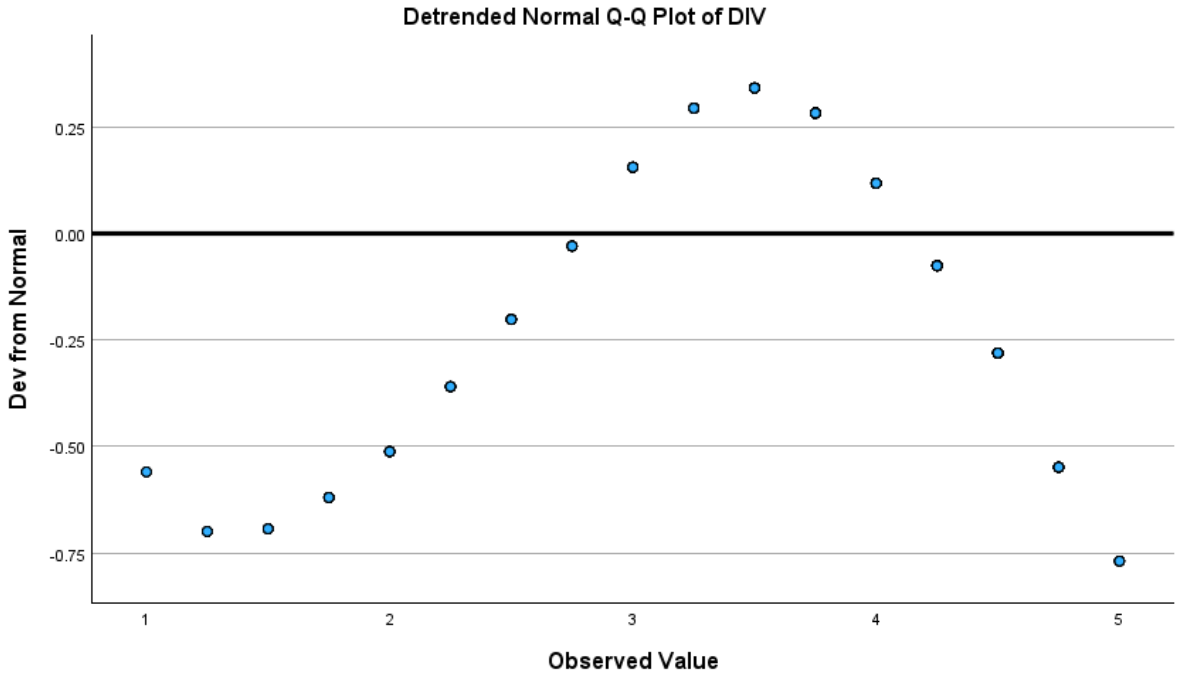


Figure 11: Detrended Normal Q-Q Plot of DIV (Chapter4)

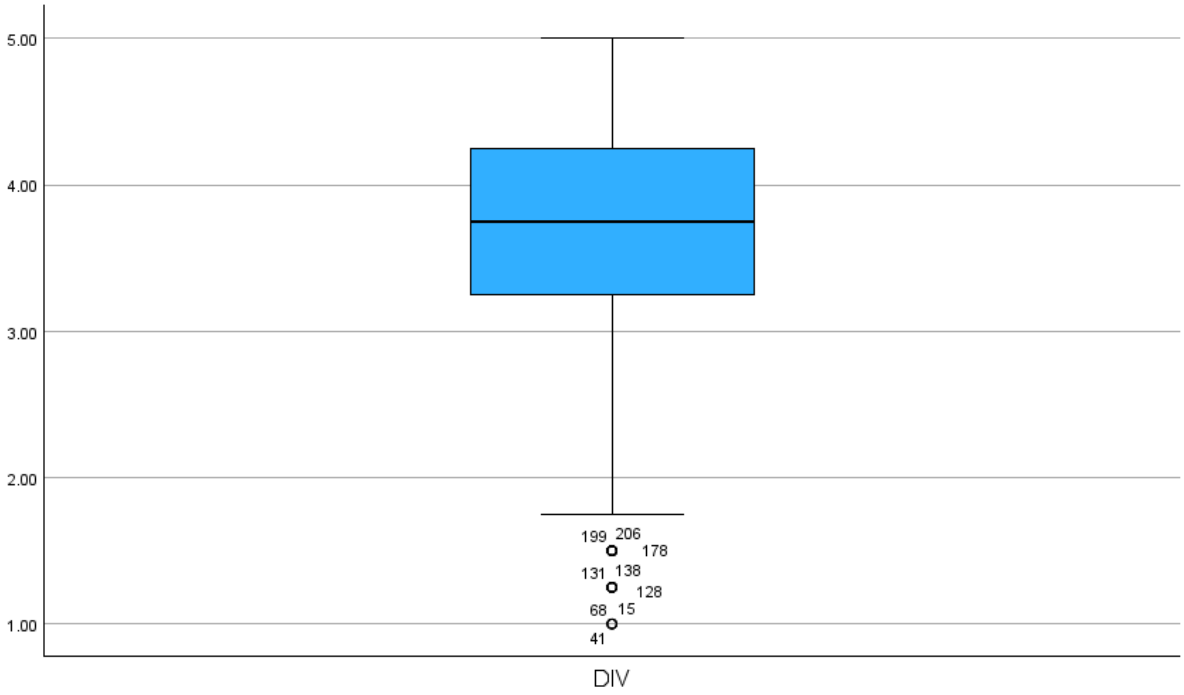


Figure 12: Boxplot of DIV Variable Showing Outliers (Chapter4)

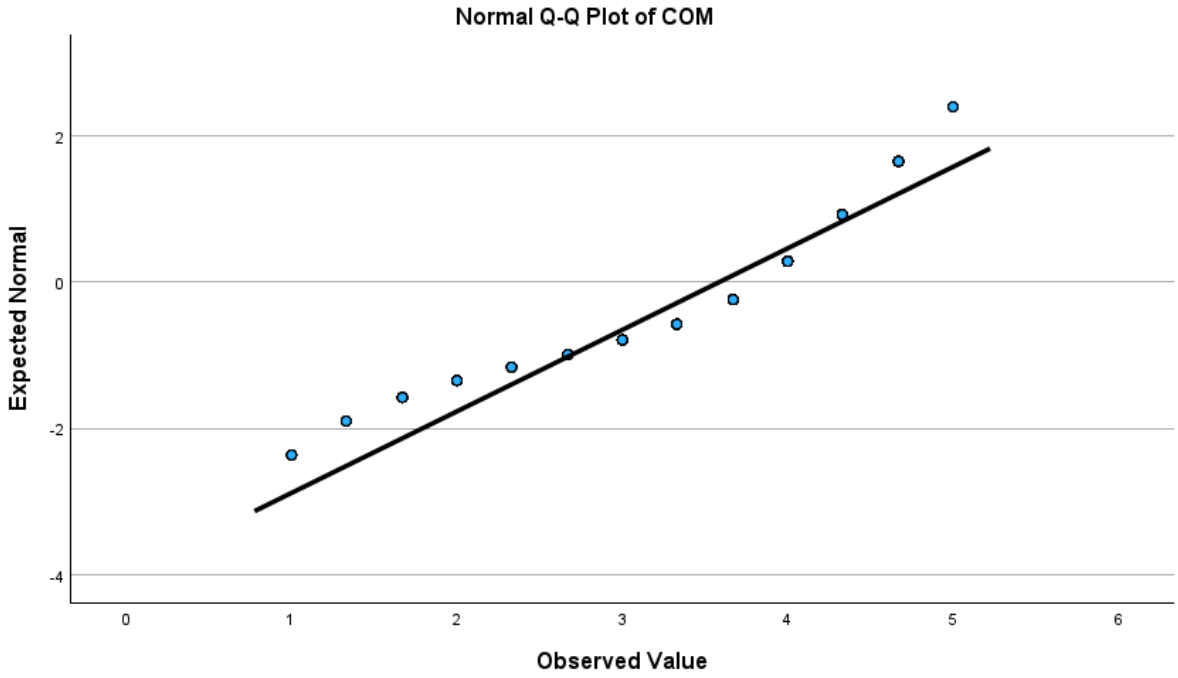


Figure 13: Normal Q-Q Plot of COM (Chapter4)

