An Empirical Analysis of Case-Based Teaching in E-Commerce Education: Effects on Learning Motivation, Classroom Engagement, and Career Cognition among Vocational Students

Zhang Mei[1*], Nurulwahida Azid[2]

[1]School of Education and Modern Langueges, Universiti Utara Malaysia

[2]School of Education and Modern Langueges, Universiti Utara Malaysia

[*]Corresponding author - zhangmei19900122@gmail.com

HOW TO CITE:

Zhang Mei, Nurulwahida Azid (2026). An Empirical Analysis of Case-Based Teaching in E-Commerce Education: Effects on Learning Motivation, Classroom Engagement, and Career Cognition among Vocational Students. International Journal of Special Education, 41(3s), 721-741.

COPYRIGHT STATEMENT:

Copyright: © 2026 Authors. Open access publication underthe terms and conditions of the Creative CommonsAttribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).

ABSTRACT:

The increasing complexity of digital commerce environments has demanded the need for vocational education systems to move from transmissive teaching practices toward practice-integrated forms of pedagogy. While there is substantial evidence supporting the case-based form of pedagogy for various professional fields, there are fewer empirical studies on the effectiveness of case-based teaching for vocational e-commerce education at the secondary level. The present study investigated whether case-based teaching has a positive influence on learning motivation, engagement, and career cognition for vocational students at the secondary level (ages 16-17 years). The study applied the quasi-experimental pre-test and post-test design and conducted a systematic contrast between case-based teaching and Lecture-based teaching in two vocational colleges in Malaysia (N = 86). The results showed that case-based teaching has a positive influence on intrinsic learning motivation, engagement and career cognition. The study also applied semi-structured interviews with five teachers and five students to validate the results from the quantitative study and provide insight into the experiential, motivational and cognitive processes of the students. The study contributes to the empirical database for case-based teaching in vocational secondary education and develops an integrated theoretical framework for the relationship between case-based teaching and learning motivation, engagement and career cognition from the perspective of constructivist learning processes and career identity development.

Keywords: Case-based teaching; E-commerce education; Vocational education; Learning motivation; Classroom engagement; Career cognition; Student-centred learning; Self-determination theory; Sustainable Development Goal 4; Quality education; Digital skills; Career readiness.

1. Introduction

The rapid development of digital marketplaces has significantly changed the skill set expected in modern commerce and business (Suryanarayana, 2023; Sadeghi et al., 2023). he e-commerce practitioner is now increasingly expected to

integrate the skills of data interpretation, governing digital marketplaces, dispute resolution with customers, and strategic decision-making in an ever-changing and dynamic technology-driven business landscape (Zhang, 2025). Recent empirical research on e-commerce adoption among SMEs further indicates that technological readiness, managerial involvement, innovativeness, and pressure from customers and suppliers significantly influence whether businesses adopt and succeed with e-commerce practices (Tamang & Photchanachan, 2025).. These are multi-dimensional skill sets that transcend the transmission of declarative knowledge and require the development of context-dependent analytical thinking and professional judgment skills (Kooloos et al., 2019). However, many vocational education systems are still grounded in traditional instructional paradigms that emphasize the transmission of content over competency development (Dahl & Mørch, 2025). Empirical studies across various disciplines in STEM and management fields have shown that an active learning context is more effective in facilitating cognitive engagement and retention compared to more passive instructional contexts (Freeman et al., 2014). Thus, there is an apparent disconnect between the instructional paradigms commonly used in e-commerce education and the competency sets expected in the industry.

Case-based pedagogy has been proposed as an alternative that is both theoretically sound and practically feasible (Bayona & Durán, 2024). The placement of the learner within a construct representation of authentic business challenges requires case analysis that necessitates interpretation, justifying and negotiating learning outcomes. So, case-based pedagogy operationalizes constructivist learning theories by providing an instantiation of the constructivist view of knowledge as constituted by contextualized inquiry, dialogic interaction, and contemplative engagement with knowledge, as opposed to more traditional and didactic approaches to knowledge transmission (Emblen-Perry, 2022). Case-based pedagogy is also aligned with self-determination theory by providing structural support for the satisfaction of the three fundamental psychological needs: autonomy, competence, and relatedness (Koh, 2006; Ryan & Deci, 2000). Despite these significant and compelling theoretical and pedagogical connections, there are three significant gaps in the existing literature that this study seeks to address. Firstly, quasi-experimental studies that make specific and direct comparisons between case-based and lecture-based pedagogies within the context of vocational e-commerce learning are surprisingly absent from the literature. Secondly, while the majority of existing studies have focused on cognitive outcomes and indicators of cognitive performance, motivational and identity outcomes have received insufficient attention. Thirdly, while career cognition is an integral and essential component of the vocational education mandate, this construct has received insufficient integration into pedagogical evaluation models. The current study addresses these gaps through a mixed-methods quasi-experimental design that compares the impact and effectiveness of case-based pedagogy to lecture-based pedagogy in terms of intrinsic motivation, engagement, cognitive integration, and professional role awareness. Figure 1 illustrates the conceptual framework supporting this study.