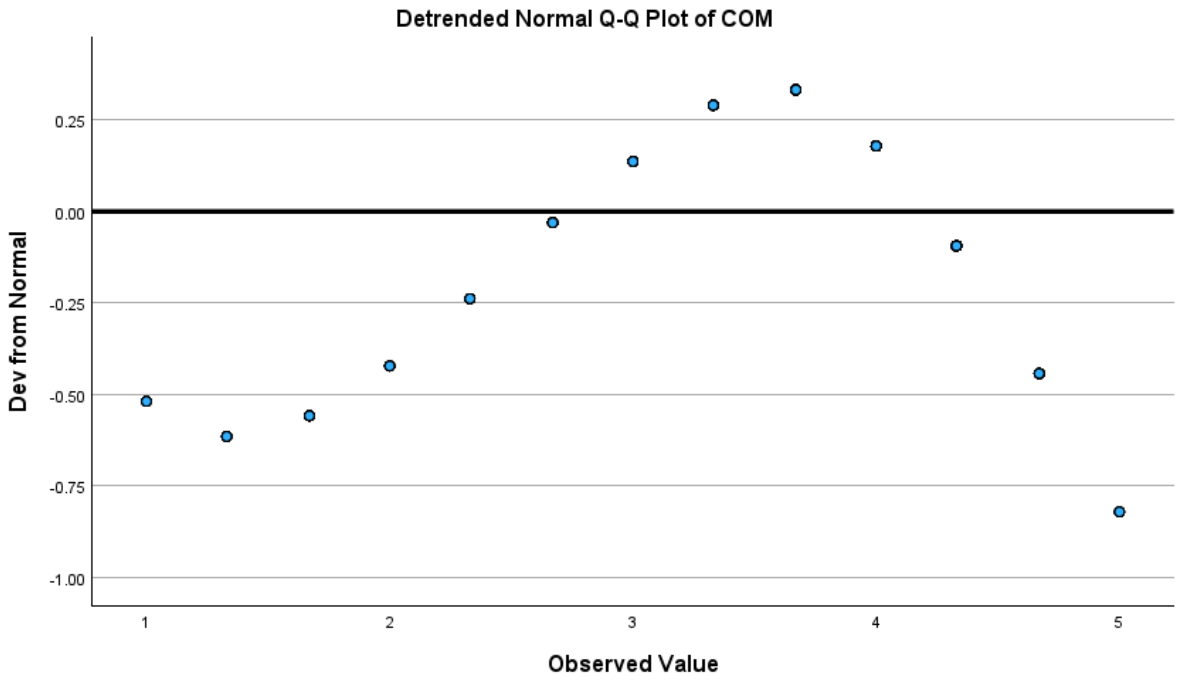


Figure 14: Detrended Normal Q-Q Plot of COM (Chapter4)

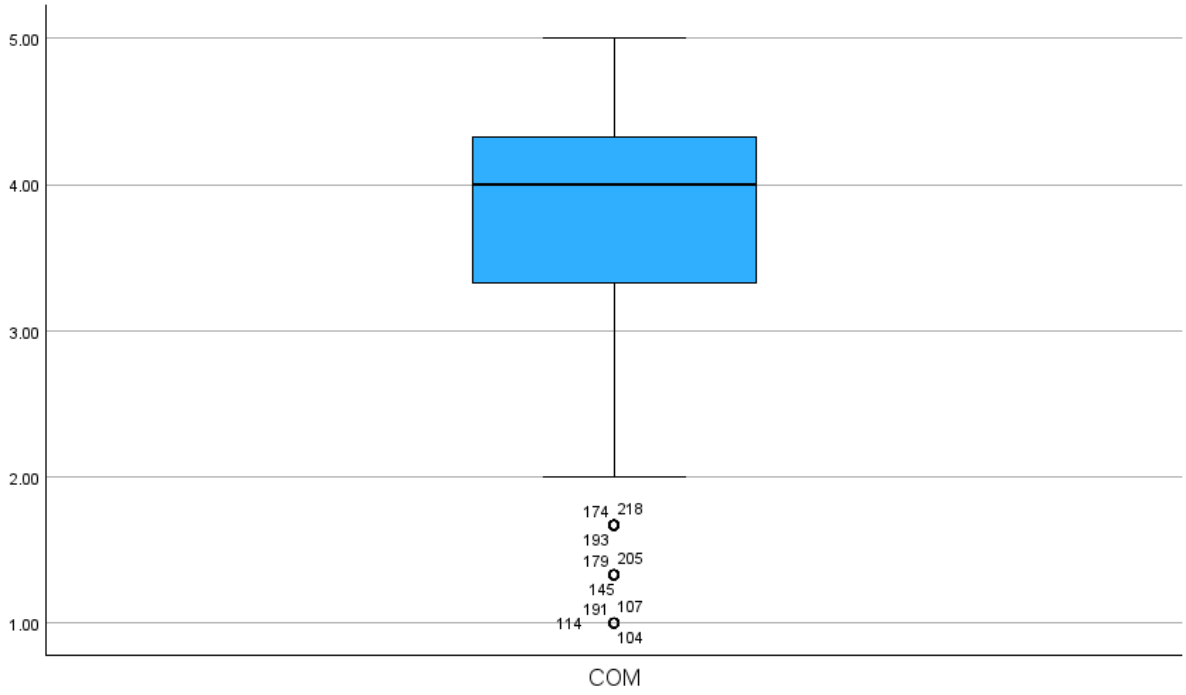


Figure 15: Boxplot of COM Variable Showing Outliers (Chapter4)

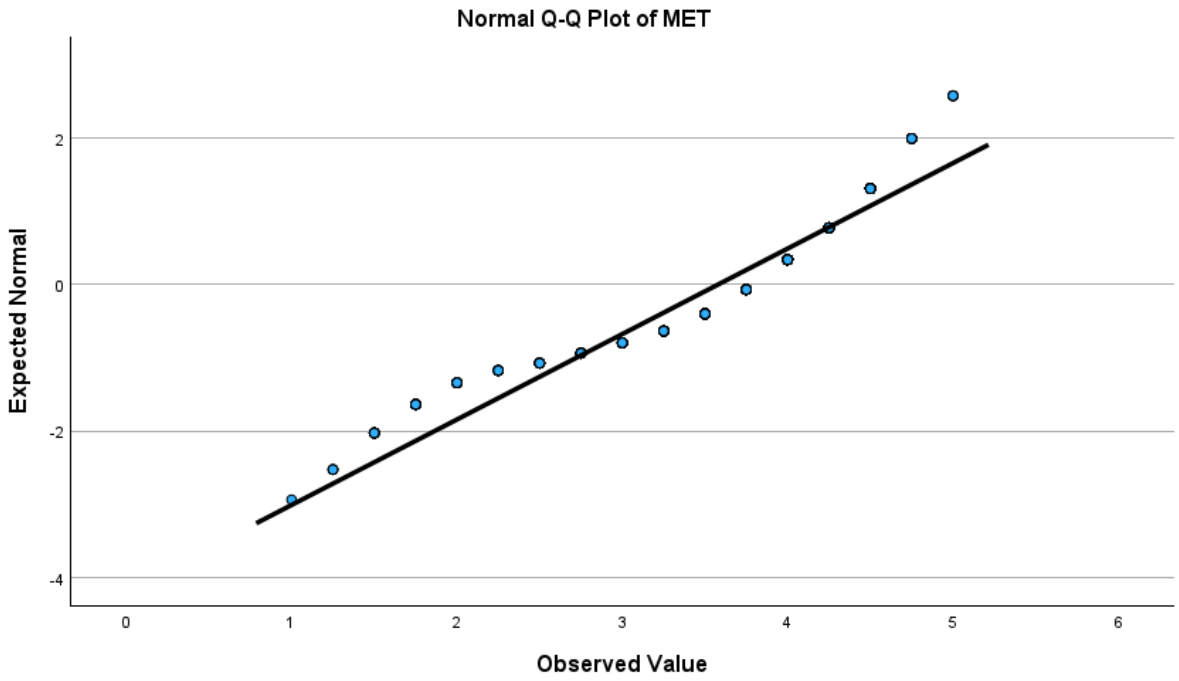


Figure 16: Normal Q-Q Plot of MET (Chapter4)

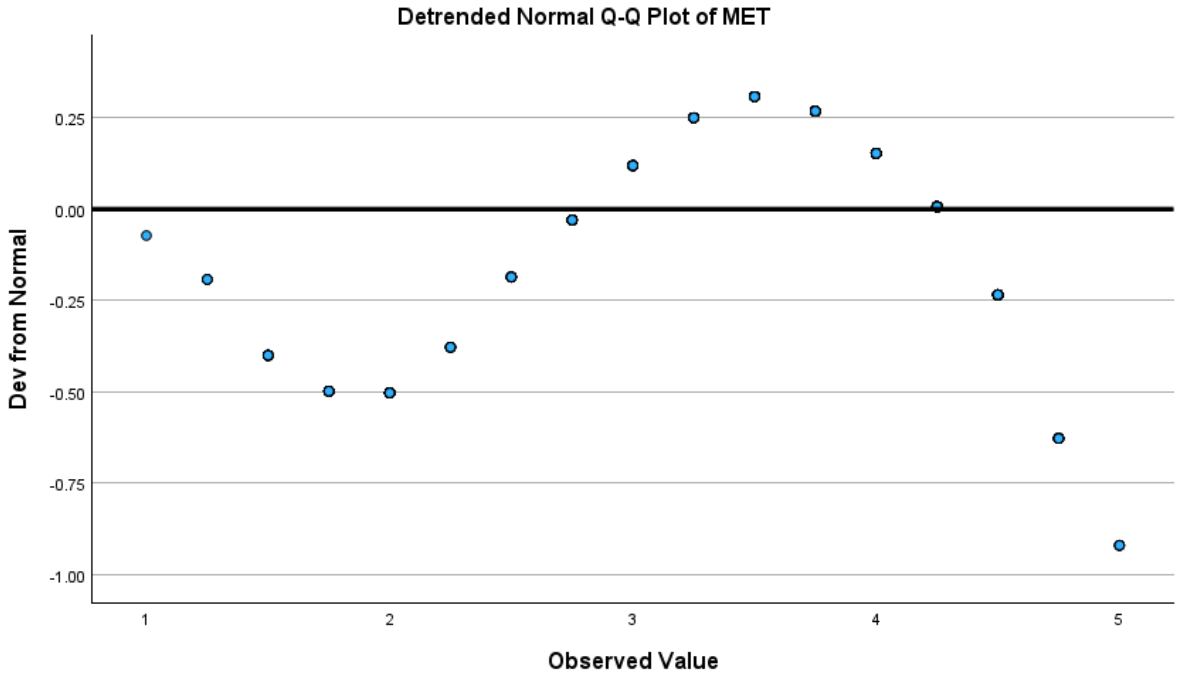


Figure 17: Detrended Normal Q-Q Plot of MET (Chapter4)

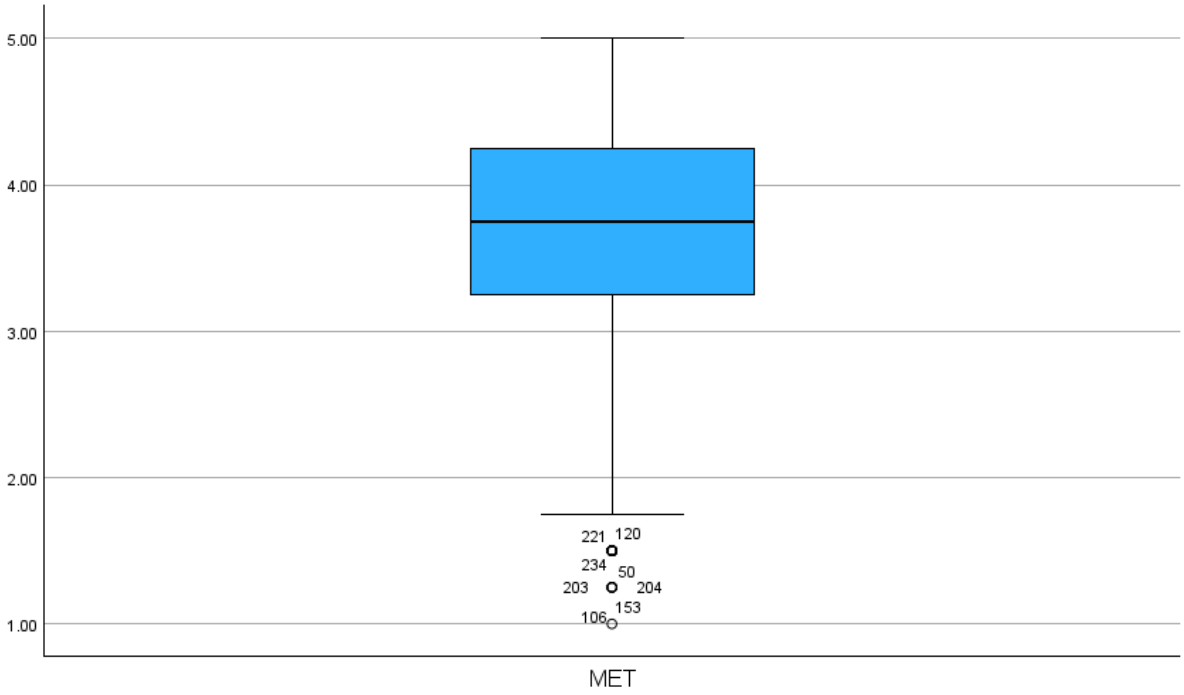


Figure 18: Boxplot of MET Variable Showing Outliers (Chapter4)

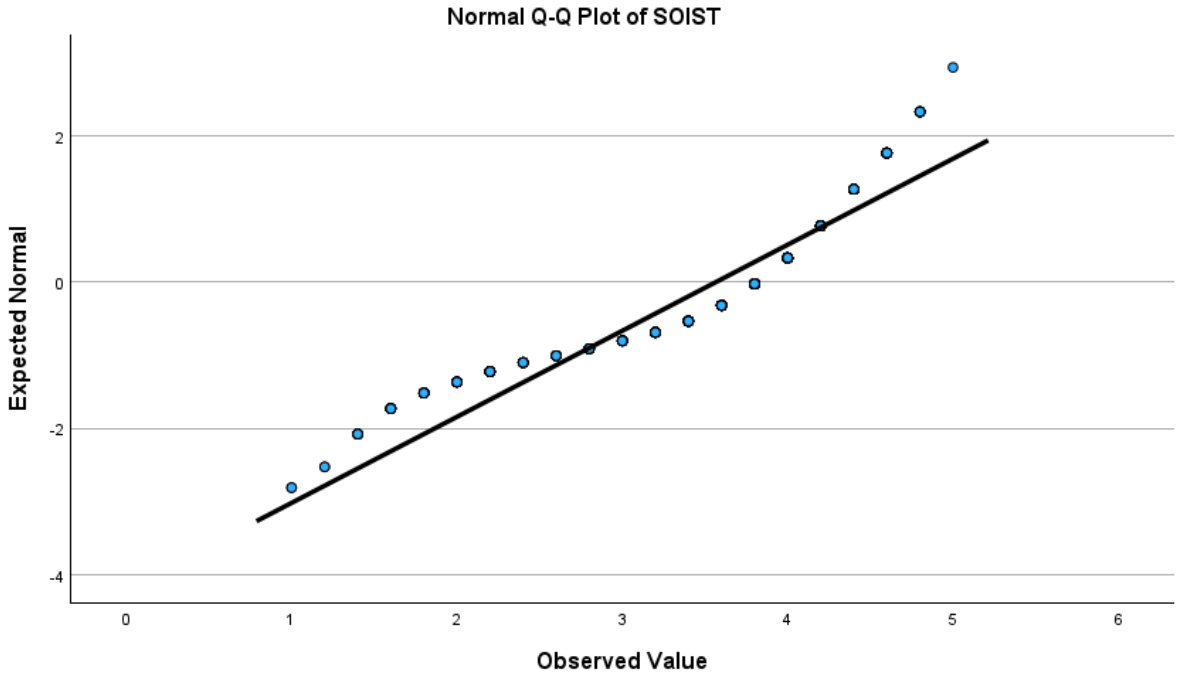


Figure 19: Normal Q-Q Plot of SOIST (Chapter4)

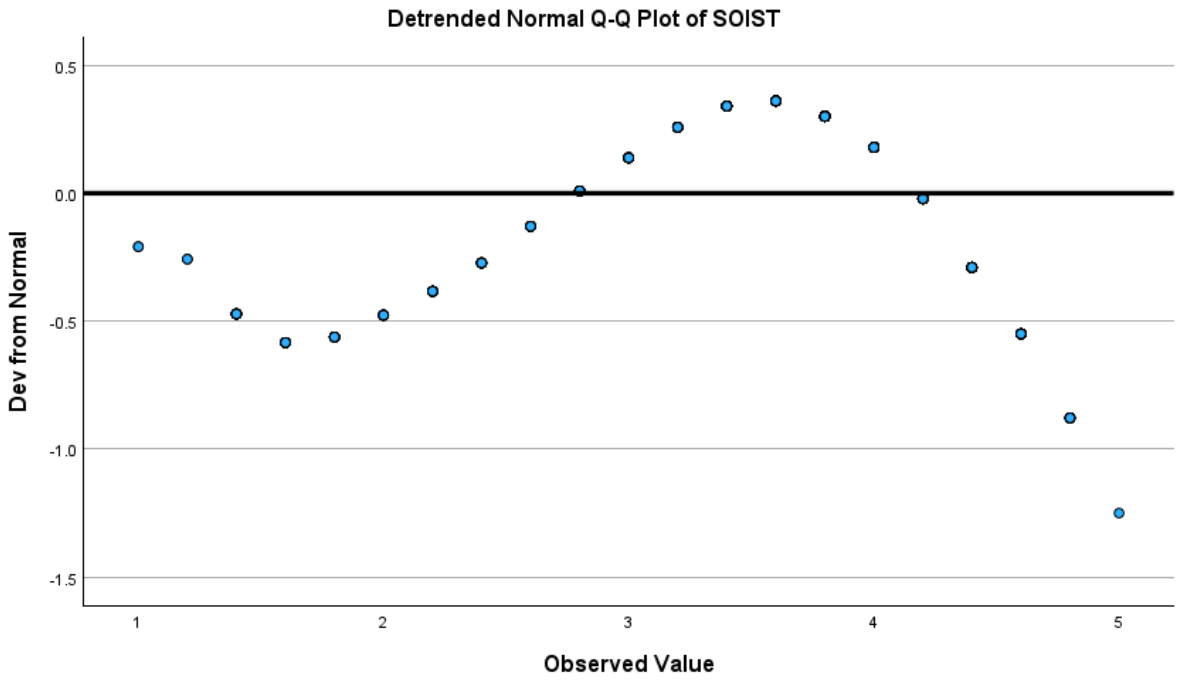


Figure 20: Detrended Normal Q-Q Plot of SOIST (Chapter4)