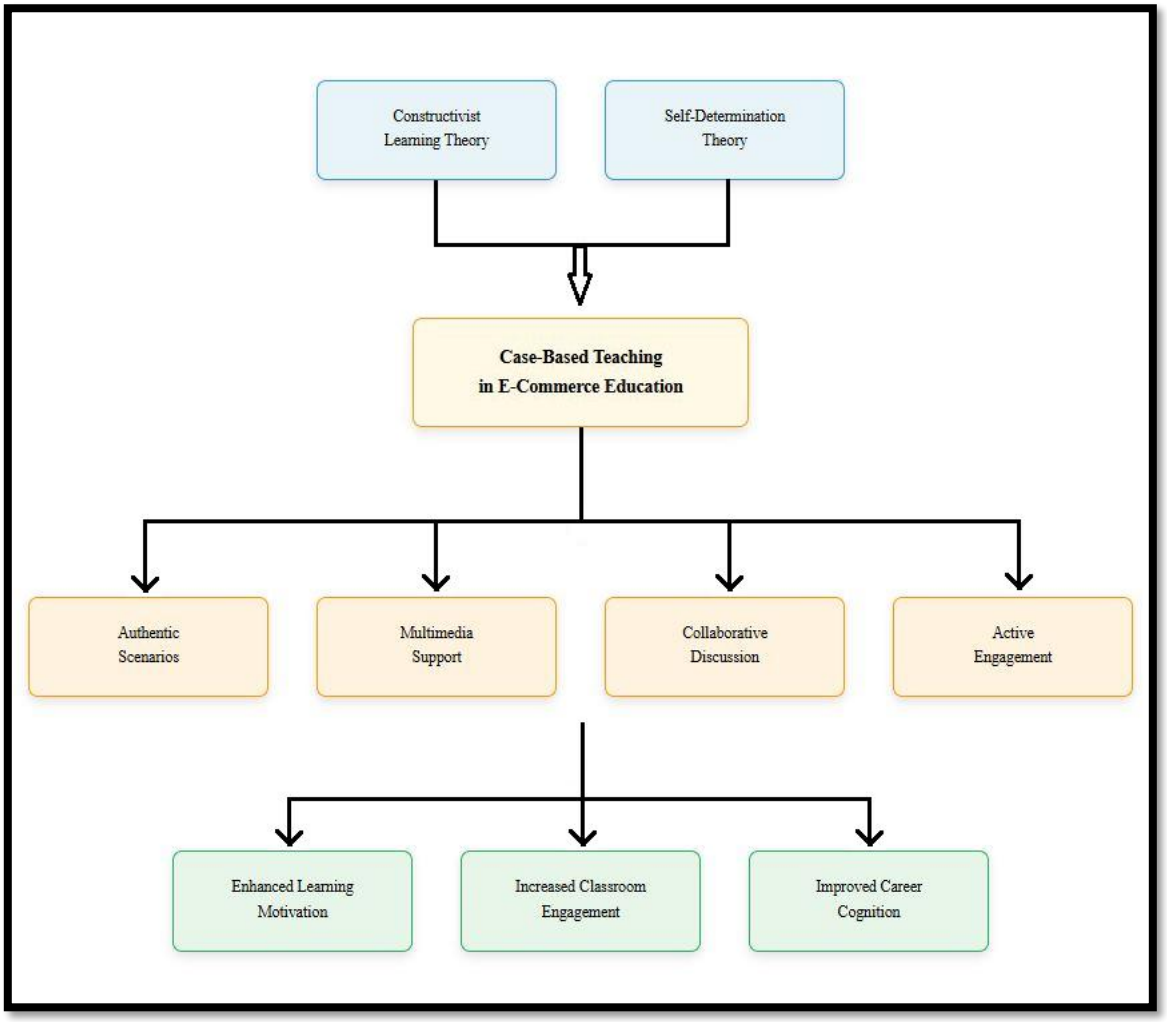

Figure 1: Conceptual Framework

2. Literature Review

2.1 Theoretical Foundations

Modern learning theory has continued to move from the idea of instructional approaches that emphasize the transmittal of knowledge toward epistemologies that emphasize the construction of knowledge as an inherently situated, interactive, and interpretive practice. The constructivist theory of learning argues that the learner actively constructs meaning from the integration of new information into the learner's cognitive schema rather than the transmittal of propositional information (Pande & Bharathi, 2020). In such an approach, the construction of understanding is seen to occur through the engagement of learners with problems, the use of dialogue, and the process of abstraction. The instructional environment that fails to contextualize the conceptual information from the application of the concept results in the construction of inert knowledge, that is, the construction of information that is nominally stored but functionally inapplicable. The empirical evidence for the theoretical approach is well supported, with the learner-centered approach that emphasizes the use of exploration and dialogue yielding higher results for critical thinking and conceptual understanding compared to the lecture approach (Kwan & Wong, 2015). The analyses that have examined the tension between the constructivist approach and the rigid approach to the transmittal of information highlight the ineffectiveness of the object-centered approach in the development of adaptive thinking (Dahl & Mørch, 2025). The implications for vocational training, where the transfer of the learner into the occupation is the primary measure for evaluation, are evident.

Self-Determination theory can be used to offer a supplementary and supportive motivational structure. Ryan and Deci (2000) have shown that long-term maintenance of intrinsic motivation depends on the satisfaction of three basic psychological needs for autonomy (the experience of self-determination), competence (the experience of effective environmental mastery), and relatedness (the experience of genuine social connection). Instructional conditions that limit learner agency and social interaction have a deleterious effect on internalized engagement and intrinsic motivation. Instructional conditions that allow for purposeful decision-making, skill development, and social interaction have a much greater likelihood of supporting the development of long-term motivational orientations. From a pedagogical standpoint, instructional methods need to be evaluated not only for their potential to produce cognitive outcomes but also for their structural potential to activate motivational processes. The alignment of both constructivist and self-determination theory implies that effective vocational pedagogy needs to offer a balance of contextual engagement and autonomous problem-solving.

2.2 Case-Based Learning and Student Engagement

Case-based learning is a practical implementation of these theoretical principles, in which conceptual learning is integrated into a framework of professional problems, either in reality or simulation (Zhou & Zhang, 2025). Rather than focusing purely on learning abstract principles, case-based learning requires learners to engage with contextual data, weigh competing factors, and generate and argue decisions. The epistemological change here is small but significant. The learner is no longer simply memorizing or reproducing facts, but analysing, synthesizing, and evaluating. The meta-analytical evidence is clear that case-based learning formats, including active learning, generate superior cognitive and affective outcomes in comparison to traditional lecture formats (Bayona & Durán, 2024; Freeman et al., 2014). Critically, however, these outcomes include not simply improvements in formal examination outcomes, but reductions in course dropout rates, improvements in engagement and transfer outcomes. In particular, the effectiveness of reflective learning environments confirms that well-designed analytical learning formats improve instrumental learning outcomes, enabling learners to apply conceptual learning to novel contexts (Roessger, 2014). Engagement cannot be thought of in simple terms of compliance or surface-level participation. Rather, engagement is best understood as a form of cognitive investment, dialogic interaction, and task orientation, all of which case-based learning is uniquely positioned to activate. However, the important point is that the overwhelming majority of empirical studies of case-based learning formats have focused solely in the context of higher education disciplines (Emblen-Perry, 2022). The area of vocational secondary education in relation to new digital commerce formats, is a significant gap in the pedagogical evidence base.

2.3 Digital Media and Case-Based Pedagogy

The integration of digital media within case-based pedagogical environments raises several cognitive and motivational issues that must be subject to critical theoretical analysis. Multimedia learning theory suggests that learning will be enhanced through the effective coordination of both verbal and visual representations of the material in the mind of the learner through the use of dual processing channels, as long as the cognitive load of the learning material remains within the limits of the learner's potential (Mayer et al., 2014). Excessive complexity in the multimedia learning environment will overwhelm the learner's potential and impede learning, while the strategic use of multimedia will greatly facilitate learning by helping learners understand procedural steps, visualize abstract processes, and reduce the level of abstraction. Recent studies on the effect of visual load and language proficiency suggest that the strategic use of multimedia learning environments will either facilitate or impede learning based on the level of congruence between the digital media and the learners' characteristics and learning goals (Bali et al., 2026). In the case of e-commerce learning environments, the interfaces, analytical tools, digital marketing processes, and logistics processes will be

critical learning objects in the environment. Visual learning will be used as a critical tool in the learning environment and will be used as a means of providing learners with the necessary cognitive scaffolding. Another critical feature of digital media in case-based learning environments is the opportunity for learners to engage in iterative learning. Through the improvement of sentiments of competence and independent self-regulation, this aspect of digital case materials will directly impact the learners' motivation level. It must be noted that the strategic use of technology in learning environments will be based on the strategic integration of the technology within the learning environment and will not be based on the use of technology as a form of supplementation of the learning environment (Sailer et al., 2021).

2.4 Case-Based Learning and Career Cognition

It is the inherent vocational nature of the training that distinguishes vocational education from other forms of academic training. The vocational mission is characterized by an emphasis on employability, professional identity, and the development of occupational competence. Thus, the concept of career cognition transcends the simple recognition of job titles and involves an awareness of job responsibilities, ethical constraints, decision-making responsibilities and prevailing norms. Research findings suggest that the genuine engagement of students in work activities results in the development of their self-efficacy and vocational goals (Gashi et al., 2023). It has also been discovered that using the project-based method, which incorporates industry feedback, improves students' perceptions of their competence and preparedness for the workforce (Naseer et al., 2025). The difference between the two forms of knowledge is central to the vocational mission of vocational education. The contextual specificity of the development of the vocational identity must also be recognized. The overgeneralization of research findings from small homogeneous samples has been highlighted in the study of human behaviour (Henrich et al., 2010). Since an individual's cognition is influenced by their surroundings, the effectiveness of an intervention may fluctuate greatly depending on the situation. Thus, the importance of testing the efficacy of the case-based approach in the specific vocational context must be recognized. In the case of e-commerce, the match between the case study and the reality of the industry could play an important role in the development of the students and the closure of the well-documented theory-practice gap (Gupta et al., 2023; Suryanarayana, 2023).

2.5 Research Propositions and Theoretical Framework

Through the synthesizing of the above literature, a complex pedagogical mechanism can be identified that connects instructional design to motivational and career-cognitive outcomes. The constructivist theory predicts that authentic and problem-oriented instructional settings can enhance deeper conceptual integrations and meaningful knowledge constructions. The self-determination theory predicts that autonomy-supportive, competence-enhancing, and socially interactive instructional settings can enhance intrinsic motivational orientations. The empirical investigations of active and case-based learning have shown positive effects on engagement, retention, and transfer in various educational domains (Freeman et al., 2014; Bayona & Durán, 2024). However, there are three important limitations of the above literature. Firstly, quasi-experimental studies of case-based and lecture-based instruction in vocational e-commerce settings have not been conducted. Secondly, the above studies have often neglected to investigate cognitive performance outcomes in relation to motivational and career-cognitive variables within a holistic evaluative framework. Finally, the extension of case-based pedagogy to younger vocational learners aged 16-17 has not been explored.

Accordingly, the current study aims to test three interrelated propositions: (1) case-based instruction in vocational e-commerce education can enhance intrinsic learning motivation by creating autonomy-supportive instructional structures. (2) case-based instruction can enhance classroom engagement by activating dialogic and collaborative problem-solving processes. (3) case-based instruction can enhance career cognition by systematically exposing learners to authentic professional scenarios that require contextualized analyses and rational

decision-making. Figure 2 conceptualizes these interrelated relationships, where case-based instruction can be conceptualized as a mediating instructional structure that connects the above theoretical foundations to observed outcomes.