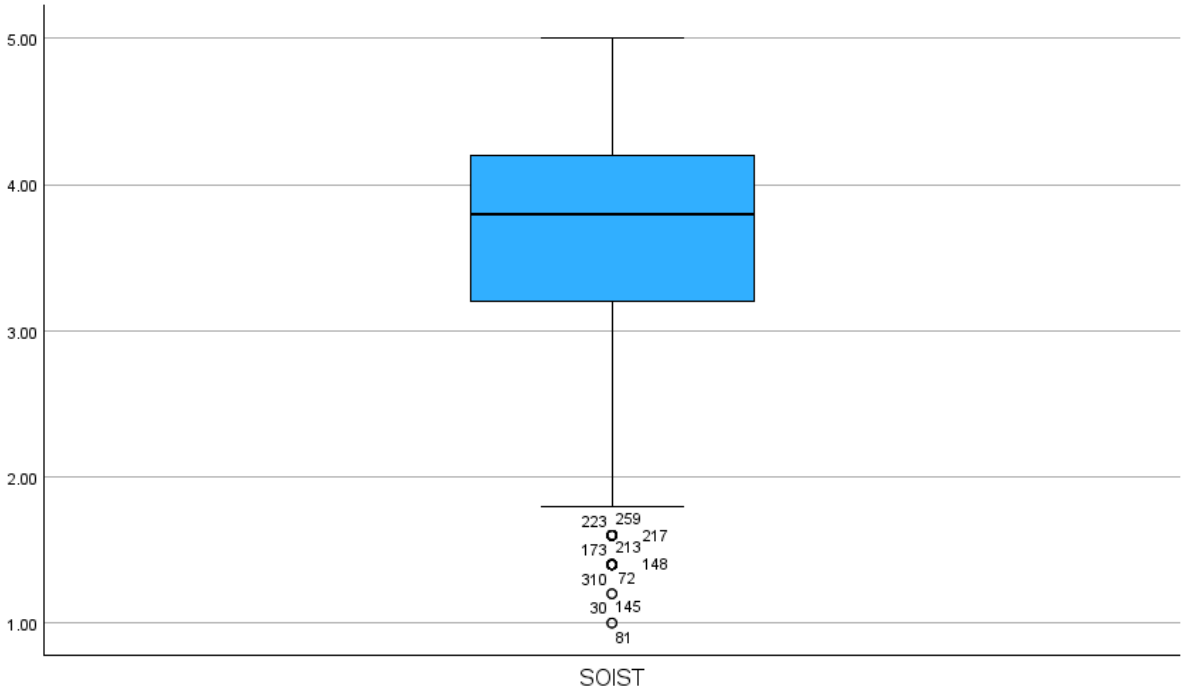


Figure 21: Boxplot of SOIST Variable Showing Outliers (Chapter4)

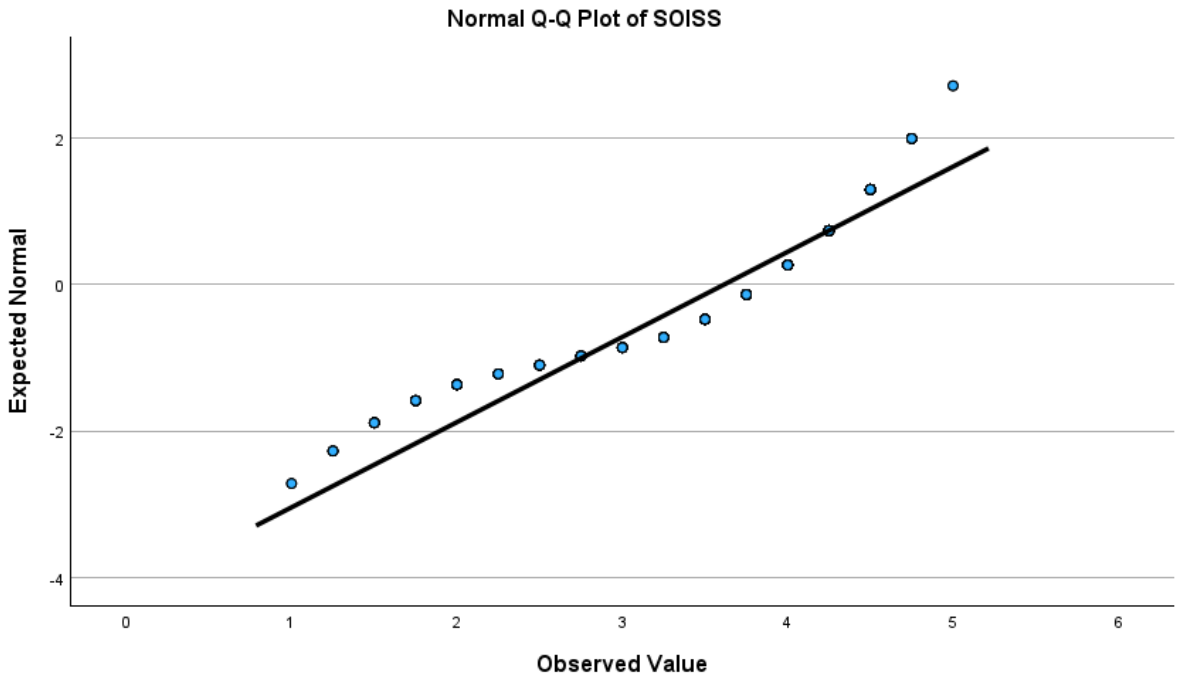


Figure 22: Normal Q-Q Plot of SOISS (Chapter4)

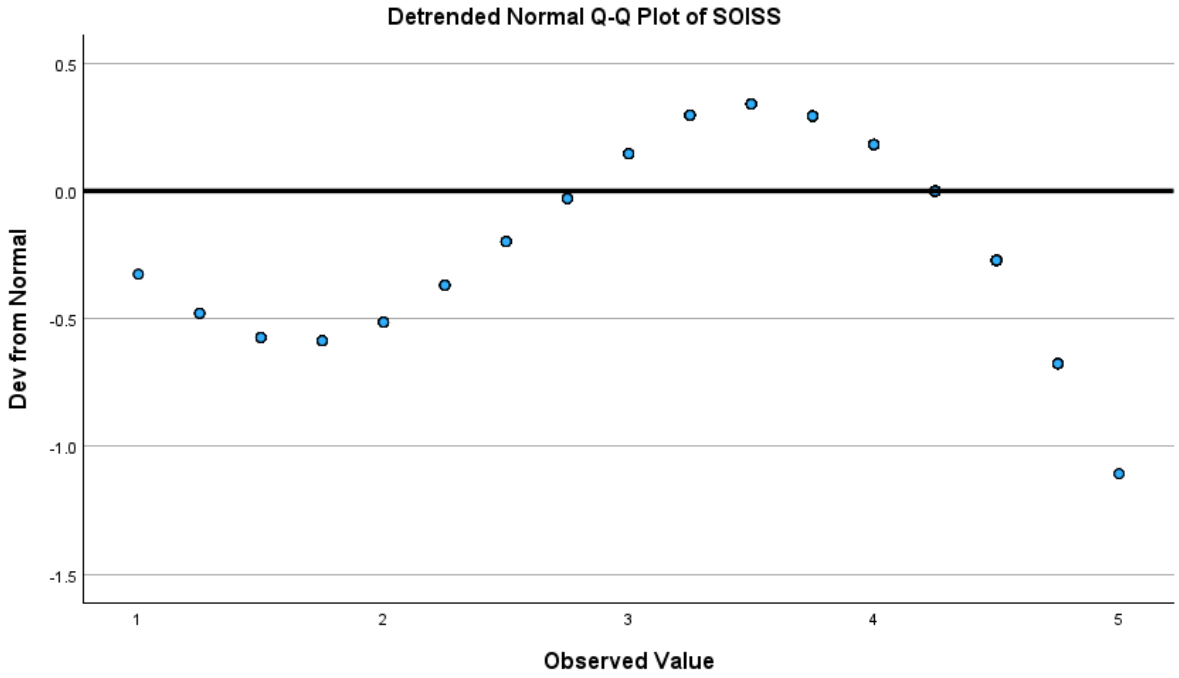


Figure 23: Detrended Normal Q-Q Plot of SOISS (Chapter4)

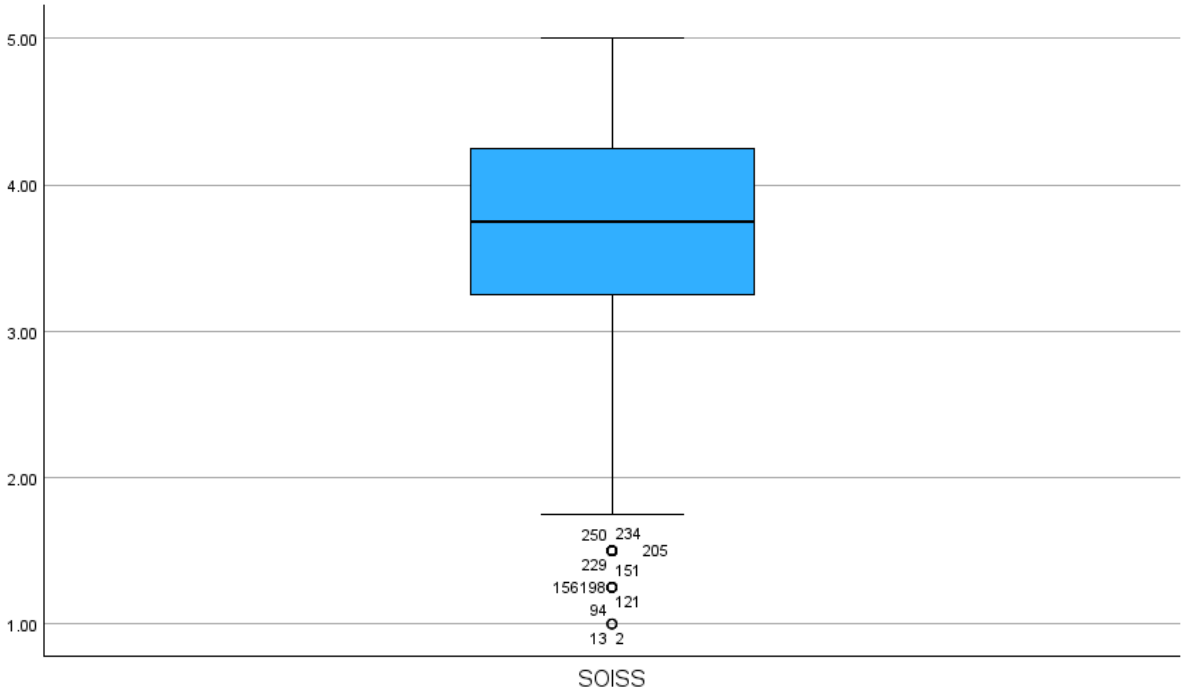


Figure 24: Boxplot of SOISS Variable Showing Outliers (Chapter4)

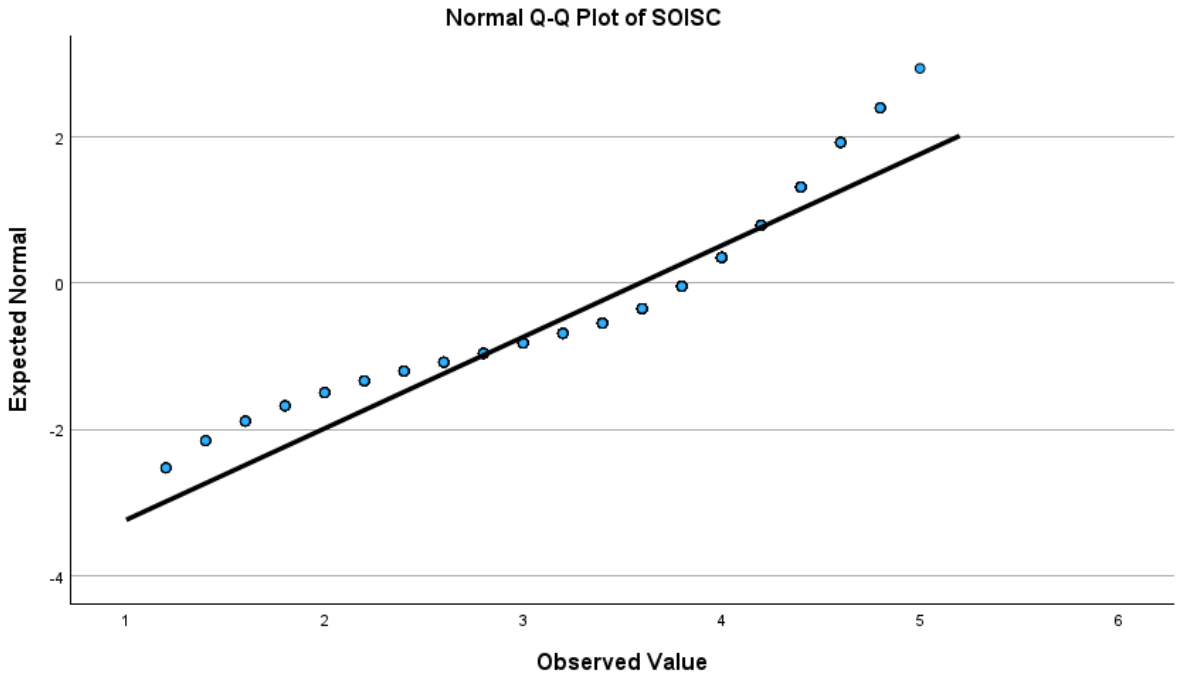


Figure 25: Normal Q-Q Plot of SOISC (Chapter4)

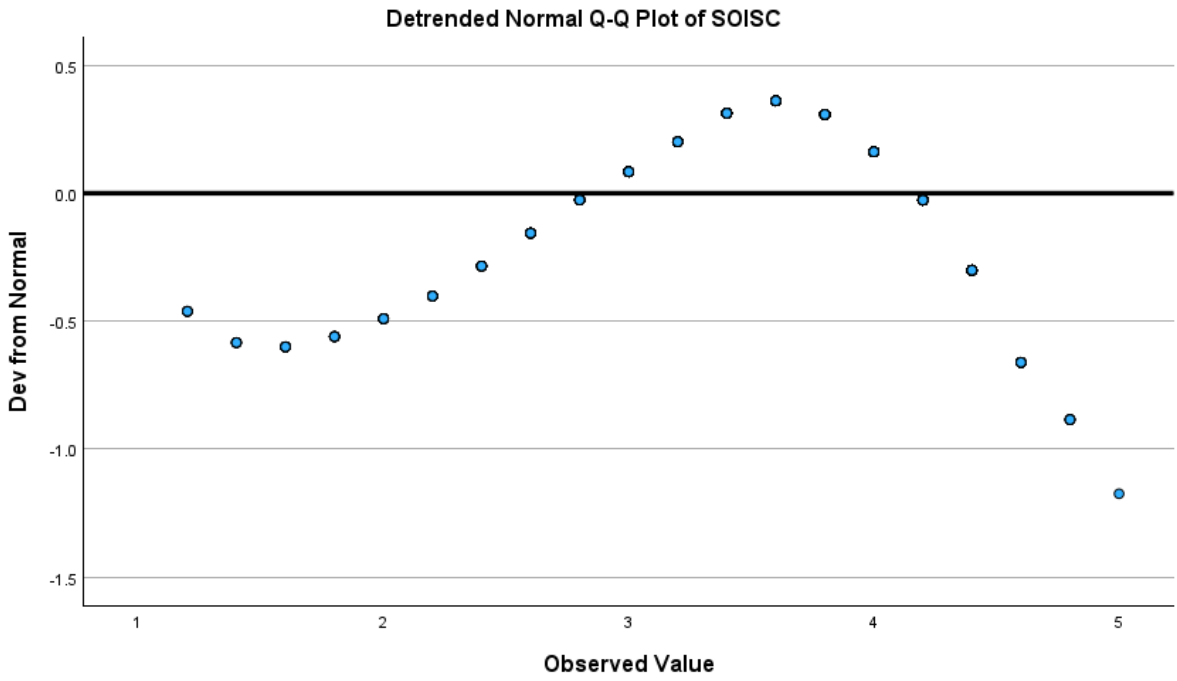


Figure 26: Detrended Normal Q-Q Plot of SOISC (Chapter4)

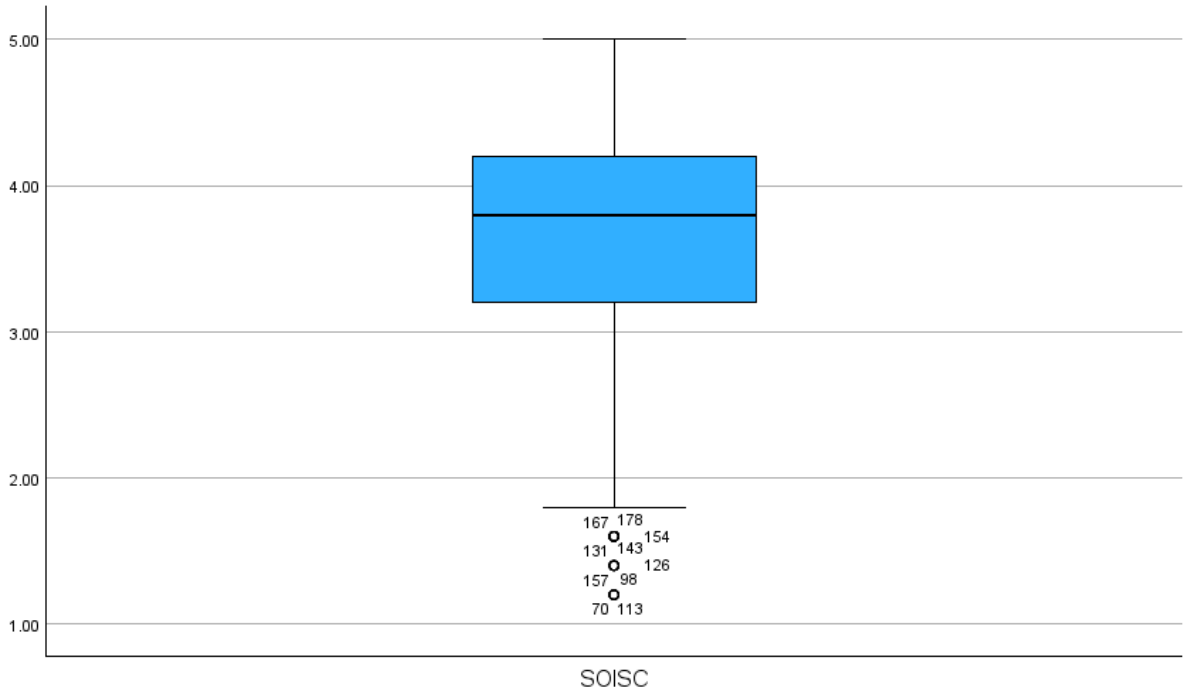


Figure 27: Boxplot of SOISC Variable Showing Outliers (Chapter4)