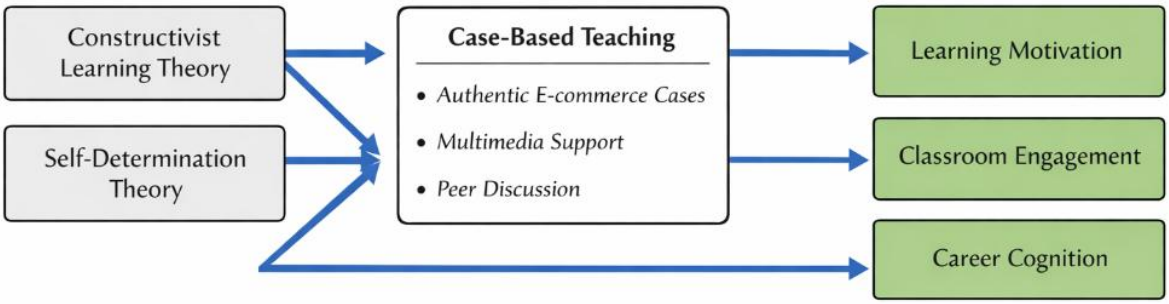

Figure 2: Case based teaching framework

3. Methodology

3.1 Research Design

The current study was based on a mixed-methods research design, where a quasi-experiment pre-test/post-test design was combined with a qualitatively oriented research strand. The quasi-experiment was chosen because random assignment of students to instructional conditions is not feasible in most authentic vocational education settings, where cohorts of students are predetermined by the educational institutions and where disruptions to the regular instructional schedule need to be avoided. The quasi-experiment has long been acknowledged as an appropriate research design for educational studies in general. According to Wiyono et al. (2025), quasi-experiment approaches to educational research have been widely used to study the effects of instructional interventions, and they have been found to be appropriate for educational settings. The use of pre-test and post-test data allows for a causal attribution of observed effects to the instructional intervention rather than pre-existing group differences. The quasi-experiment design was supplemented by a qualitatively oriented research strand to allow for a mixed-methods approach to data collection. The qualitative approach was emphasized in the current study because qualitative data was used as a primary source for interpreting the effects of motivation, engagement, and professional cognition. The use of a mixed-methods research design allowed for an assessment of the effects of the instructional intervention, where quantitative outcome data was used to provide structural evidence for the effects of the intervention. The qualitative approach allowed for a deeper assessment of the effects of the instructional intervention because semi-structured interviews were conducted after the completion of the instructional intervention. This allowed for an assessment of the effects of the instructional intervention based on the participants' reflections on the instructional experiences. The use of a mixed-methods research design allowed for an assessment of the effects of the instructional intervention based on a qualitatively oriented research approach. The use of a qualitatively oriented research approach allowed for an assessment of the effects of the instructional intervention based on the participants' reflections on the instructional experiences. The use of a qualitatively oriented research approach allowed for a deeper assessment of the effects of the instructional intervention. The use of a qualitatively oriented research approach allowed for an assessment of the effects of the instructional intervention based on the participants' reflections on the instructional experiences. The use of a qualitatively oriented research approach allowed for a deeper assessment of the effects of the instructional intervention.

3.2 Participants

The participants for the study comprised students from two vocational institutions in Malaysia that offered formally accredited courses in E-commerce at the secondary level. The total number of students was 86, with 43 students allocated to the treatment

group that received case-based instruction and another 43 students allocated to the control group that received conventional lecture-based instruction. The participants were between the ages of 16 and 17 years, which was the typical range for the secondary level of the vocational system in Malaysia. The participants in both groups had comparable academic background, prior exposure to the curriculum, and the environment, thereby establishing the group equivalence prior to the intervention. The full profile of the participants is provided in Table 1. The choice of the vocational E-commerce programs was purposive and theoretically informed. The programs are formally and explicitly designed for the development of employability, the acquisition of skills, and the demonstration of their application in the industry. The choice of the programs was informed by the fact that prior research has established that contextual and experience-based approaches are beneficial for vocational students rather than the conventional lecture-based approach, as the former is closer to the students' orientation and their aspiration for development (Børte & Lillejord, 2024). All the procedures for the study are consistent with the ethical guidelines for the institution, and informed consent was obtained from the students prior to the study.

Table: 1 Participant Profile

Variable	**Treatment Group**	**Control Group**
Institution type	Vocational college	Vocational college
Number of students	43	43
Age range	16–17 years	16–17 years
Academic discipline	E-commerce	E-commerce
Instructional method	Case-based teaching	Traditional lecture

3.3 Instructional Intervention

The intervention was conducted within the designated class time over an established instructional period. The treatment group was provided case-based instruction that was carefully designed and contextualized for secondary-level vocational e-commerce education. The design of the case-based instruction was informed by the integration of the following four essential components: (1) the use of genuine industry cases based on established e-commerce business scenarios; (2) small group deliberation sessions that require case analysis, solution development, and evidence-based justification; (3) the use of multimedia resources for case development, including the creation of short documentary videos; and (4) the incorporation of task-based activities that require the application of decision-making skills. The case scenarios were informed by the application of modern industry practices in e-commerce, such as the management of online retail businesses, the management of logistics for e-commerce businesses, digital marketing strategies, the evaluation of digital marketing strategies, handling customer complaints, and compliance issues. The connection between the instructional design and the genuine industry scenarios was essential for enhancing the authenticity of the instructional design and for activating the cognitive schemas of the participants. The control group was provided conventional teacher-centered instruction that was informed by the same curriculum objectives. The instructional design for the control group was mainly textbook exposition, slide-supported presentations, and teacher explanation. The classroom interaction was mainly for clarifying procedures. The application of peer deliberation and case analysis was not applied in the control group. The design of the study allowed for the examination of the effects of instructional design formats that are independent of the curriculum content. Figure 3 illustrates the visual representation of the instructional design that differentiated the case-based treatment from the conventional control group.

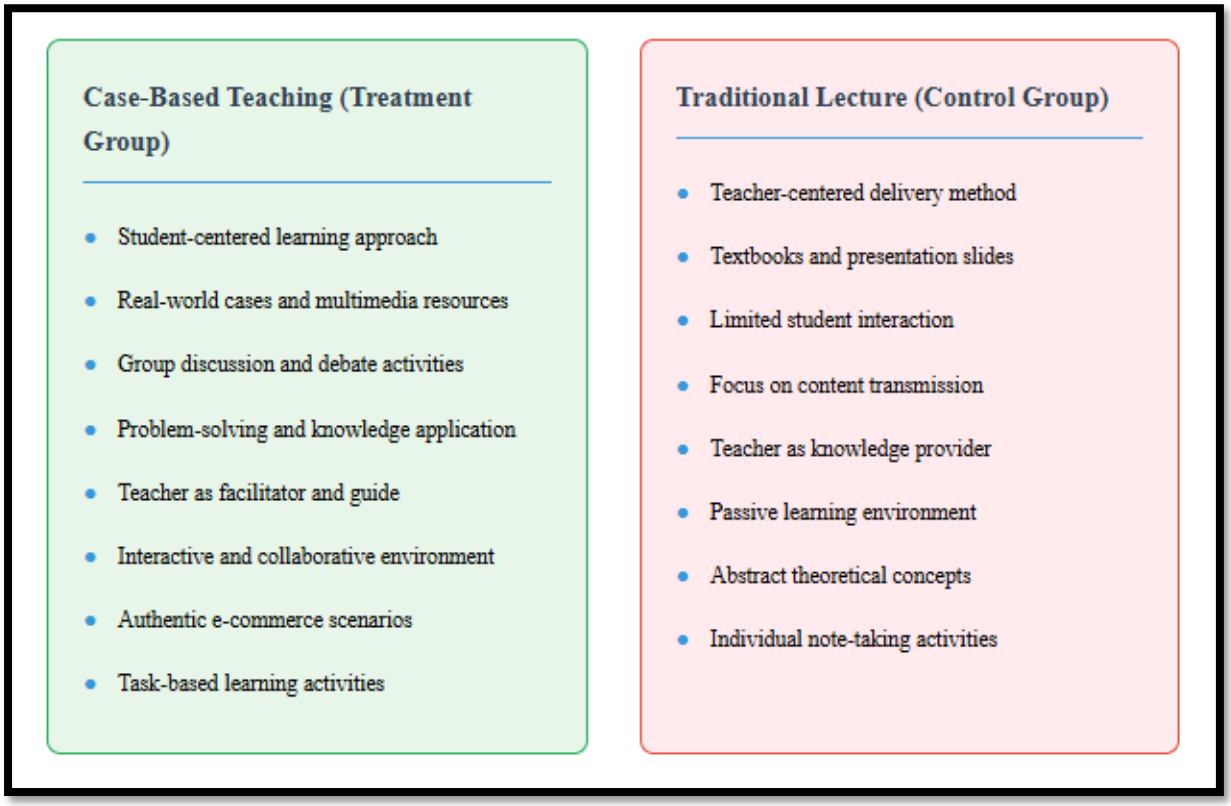

Figure 3 Instructional Characteristics Comparison of Case-Based Teaching (Treatment) and Conventional Lecture (Control)

3.4 Data Collection

Qualitative data was obtained through the use of semi-structured interviews, which were conducted immediately after the conclusion of the intervention period. For the purposes of the qualitative research, the sample size for the interviews consisted of five teachers who were directly involved in the instructional delivery and five students from the treatment group. The aim of the interviews was to ensure the systematic exploration of the following domains: changes in the level of intrinsic motivation for learning; patterns of student engagement and interactive engagement in the classroom; depth of conceptual understanding of the processes of e-commerce and the level of understanding of the application of the processes in the real world; and the level of perceived relevance of the instructional content in the context of future career prospects. For the teachers, the interview protocol was further expanded to include the feasibility of the instructional design, preparation time required for the instructional delivery, dynamics of classroom management in relation to the case-based instructional design, and the level of perceived pedagogical trade-offs in the application of the case-based and non-case-based instructional design. The semi-structured interview approach balanced the need for cross-participant consistency with the need for flexibility in the approach in order to ensure the exploration of the desired domains. All the interviews were audio-recorded with the consent of the interviewees and were later anonymized for confidentiality purposes. Despite the fact that the sample size for the qualitative approach was deliberately kept low in order to ensure the in-depth exploration of the desired domains, the responses were encouraged to be long and reflective.

3.5 Data Analysis

Systematic theme analysis of qualitative data was carried out using a well-established multi-stage analytic framework. The analysis of the transcripts of the interviews involved repeated, meticulous readings of the data to facilitate data familiarization, followed by repeated identification of significant informational units in relation to learning motivation, engagement, interaction, and

professional cognition. The open coding method was employed as a preliminary analysis of the data, resulting in a preliminary taxonomy of codes, after which axial coding was employed to reveal relationships among categories of data, culminating in the development of thematic dimensions. The analysis resulted in well-defined thematic constructs that reflect converging and diverging views of teacher and student participants. Table 2 illustrates the thematic analysis framework employed in this study.

Table 2. Thematic Analysis Framework

Stage	Description
Data familiarisation	Repeated reading of interview transcripts
Open coding	Identification of meaningful units of data
Axial coding	Grouping codes into related categories
Theme development	Formation of overarching dimensions
Validation	Cross-checking between student and teacher data

Triangulation of data sources of student and teacher participants was employed to enhance analytical rigor by facilitating systematic cross-validation of findings, thereby ensuring credibility of interpretation. For teacher interview data, word cloud analysis was employed as an additional tool in facilitating identification of dominant conceptual emphases, thereby ensuring verification of thematic priorities. The use of this analysis was as an additional tool in facilitating identification of thematic priorities, as opposed to being employed as a main analysis tool. The use of well-established qualitative research protocols, including extensive, immersive engagement with data, open coding, and cross-validation of interpretation, ensured reliability, credibility and trustworthiness of findings (Freudenburg et al., 1986).

4. Results

4.1 Teachers' Perspectives on Case-Based Teaching

As a result of analysing the interviews conducted with the teachers, it was found that a dominant and well-articulated main theme was clearly identifiable, and this was centered on the optimization of student-centered pedagogical approaches. The teachers emphasized and highlighted the manner in which the implementation of case-based teaching approaches fundamentally transformed the classroom pedagogical dynamic from a teacher-centered transmission of knowledge to a student-centered facilitation of discussion and reasoning. The instructors highlighted their new role as facilitators of structured classroom dialogue and reasoning, where students derive their own conclusions based on e-commerce scenarios, rather than a sole provider of knowledge to students (Ventista & Brown, 2023). The pedagogical approach was found to be of particular relevance to vocational education, where students' responses to contextual instructional approaches have shown a consistent advantage over abstract theoretical approaches. All the instructors highlighted the manner in which students displayed a marked increase in engagement and voluntary participation in the classroom when the curriculum was clearly linked to identifiable real-world commercial scenarios.

Five interrelated domains of observable pedagogical change were described by teachers. Firstly, a significant pedagogical shift from teacher-centered learning towards learner-centered learning and engagement was observed, in which students increasingly took ownership of classroom discourse and became independent in completing analytical learning tasks. Secondly, multimedia case materials emerged as significant pedagogical agents in facilitating the understanding of complex e-commerce concepts and making such learning content accessible and meaningful. Multimedia case

materials offered tangible and concrete learning representations of abstract processes and allowed learners to make substantive learning connections between theoretical constructs and tangible commercial practices. Thirdly, the pedagogical interactions in the classroom underwent significant transformation, in which unidirectional information delivery and static learning environments were replaced by dynamic learning environments that featured structured debates, collaborative deliberations, and group problem-solving. Fourthly, teachers observed significant pedagogical changes in the level of attentiveness, intellectual interest, and engagement of learners. Such positive learning attitudes and behaviours were observed when case materials featured realistic business dilemmas and learning scenarios that were similar to learners' digital experience. Fifthly, the structured nature of case materials seemed to facilitate the visibility and understandability of learning objectives for learners, thereby enhancing learners' understanding of learning purposes and the applicability of learning concepts. Table 3 presents teachers' reported pedagogical observations in the aforementioned dimensions.

Table 3. Perspectives of teachers on Case-Based Teaching

Dimension	**Key Observations and Pedagogical Shifts**
Teaching subjects and objects	Transition from teacher-dominated instruction to learner-oriented engagement; students became active participants rather than passive listeners
Teaching content and carriers	Case materials supported by multimedia resources made complex e-commerce concepts accessible and relatable; helped connect theory with industry practices
Teaching interaction and forms	Dynamic classroom environment with frequent discussions, debates, and collaborative problem-solving replaced one-way lectures
Learning motivation and status	Higher levels of student attentiveness, curiosity, and willingness to participate; students more mentally present and emotionally invested
Teaching objectives and effects	Case-based instruction made learning goals more visible and outcomes more observable; clearer alignment with vocational objectives

4.2 Student Learning Engagement Enhancement

The interview data from the student participants revealed that the exposure to case-based instruction has a positive and significant effect on learning engagement in various and interconnected dimensions. Specifically, the student participants reported significant and noticeable changes in their learning orientations, learning participation, and the depth and stability of their conceptual understanding. However, the changes in learning engagement were not immediately observable but rather developed progressively as the students became increasingly familiar and proficient in the case-based instruction. Figure 3 presents the progressive and layered development of learning engagement in various dimensions.