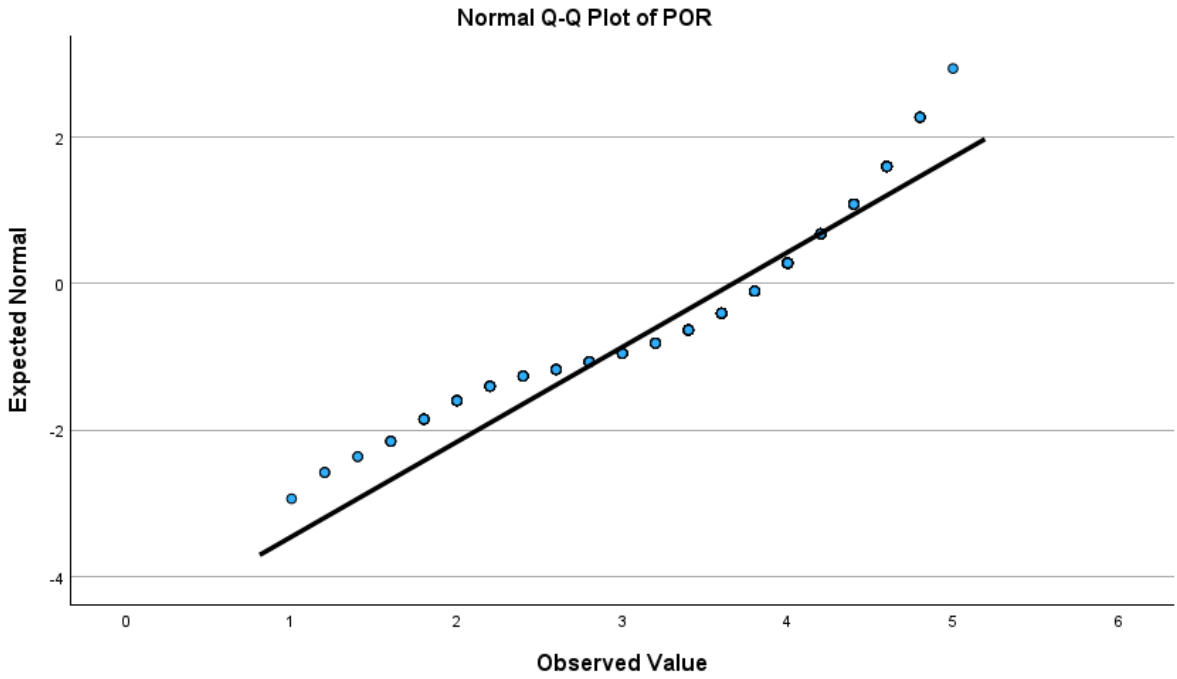


Figure 28: Normal Q-Q Plot of POR (Chapter4)

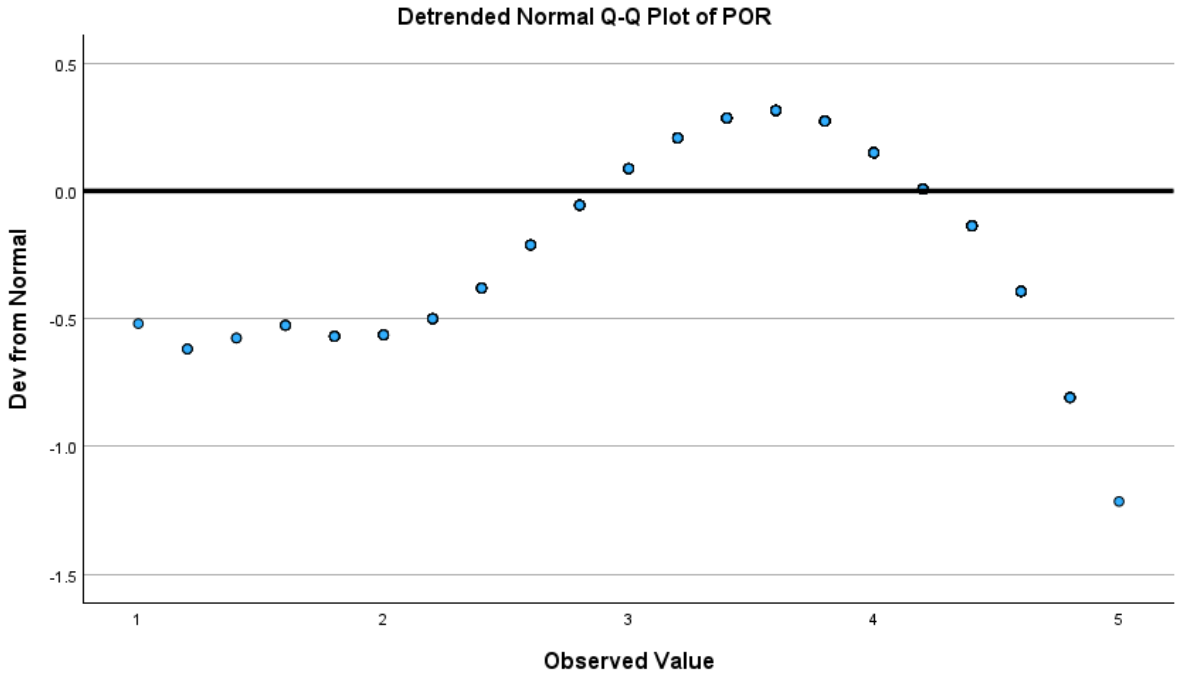


Figure 29: Detrended Normal Q-Q Plot of POR (Chapter4)

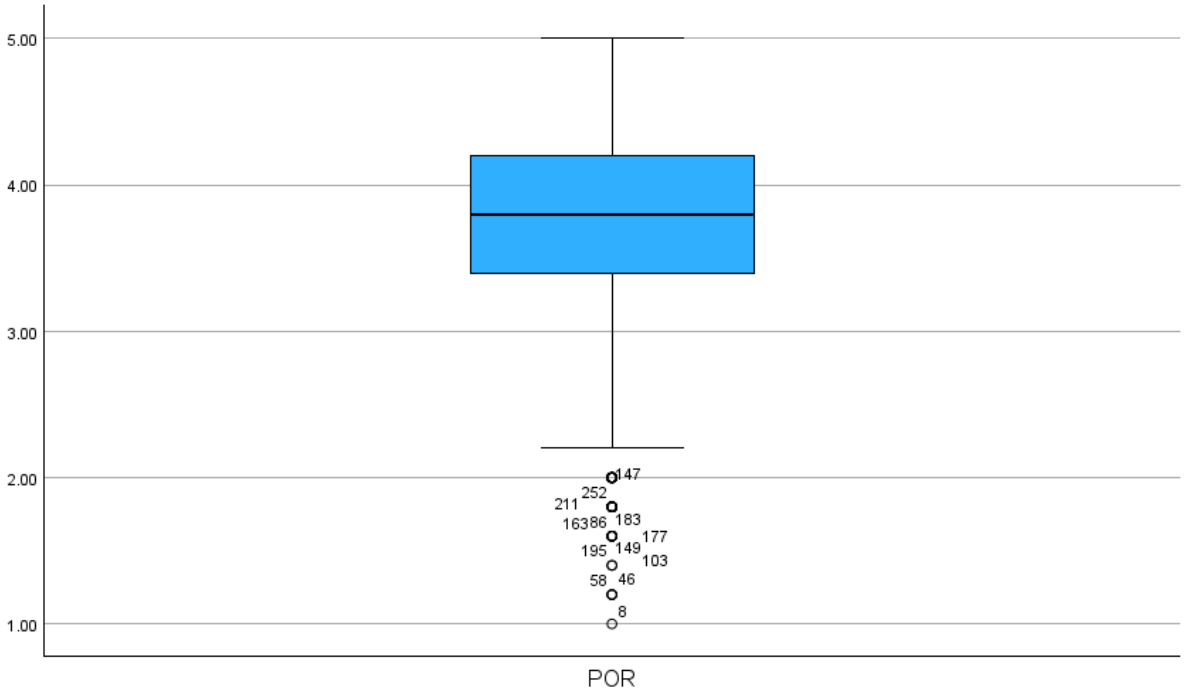


Figure 30: Boxplot of POR Variable Showing Outliers (Chapter4)