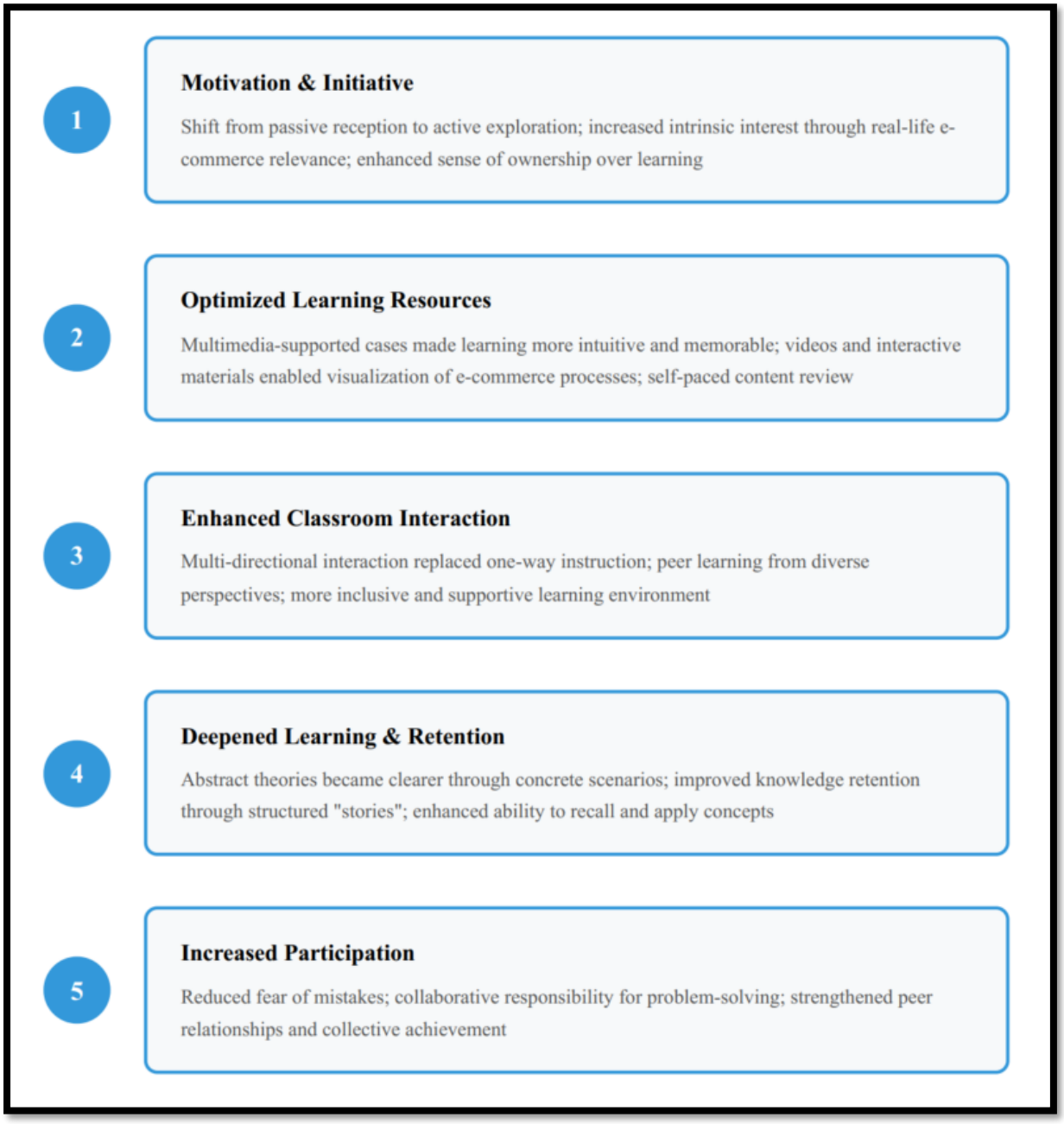

Figure 3: Student Learning Engagement Enhancement Process

4.2.1 Motivation and Initiative

One of the most significant and commonly observed outcomes among the student interviews was the significant change in motivational orientation from the reception of information to intellectual exploration. Several students mentioned that the conventional lecture-based learning experience often led to difficulties in maintaining interest and understanding the applicability of theoretical concepts. However, case-based learning was mentioned as an experience that encouraged intellectual exploration, critical evaluation of business scenarios in context, and voluntary exchange of ideas in class. The applicability and relevance of e-commerce scenarios, especially those related to strategic decisions or intricate customer dispute resolutions in an online business context, have emerged as significant motivational drivers and intellectual exploration among students. The relevance and applicability of e-commerce concepts in context have been identified as significant drivers of student motivation and interest in learning. The

learning experience was mentioned as highly purposeful and meaningful among students who could relate e-commerce concepts with their understanding and observation of their real-world applicability in digital business contexts. The observed motivational orientation among students is in line with the propositions of self-determination theory, which suggests that learners are highly motivated if their learning experience is aligned with their sense of autonomy, competence, and relevance.

4.2.2 Instructional Resources and Interactive Engagement

The quality and availability of multimedia-supported instructional resources were repeatedly cited by students as an important aspect that influenced the level of clarity and engagement value of case-based learning. The multimedia materials were often cited as more engaging and more clearly presented than text-based instructional materials, primarily due to their capacity to facilitate the visualization of otherwise abstract e-commerce processes and to allow learners to review specific aspects of the multimedia materials at their own pace. The level and pattern of interaction in the classroom setting also underwent an observable and highly desirable transition. The deliberation and analysis of cases in small groups enabled students to engage in meaningful peer learning discourse from which they benefited not only from the instructor but also from their peers and their various perspectives and learning strategies (Navrátilová & Jurčík, 2025). Several students observed that learning from different perspectives and approaches to similar scenarios led them to re-evaluate their own assumptions and to construct an integrated and more comprehensive understanding of the subject matter. The progressive evolution from largely unidirectional discourse to more interactive and mutual discourse ultimately led to the development of an instructional setting characterized by students as more open and intellectually stimulating.

4.2.3 Conceptual Depth and Knowledge Retention

The participants expressed that case-based learning activities greatly improved the depth of conceptual understanding and retention of the e-commerce principles. It was evident that when theoretical concepts were related to the real world, the students found that the concepts were easier to understand and retain. One of the participants expressed that the case study helped the students organize the complex material in a way that the information was easier to remember. It was evident that when the events in the case study progressed sequentially, the students were able to understand not only what was happening in the business scenario but, more importantly, they were able to understand why the decisions made in the scenario led to the results that they did. This contextual learning experience helped the students develop better conceptual structures and enhanced confidence in applying the theoretical concepts to new analytical situations (Sailer et al., 2021).

4.3 Classroom Participation and Task Engagement

A notable change in the nature of classroom participation was evident throughout the intervention period. The students expressed increased comfort and reduced inhibition in classroom discussions, citing significantly lower anxiety levels regarding the expression of their interpretations that might turn out to be incorrect. The shared responsibility for task accomplishment that was promoted through the group-based case study approach was seen to have reduced performance pressures on the students and lowered the barriers for voluntary participation. The students did not seem focused on the evaluation of the accuracy of their responses but rather on the constructive examination of their assumptions, iterative refinement of potential solutions, and development of their reasoning skills through peer discourse. A number of students who had traditionally remained silent in the classroom lecture formats expressed increased willingness to voluntarily articulate their ideas in the case study environment. The increased level of engagement was seen to enhance the quality of peer relationships and promote a shared sense of collaborative progress, with multiple students citing the collaborative case study activities as fostering

increased trust, support, and positive classroom climate (Xu et al., 2025).

A second notable change was the increased level of engagement in the nature and purpose of the academic activities. Rather than viewing the academic activities from the perspective of assessment requirements that needed to be fulfilled for the award of grades, the students expressed increased engagement in the activities from the perspective of problems that needed to be solved. The engagement in activities such as the analysis of scenarios in the context of online retail businesses or the solution of customer complaints was cited as having generated increased intrinsic intellectual curiosity and genuine intrinsic interest. The students cited the challenge of applying the theoretical knowledge in the context of realistic scenarios as genuinely motivating, as it promoted the need for deeper engagement with the curriculum. This phenomenon is consistent with the problem-based learning approach that emphasizes the promotion of intrinsic motivational orientations and increased intellectual engagement through the use of open-ended and contextualized problems that promote the construction of problem solutions rather than the application of procedures (Roessger, 2014).

4.4 Learning Outcomes and Career Cognition Development

In addition to the influence that case-based instruction was seen to have on the engagement and participation of the students, the study also found that such an approach was associated with the development of greater understanding and the progressive development of cognition within the realm of the student's career. The development of the students was seen to progress along the trajectory depicted in Figure 4, wherein the interconnected development of the capacity for the application of knowledge, the development of operational understanding, the development of awareness within the realm of the career, and the development of professional identity are seen. The study found that the students exhibited a markedly enhanced capacity for the integration of theoretical constructs with the operational reality that is often encountered within the scenarios that are characteristic of the industry. The study found that the students exhibited an enhanced capacity for the identification of potential business risk, for the management of regulatory and legal considerations, and for the recognition of the decision-making considerations that are characteristically encountered within the realm of the e-commerce operational environment. Indeed, some of the participants indicated that the engagement with the case scenarios that involved issues of dispute, regulatory considerations and the management of operational considerations prompted considerable critical thinking in relation to the manner in which digital businesses ought to be governed and managed.

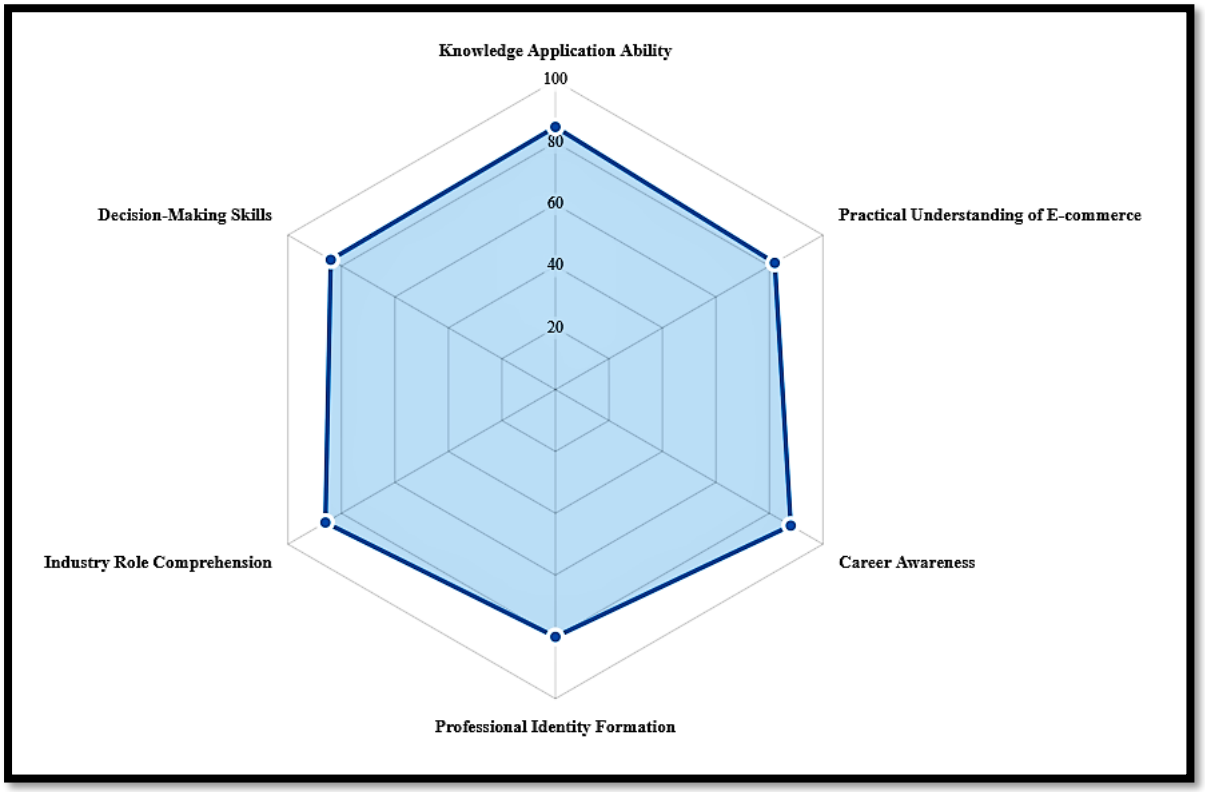

Figure 4: Learning Outcomes and Career Cognition Development

The exposure that the students received to the various e-commerce scenarios was seen to progressively enhance the development of the students' substantive understanding of the industry. So, the study found that the students exhibited an increasingly refined appreciation of the responsibilities, competencies, and dynamics associated with specific roles within the e-commerce industry. Indeed, some of the participants indicated that the instructional scenarios prompted considerable reflection in terms of their developing interests and cognitions in relation to specific roles within the e-commerce industry. Such reflection is characteristic of the vocational programs that are mandated within the academic environment, wherein the integration between the academic environment and the occupational environment is mandated (Zuo et al., 2025).

5. Discussion

5.1 Interpretation of Key Findings

The aggregate findings of this study provide substantive empirical support for the proposition that case-based instruction represents an effective and theoretically well-founded pedagogical model in the context of vocational e-commerce education. The movement from a passive reception of knowledge to active, contextualized inquiry directly supports the predictive logic of constructivist learning theory, in which knowledge is constructed via active experience, reflective deliberation, and social interaction, as opposed to a passive reception of transmitted propositions. The progressive development of comprehension, as well as the capacity for meaning-making, as reflected in student engagement with contextualized e-commerce cases, is consonant with constructivist learning theory's claims regarding the importance of a learning context in fostering sustained cognitive engagement and knowledge construction (Do et al., 2023). Table 4 provides a summary of key findings in relation to theoretical implications.

Table 4. Summary of Key Findings and Contributions

Area	Key Contribution
Pedagogical impact	Case-based teaching significantly enhances intrinsic motivation and active engagement in vocational e-commerce education; confirms constructivist predictions regarding authentic instructional environments
Learning depth	Improves conceptual understanding and facilitates knowledge transfer from theoretical constructs to authentic practice through contextualised case analysis
Classroom dynamics	Promotes peer-to-peer collaborative learning, distributed problem-solving, and substantial reductions in participation anxiety; transforms classroom interaction patterns
Career readiness	Strengthens professional role awareness, industry-contextualised understanding, and the early formation of career identity among secondary level vocational learners
Research contribution	Extends empirical evidence for case-based learning effectiveness into vocational secondary education contexts involving younger learners; integrates motivational and career-cognitive outcomes into a unified evaluative framework

The results further indicate that case-based instruction was successful in facilitating the motivational processes specified within self-determination theory. The increased level of voluntary participation, discourse, and perseverance within the complex problem-solving activities indicate that the instructional environment was successful in activating the three inherent psychological needs specified within self-determination theory. The need for autonomy was satisfied through the open-ended nature of the analytical decision-making activities that allowed the students to guide their investigative reasoning processes. The need for competence was satisfied through the successful application of the theoretical frameworks within contextually realistic scenarios that allowed the students to observe their competent mastery. The need for relatedness was satisfied through the collaborative group discourse activities. The concurrent satisfaction of these three needs was successful in activating the intrinsic motivations and intellectual engagement, thus empirically validating the specified motivational theory within the context of an instructional domain that had been relatively unexplored within the field of education.

The multimedia resources proved integral in facilitating the role of the instructional case in supporting the students' comprehension of the operational processes, causal relationships, and structural dynamics depicted within the instructional case. The visual and digital media allowed the learners to observe the action sequences, decision paths within complex scenarios, and the interdependencies between the various components of the e-commerce system. The self-paced iterative review that the digital media allowed the learners to undertake was also successful in reducing the cognitive load associated with the comprehension of unfamiliar or complex information. The findings are consistent with the multimedia learning theory that suggests that the coordination of multiple channels of visual and verbal representation can facilitate the comprehension of complex information through the distribution of cognitive load between the various channels, thus keeping the overall load within manageable limits (Mayer et al., 2014). The integration of the multimedia within the case-based instructional environment was thus successful in facilitating the comprehension and engagement of the learners.

5.2 Theoretical Contributions

In terms of theoretical contributions, the present research makes significant inroads into the existing body of knowledge in the domain of case-based pedagogical learning within the context of secondary-level vocational learning in the domain of

e-commerce. While existing research has been rather narrow in terms of the domain of case-based learning, being restricted to higher-level learning in medicine, law, and business management, the present investigation shows that secondary-level vocational learning in e-commerce among learners aged 16-17 is capable of being meaningfully and productively engaged with in terms of professional scenarios. This is an important contribution to the existing body of knowledge in that it extends the theoretical application of case-based learning to secondary-level learners. Another important theoretical contribution of the present research is that it shows that motivation, participation, and career cognition can develop as integrated processes within an active learning environment, rather than as separate cognitive or behavioural processes. This is an important contribution in that it shows that these processes can develop in an integrated manner, rather than in isolation from each other. For instance, the positive correlation between intrinsic motivation in terms of instructional activities and active participation in terms of learning scenarios, as well as the positive correlation between active participation in terms of learning scenarios and conceptual understanding in terms of career identity, suggests that these processes can develop in an integrated manner. This is in line with existing theoretical frameworks that posit the integration of cognitive engagement, motivational orientation, and behavioural participation in terms of effective learning environments (Tursynkulova et al., 2023; Roessger, 2014). Additionally, the positive correlation between authentic scenario exposure in terms of learners' perceptions of their future occupational roles suggests that learners' perceptions of their future occupational roles can develop in terms of authentic experience, in line with existing theoretical frameworks that posit the primacy of authentic experience in terms of the formation of learners' vocational identity and the crystallization of learners' career aspirations (Hu et al., 2025).

5.3 Practical Implications

The results of the present investigation have various substantial implications for the design of the curriculum in vocational education, as well as classroom practices in general. First, in terms of curriculum design, the results of the present investigation support the systematic integration of authentic industry cases that reflect the managerial complexity, operational challenges, and regulatory aspects that are characteristic of contemporary ecommerce practice (Gupta et al., 2023). It is suggested that such industry cases do not simply serve as illustrative supplements to instruction but rather as integral, load-bearing aspects of instruction. Moreover, the systematic alignment of case scenarios with contemporary industry realities is critical in maximizing the potential of the career cognitive benefits that were identified in the present investigation. Second, in terms of classroom practice, the results of the present investigation support the systematic integration of structured peer interactions that involve collaborative analysis activities, questioning protocols, and deliberative group processes. Such practices were associated with substantially lower levels of participation anxiety, voluntary engagement, and intrinsic motivation.

In addition, the integration of multimedia resources, such as videos and interactive digital demonstrations, could potentially maximize comprehension accessibility, particularly among learners that experience comprehension difficulties with abstract text-based instructional methods. Third, in terms of professional development, the results of the present investigation support the notion that effective case-based instruction in ecommerce practice necessitates that teachers fundamentally reconceptualize their professional role from that of content deliverer to that of analytical facilitator. It is suggested that professional development programs focus on the systematic design of facilitation strategies, Socratic questioning protocols, and pedagogical scaffolding methods that are specifically intended to foster active inquiry-oriented learning environments (Machost & Stains, 2023). Figure 6 presents an evidence-grounded practical implementation framework for case-based teaching in vocational e-commerce practice.