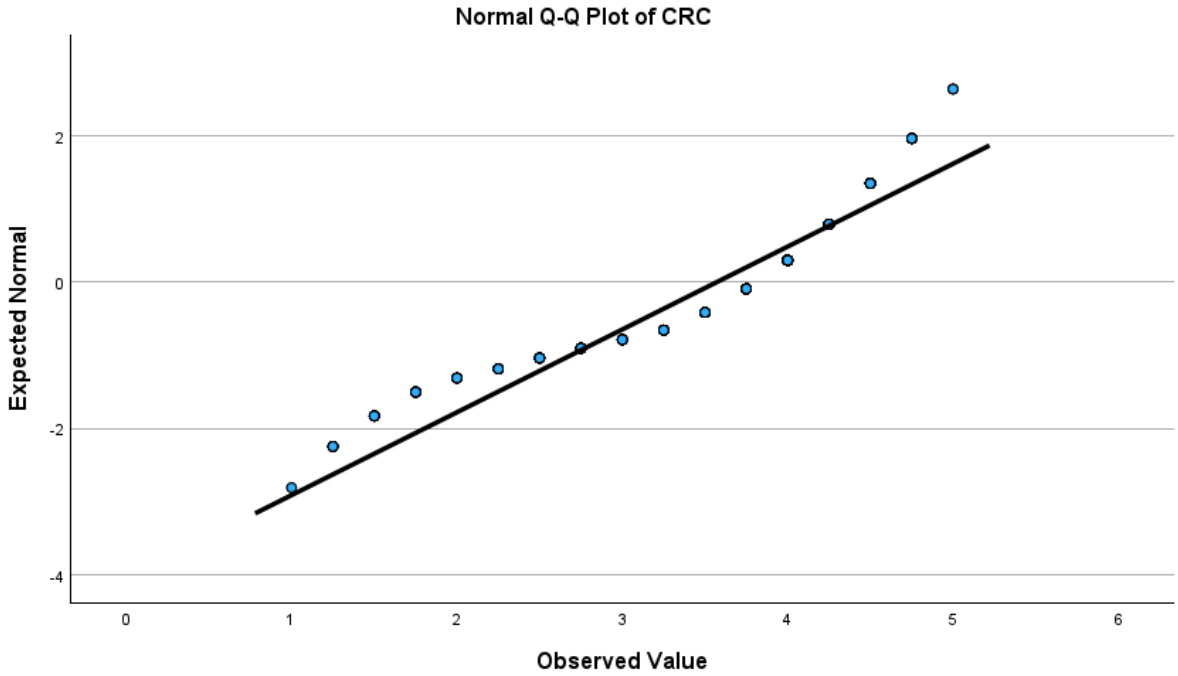


Figure 31: Normal Q-Q Plot of CRC (Chapter4)

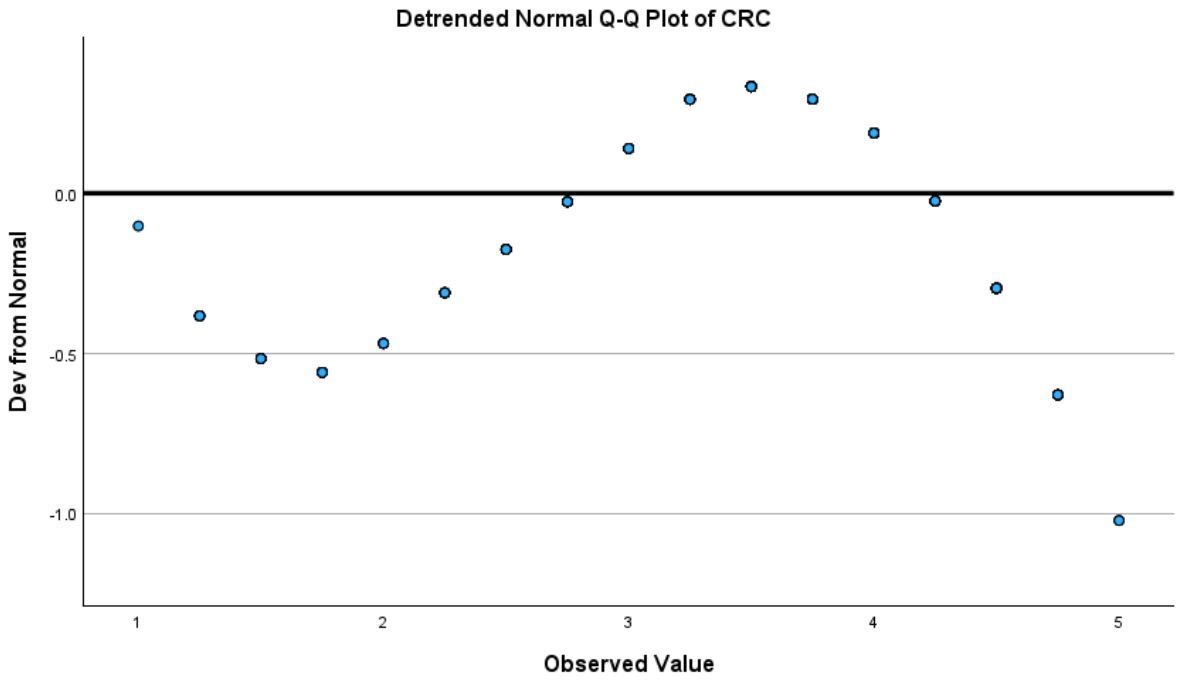


Figure 32: Detrended Normal Q-Q Plot of CRC (Chapter4)

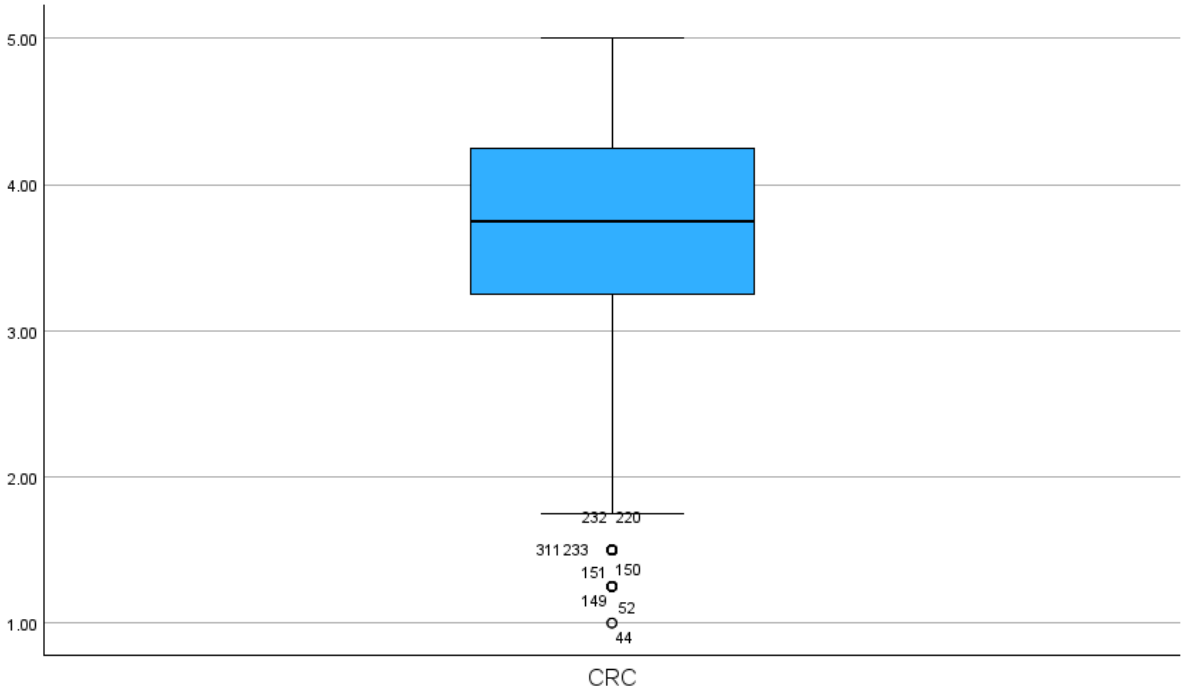


Figure 33: Boxplot of CRC Variable Showing Outliers (Chapter4)