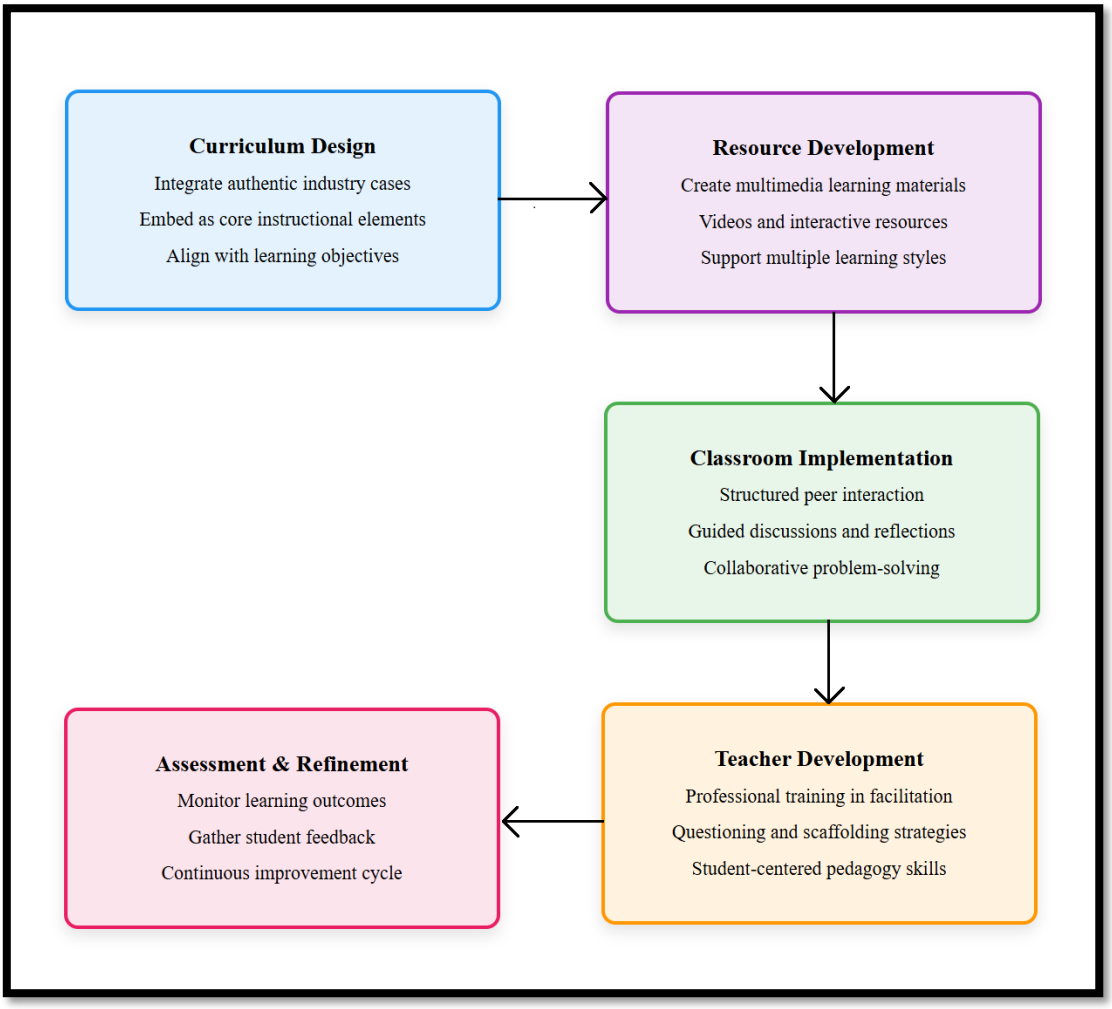

Figure 6: Practical Implementation Framework for Case-Based Teaching

Figure 6 illustrates an overall and detailed step-by-step implementation methodology from curriculum and case preparation, instruction and pedagogical scaffolding, and evaluation and professional reflection. The framework provides an operationalized definition of case-based instruction as an overall and comprehensive educational paradigm that includes the development of theoretical knowledge and the analysis of scenarios in the context of the workplace. The overall and significant potential impact of this instructional methodology is that student motivation and intellectual engagement would be positively influenced and improved, and the preparation of vocational e-commerce students would also be positively influenced and improved.

6. Limitations and Directions for Future Research

The present study is an important and meaningful contribution to the overall and qualitative body of knowledge with respect to case-based instruction and its application in the context of vocational e-commerce education; nonetheless, there are specific and significant methodological limitations that need to be recognized and highlighted. The qualitative sample was purposefully limited to five student participants and five teacher participants in order to allow for more depth in analysis and findings. While this limitation is significant with respect to providing an in-depth and detailed analysis and exploration of the instructional and pedagogical experiences and perspectives, the limitation with respect to breadth is recognized and acknowledged. With respect to qualitative research methodology and design, credibility and trustworthiness are

recognized and defined as functions of depth and analysis and not breadth and sample size; nonetheless, some level of cautious and prudent consideration is required with respect to the overall and qualitative findings and their application beyond the specific and particular contexts from which the findings are derived and presented (Freudenburg et al., 1986).

A second limitation of this study is its institutional and national scope. Quantitative and qualitative data were collected in two separate vocational colleges within one national context of education, thereby ensuring contextual consistency and internal validity, yet significantly limiting the external validity of these findings to other national contexts of education, other types of education, or other types of work contexts. There is an increasing recognition in education research that students' responses to pedagogical interventions, as well as learning and career development processes, may vary significantly across institutional, discipline, and sociocultural contexts (Henrich et al., 2010). The findings of this study, therefore, might not be generalized across different contexts without replication in another context, as in this study conducted in Malaysia. A third limitation of this study is its exclusive focus on short-term, as well as immediate, post-intervention outcomes of learning. The evaluation of long-term knowledge retention, transfer of skills, as well as long-term career cognitive outcomes, was beyond the scope of this study, though there was a consistent report of long-term benefits of motivational and engagement outcomes by teachers as well as students. The benefits of case-based instruction, as reported in this study, might be limited to the short term, as well as the immediate, post-intervention context, and might not be reflected in long-term employability outcomes.

Future research endeavours must overcome these limitations by employing a variety of methodologies. Firstly, research that involves more numerous and more demographically and institutionally diverse samples from various countries and vocational sectors will greatly improve the external validity and generalisability of the conclusions drawn with respect to case-based pedagogies in vocational education (Song & Sahid, 2024). More specifically, comparative research in various countries will be necessary in order to examine the impact of institutional structures, curriculum frameworks, and cultural orientations on the effectiveness of case-based pedagogies. Secondly, longitudinal research will be necessary in order to establish the long-term effects of case-based pedagogies by monitoring students over long periods of time from the time of first exposure to the time of first occupational involvement. Thirdly, future research endeavours employing a variety of methodologies will be necessary in order to improve the quantitative aspects of the research by including validated psychometric measures and more numerous samples while maintaining the interpretive advantages of qualitative methodologies (Song & Lai, 2025).

7. Conclusion

The study has attempted to investigate the effectiveness of case-based instruction in the context of secondary-level vocational ecommerce learning through the application of a mixed-methods quasi-experimental design. The results have offered significant empirical support that this form of instruction provides learning experiences and learning outcomes that differ substantially from traditional lecture-based instruction. The results have demonstrated that the incorporation of industry case scenarios into the learning experience has fundamentally impacted the way in which students engage, process, and apply the curriculum. Rather than focusing on the reception and reproduction of curriculum content, the students have been required to engage in the analysis of complex operational realities, collaborative deliberation in the interpretation of different explanations, and the production and justification of decisions. This has been associated with enhanced intrinsic motivation, active and confident engagement, and conceptual understanding.

The multimedia case materials have functioned as significant cognitive scaffolding in the presentation of abstract digital processes in a concrete and understandable form. Collaborative deliberation has enhanced conceptual understanding and has been associated with the development of confidence in

the application of conceptual understanding in the context of operational realities. Significantly, the presentation of industry case realities has been associated with enhanced clarity of professional role and the formation of occupational identity. Such aspects have significant and foundational importance in the context of the delivery of vocational learning, which places substantial emphasis on the integration of academic learning and employability. Although the study has offered significant and substantial results, the study has been constrained by the context and the short-term assessment period. However, the results have demonstrated that case-based instruction represents a substantively different and significantly better form of instruction than traditional instruction. It is a form of instruction that represents a significant methodological variation from traditional instruction. However, when case-based instruction is systematically aligned with curriculum objectives, industry realities, and the career development aspirations of the vocational student, the potential for the significant enhancement of the conceptual understanding, professional awareness, and occupational readiness of the secondary-level ecommerce graduate is substantial.

References

Bali, C., Tasdelen, B., Bandi, S., & Zsidó, A. (2026). Understanding the cognitive cost of multimedia learning: effects of visual load and language proficiency. *Cognitive Research Principles and Implications*, *11*(1), 2. https://doi.org/10.1186/s41235-025-00699-2

Bayona, J. A., & Durán, W. F. (2024). A meta-analysis of the influence of case method and lecture teaching on cognitive and affective learning outcomes. *The International Journal of Management Education*, *22*(1), 100935. https://doi.org/10.1016/j.ijme.2024.100935

Børte, K., & Lillejord, S. (2024). Learning to teach: Aligning pedagogy and technology in a learning design tool. *Teaching and Teacher Education*, *148*, 104693. https://doi.org/10.1016/j.tate.2024.104693

Dahl, J. E., & Mørch, A. (2025). A theoretical and empirical analysis of tensions between learning objects and constructivism. *Education and Information Technologies*, *30*(15), 22101–22150. https://doi.org/10.1007/s10639-025-13636-z

Do, H., Ngoc, B., DO, & Nguyen, M. H. (2023). 3How do constructivism learning environments generate better motivation and learning strategies? The Design Science Approach. *Heliyon*, *9*(12), e22862. https://doi.org/10.1016/j.heliyon.2023.e22862

Emblen-Perry, K. (2022). Auditing a case study: Enhancing case-based learning in education for sustainability. *Journal of Cleaner Production*, *381*, 134944. https://doi.org/10.1016/j.jclepro.2022.134944

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, *111*(23), 8410–8415. https://doi.org/10.1073/pnas.1319030111

Freudenburg, W. R., Ahearn, F. L., & Cohen, R. E. (1986). Disasters and Mental Health: An annotated Bibliography. *Contemporary Sociology a Journal of Reviews*, *15*(3), 442. https://doi.org/10.2307/2070070

Gashi, L. J., Bërxulli, D., Konjufca, J., & Cakolli, L. (2023). Effectiveness of career guidance workshops on the career self-efficacy, outcome expectations, and career goals of adolescents: an intervention study. *International Journal of Adolescence and Youth*, *28*(1). https://doi.org/10.1080/02673843.2023.2281421

Gupta, S., Kushwaha, P., Badhera, U., Chatterjee, P., & Gonzalez, E. D. S. (2023). Identification of benefits, challenges, and pathways in E-commerce industries: An integrated two-phase decision-making model. *Sustainable Operations and Computers*, *4*, 200–218. https://doi.org/10.1016/j.susoc.2023.08.005

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Beyond WEIRD: Towards a broad-based behavioral science. *Behavioral and Brain Sciences*, *33*(2–3), 111–135. https://doi.org/10.1017/s0140525x10000725

Hu, A., Liu, Q., & Daniel, B. (2025). Digital Technologies in Authentic Assessment in Higher Education: A systematic literature review and Narrative Synthesis. *SAGE Open*, *15*(3). https://doi.org/10.1177/21582440251357198

Koh, J. H. L. (2006). Motivating students of mixed efficacy profiles in technology skills classes: A case study. *Instructional Science*, *34*(5), 423–449. https://doi.org/10.1007/s11251-006-0001-3

Kooloos, J. G., Bergman, E. M., Scheffers, M. A., Schepens-Franke, A. N., & Vorstenbosch, M. A. (2019). The effect of passive and active education methods applied in repetition activities on the retention of anatomical knowledge. *Anatomical Sciences Education*, *13*(4), 458–466. https://doi.org/10.1002/ase.1924

Kwan, Y. W., & Wong, A. F. (2015). Effects of the constructivist learning environment on students' critical thinking ability: Cognitive and motivational variables as mediators. *International Journal of Educational Research*, *70*, 68–79. https://doi.org/10.1016/j.ijer.2015.02.006

Machost, H., & Stains, M. (2023). Reflective Practices in Education: A primer for practitioners. *CBE—Life Sciences Education*, *22*(2), es2. https://doi.org/10.1187/cbe.22-07-0148

Mayer, R. E., Mayer, R. E., Mayer, R. E., Shaaron, A., Mayer, R. E., Paas, F., Mayer, R. E., Schnotz, W., Van Merriënboer, J. J. G., Clark, R. E., Butcher, K. R., Ayres, P., Low, R., Kalyuga, S., Van Gog, T., Mayer, R. E., Mayer, R. E., Mayer, R. E., De Jong, T., . . . Ainsworth, S. (2014). The Cambridge Handbook of Multimedia Learning. In *Cambridge University Press eBooks*. https://doi.org/10.1017/cbo9781139547369

Naseer, F., Tariq, R., Alshahrani, H. M., Alruwais, N., & Al-Wesabi, F. N. (2025). Project based learning framework integrating industry collaboration to enhance student future readiness in higher education. *Scientific Reports*, *15*(1), 24985. https://doi.org/10.1038/s41598-025-10385-4

Navrátilová, J., & Jurčík, M. (2025). Analysing the intersection between teachers 'peer learning strategies and students' perspectives in inclusive classrooms. *Education Inquiry*, 1–21. https://doi.org/10.1080/20004508.2025.2522521

Pande, M., & Bharathi, S. V. (2020). Theoretical foundations of design thinking – A constructivism learning approach to design thinking. *Thinking Skills and Creativity*, *36*, 100637. https://doi.org/10.1016/j.tsc.2020.100637

Reed, S. K. (2015). The structure of Ill-Structured (and Well-Structured) problems revisited. *Educational Psychology Review*, *28*(4), 691–716. https://doi.org/10.1007/s10648-015-9343-1

Roessger, K. M. (2014). The effect of reflective activities on instrumental learning in adult work-related education: A critical review of the empirical research. *Educational Research Review*, *13*, 17–34. https://doi.org/10.1016/j.edurev.2014.06.002

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066x.55.1.68

Sadeghi, M., Nematollahi, M., Farokhzadian, J., Khoshnood, Z., & Eghbalian, M. (2023). The effect of scenario-based training on the Core competencies of nursing students: a semi-experimental study. *BMC Nursing*, *22*(1), 475. https://doi.org/10.1186/s12912-023-01442-2

Sailer, M., Schultz-Pernice, F., & Fischer, F. (2021). Contextual facilitators for learning activities involving technology in higher education: The C♭-model. *Computers in Human Behavior*, *121*, 106794. https://doi.org/10.1016/j.chb.2021.106794

Song, S., & Lai, Y. C. (2025). Blended learning in vocational education: benefits, challenges, and student engagement. *Cogent Education*, *12*(1). https://doi.org/10.1080/2331186x.2025.2548348

Song, Z., & Sahid, S. (2024). Exploring factors shaping intercultural competence among China's college students to seize global business opportunities: A systematic literature review. *Social Sciences & Humanities Open*, *11*, 101190. https://doi.org/10.1016/j.ssaho.2024.101190

Suryanarayana, K. N. (2023). E-commerce growth and its implications for consumer behavior: A review of recent trends. *Asian Journal of Management and Commerce*, *4*(1), 366–372. https://doi.org/10.22271/27084515.2023.v4.i1d.360

Tamang, P., & Photchanachan, S. (2025). Determinant factors of e-commerce adoption by SMEs in Napal. *วารสารวิทยาลัยนครราชสีมา สาขามนุษยศาสตร์และสังคมศาสตร์, 19*(1), 339–356. https://so03.tci-thaijo.org/index.php/hsjournalnmc/article/view/273942

Tursynkulova, E., Madiyarov, N., Sultanbek, T., & Duysebayeva, P. (2023). The effect of problem-based learning on cognitive skills in solving geometric construction problems: a case study in Kazakhstan. *Frontiers in Education*, *8*. https://doi.org/10.3389/feduc.2023.1284305

Ventista, O., & Brown, C. (2023). Teachers' professional learning and its impact on students' learning outcomes: Findings from a systematic review. *Social Sciences & Humanities Open*, *8*(1), 100565. https://doi.org/10.1016/j.ssaho.2023.100565

Wang, H., Ding, J., Akram, U., Yue, X., & Chen, Y. (2021). An empirical study on the impact of E-Commerce live features on consumers' purchase intention: from the perspective of flow experience and social presence. *Information*, *12*(8), 324. https://doi.org/10.3390/info12080324

Wiyono, B. B., Imron, A., Sumarsono, R. B., Musa, K., & Saat, R. B. M. (2025). The effect of constructivist learning and project-based learning model on students' entrepreneurial competence in higher education. *Cogent Education*, *12*(1). https://doi.org/10.1080/2331186x.2025.2557606

Xu, F., Wang, L., & Xu, J. (2025). The impact of teachers' motivating style and student-teacher relationships on adolescents' class participation: The indirect role of learning motivation. *Acta Psychologica*, *257*, 105105. https://doi.org/10.1016/j.actpsy.2025.105105

Zhang, Y. (2025). Research on Vocational Education Practice Teaching Mode under the Background of "internet plus." *International Journal of Web-Based Learning and Teaching Technologies*, *20*(1), 1–18. https://doi.org/10.4018/ijwltt.382589

Zhou, Q., & Zhang, H. (2025). Flipped Classroom Teaching and ARCS Motivation Model: Impact on college Students' Deep Learning. *Education Sciences*, *15*(4), 517. https://doi.org/10.3390/educsci15040517

Zuo, H., Zhang, M., & Huang, W. (2025). Lifelong learning in vocational education: A game-theoretical exploration of innovation, entrepreneurial spirit, and strategic challenges. *Journal of Innovation & Knowledge*, *10*(3), 100694. https://doi.org/10.1016/j.jik.2025.100694