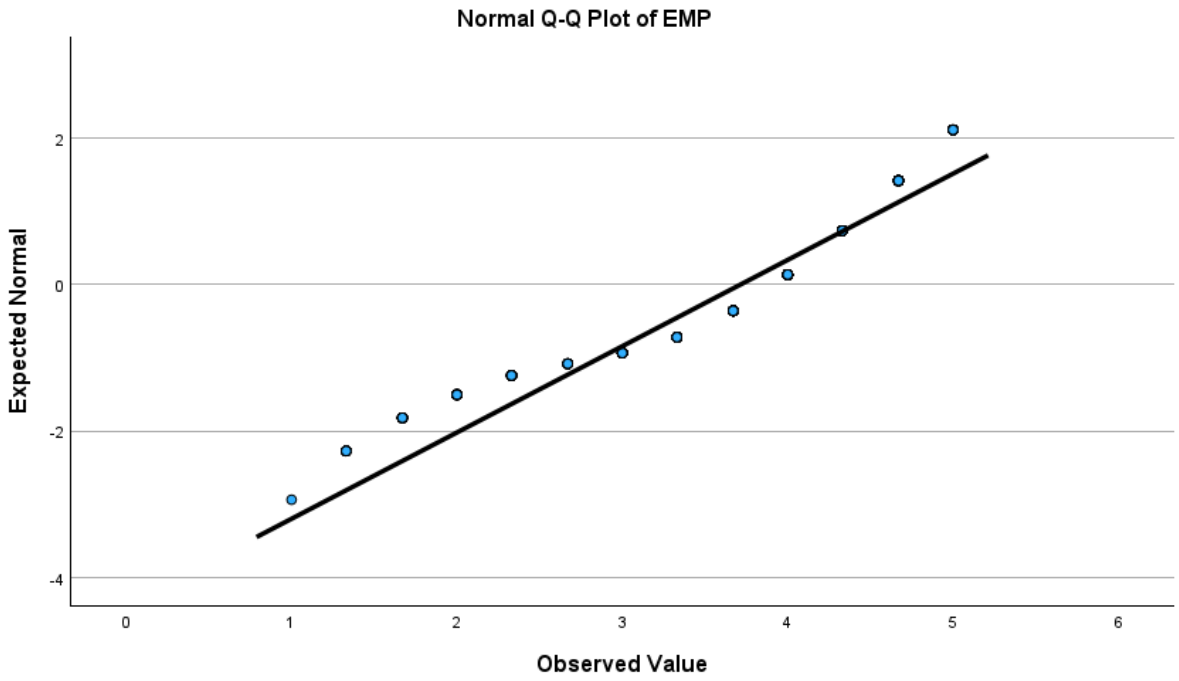


Figure 34: Normal Q-Q Plot of EMP (Chapter4)

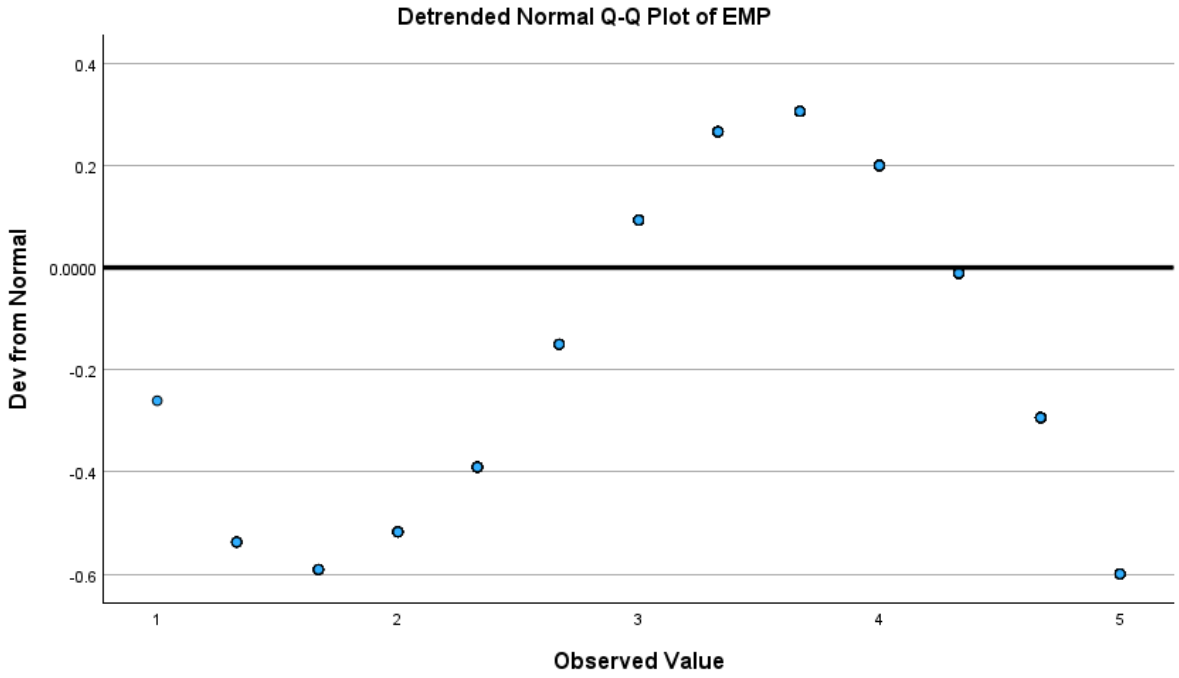


Figure 35: Detrended Normal Q-Q Plot of EMP (Chapter4)

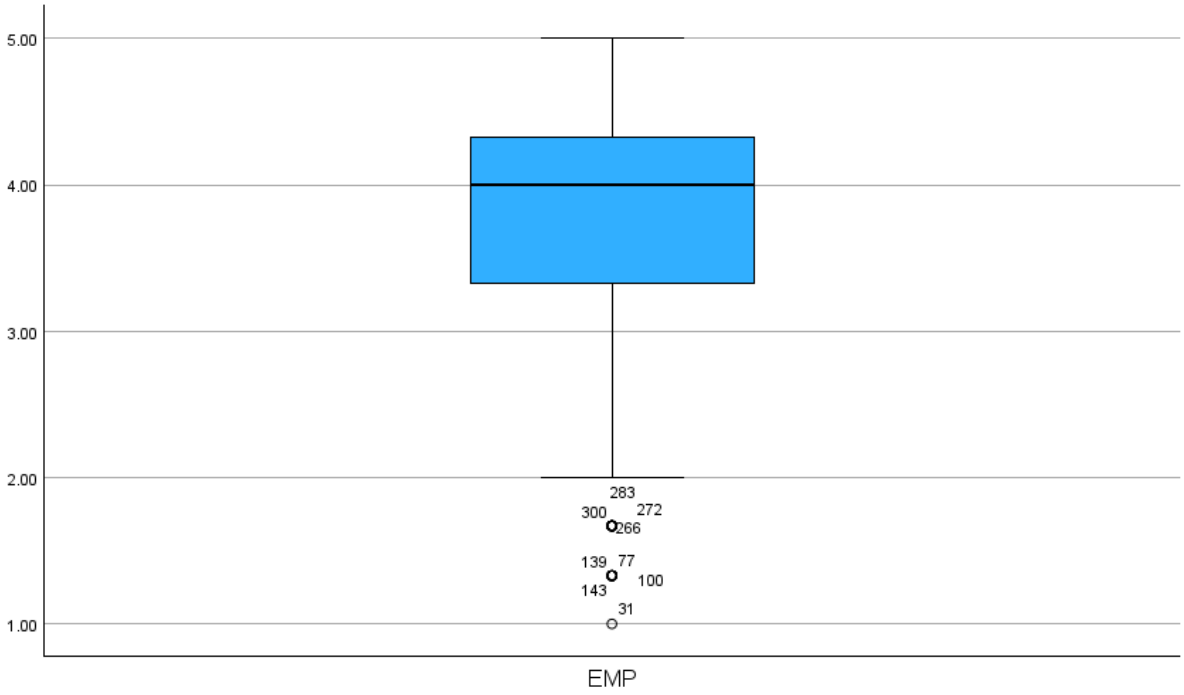


Figure 36: Boxplot of EMP Variable Showing Outliers (Chapter4)

Appendix H: Ethical Approved by UNIMAS

Deputy Vice Chancellor's Office
(Research and Innovation)
Human Research Ethics Committee
(Non Medical)
Tel: 082 581222/1223
Fax: 082 665115

UNIVERSITI MALAYSIA SARAWAK
94300 Kota Samarahan

MEMORANDUM

Reference : UNIMAS/TNC(PI)/09-65/02 Jld.2 (59)

To : Dr.Abdulrazak Yahya Saleh
Faculty of Cognitive Sciences and Human Development

From : Chair
Human Research Ethics Committee (Non Medical)

Date : 19 March 2025

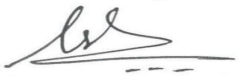
Subject : **Research Ethics Approval for Non-Medical Research on Humans**

With reference to the above, I would like to inform you that your application for research ethics clearance was discussed in the 13th Human Research Ethics Committee (Non-medical) meeting 1/2025 on 4 March 2025. Your application for research ethics has been approved.

Title of project :	Examining Student Engagement in Online Ideological and Political Learning within Vocational Colleges: A Mixed Methods Study
No. Ethics Approval :	HREC(NM)/2023 (2)/59
Principal Investigator :	Dr.Abdulrazak Yahya Saleh (Universiti Malaysia Sarawak)
Co-researcher(s):	Sun ChunXiu (Universiti Malaysia Sarawak)

Thank you.

Yours sincerely,



Professor Dr Ting Su Hie

c.c :Deputy Vice Chancellor (Research & Innovation)
:Director, UNIMAS Publisher
:Deputy Dean, Faculty of Cognitive Sciences and Human Development