Bridging Classroom and Workplace: Integrating Project-Based and Contextual Learning to Enhance Engagement in Indonesian Vocational Education

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Abstract

From a theoretical perspective, English as a Foreign Language (EFL) instruction in Indonesia faces persistent challenges such as limited exposure, examination-oriented practices, and multilingual classroom contexts, particularly in vocational high schools. Traditional teacher-centered approaches often limit authentic communication and fail to connect English learning with students' professional needs. Project-Based Learning (PjBL) and Contextual Teaching and Learning (CTL) offer alternative pedagogical frameworks, as PjBL promotes collaboration, creativity, and problem-solving through meaningful products, while CTL situates language learning in real-life and career-relevant contexts. This study aimed to examine the effectiveness of PjBL and CTL in enhancing cognitive, behavioral, and affective student engagement among vocational high school students majoring in chemical analysis. A mixed-methods convergent parallel design was employed, involving 33 students. Data were collected through questionnaires, classroom observations, and semi-structured interviews, with reliability and validity ensured through piloting and triangulation. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were examined through thematic analysis. The findings indicated that PjBL significantly improved students' motivation, communication skills, collaboration, and critical thinking, although confidence in using English for professional purposes remained limited. CTL also enhanced learning relevance, vocabulary retention, and vocational readiness, particularly in explaining technical concepts, though peer interaction and communicative confidence required further support. Overall, PjBL and CTL demonstrated complementary strengths in linking classroom English instruction with workplace communication. Pedagogically, the study underscores the importance of integrating authentic, student-centered approaches in vocational EFL contexts to foster both language competence and transferable professional skills.

1. Introduction

Teaching English as a foreign language (EFL) in Indonesia is situated within a multifaceted sociolinguistic and educational landscape, where learners typically have limited opportunities to practice English beyond formal schooling. Although English has long been mandated as a compulsory subject, authentic communicative use outside the classroom remains scarce, which hinders the development of communicative competence (Renandya, 2018). A further challenge arises from the nation's rich linguistic diversity, with more than 700 local languages spoken across the archipelago. For many students, Bahasa Indonesia functions as a second language and English as a third (Simons & Fennig, 2018). Consequently, pedagogical strategies must acknowledge learners' multilingual repertoires while also connecting English instruction to daily realities and vocational needs. Unequal access to resources

and professional development further compounds these issues (Lengkanawati, 2017). In vocational high schools, instruction is often teacher-centered, heavily reliant on textbooks and translation, thereby restricting meaningful interaction, collaboration, and higher-order thinking (Lie, 2017). Such conditions underscore the urgency for more innovative, student-centered pedagogies.

Two instructional approaches, Project-Based Learning (PjBL) and Contextual Teaching and Learning (CTL), have increasingly been identified as promising responses to these challenges. PjBL emphasizes extended tasks that culminate in tangible outputs, encouraging creativity, autonomy, and the integration of language skills (Beckett & Slater, 2020). CTL, meanwhile, highlights the embedding of learning in authentic contexts, making classroom content more purposeful and relevant. Within EFL settings, PjBL has been shown to foster oral proficiency, learner motivation, and accuracy, as students are required to produce meaningful outputs for real audiences. Its collaborative and inquiry-based design also aligns with the competencies expected in vocational education (Bakar et al., 2019). CTL complements this by explicitly linking instruction to learners' professional roles and daily experiences, reinforcing the relevance of English for practical purposes. Evidence from Indonesian classrooms suggests that CTL supports higher participation and a stronger sense of self-efficacy (Sugiyanto et al., 2020).

Indonesia's vocational education system demands graduates who possess not only technical expertise but also adequate English proficiency for documentation, workplace communication, and international collaboration (Direktorat Pembinaan SMK, 2017). Integrating PjBL and CTL offers a pathway to narrow the gap between classroom English and workplace language needs, particularly by situating English tasks within real vocational scenarios. Research on English for Specific Purposes (ESP) has demonstrated that aligning language learning with technical content, whether in chemical analysis, engineering, or hospitality, can enhance student motivation and promote mastery of discipline-specific vocabulary (Widodo, 2016; Kusni et al., 2020). This reinforces the potential synergy of combining the product-driven nature of PjBL with the context-based orientation of CTL.

Although considerable scholarship has documented the effectiveness of Project-Based Learning (PjBL) and Contextual Teaching and Learning (CTL) as independent pedagogical approaches (Beckett & Slater, 2020), their combined application in Indonesian vocational EFL classrooms remains underexplored. Theoretically, this integration is crucial because PjBL and CTL address complementary dimensions of learning: PjBL emphasizes inquiry, collaboration, and the creation of authentic products, while CTL foregrounds meaningful learning through connections between academic content and real-life, career-related contexts. When combined, these approaches align with socio-constructivist theory, which views learning as an active process shaped by social interaction and contextual relevance (Vygotsky, 1978; Lave & Wenger, 1991). Practically, vocational students require English instruction that not only engages them in purposeful tasks but also directly reflects workplace realities, making the synergy between PjBL's product-oriented structure and CTL's situational grounding particularly valuable. This pedagogical alignment is closely linked to student engagement, which is widely conceptualized as a multidimensional construct encompassing cognitive, behavioral, and affective components (Fredricks et al., 2004; Appleton et al., 2008). PjBL supports engagement by promoting sustained effort, problem-solving, and peer collaboration, while CTL enhances emotional and cognitive engagement by fostering relevance, authenticity, and perceived usefulness of learning activities (Schunk et al., 2014). In vocational EFL contexts, engagement further extends to students' willingness and confidence to apply English in professional situations, an outcome that both approaches are theoretically designed to support. However, empirical evidence explaining how this combined pedagogical framework enhances engagement across its multiple dimensions in technical learning environments remains limited, highlighting a critical research gap addressed in the present study.

From a methodological perspective, mixed-methods research provides a comprehensive framework for investigating both measurable outcomes and learners' perspectives on these pedagogies (Creswell & Clark, 2018). The present study applies surveys, interviews, and classroom observations to triangulate findings. In the case of PjBL, six key aspects are examined: real-world application, confidence in professional English use, communication, collaboration, critical thinking, and classroom engagement. These reflect the principles of authenticity, inquiry, and public product central to effective project-based instruction (Larmer et al., 2015). For CTL, analysis focuses on six dimensions: classroom engagement, real-world relevance, career readiness, ability to communicate technical concepts,

retention of vocabulary and grammar, and communication confidence in vocational contexts. These dimensions reflect CTL's emphasis on meaningful, transferable learning.

In vocational schools specializing in fields such as chemical analysis, English functions less as an abstract academic subject and more as a practical tool for tasks such as writing laboratory reports, understanding safety protocols, and presenting results. Embedding these activities in PjBL and CTL frameworks has the potential to create more engaging, relevant, and effective learning experiences (Widodo, 2016). Accordingly, this study seeks to enrich both theoretical discourse and practical implementation by examining how PjBL and CTL can be integrated to enhance EFL engagement in Indonesian vocational education. The findings are expected to inform curriculum development, teacher professional learning, and policy initiatives aimed at fostering more contextually responsive and skill-oriented English instruction.

2. Method

This study adopted a mixed-methods approach with a convergent parallel design to investigate the effectiveness of Project-Based Learning (PjBL) and Contextual Teaching and Learning (CTL) in fostering student engagement in English at SMK-SMAK Bogor, a vocational school specializing in chemical analysis. The integration of quantitative and qualitative strands enabled both measurable outcomes and rich descriptive insights into students' experiences to be considered. Quantitative data were gathered through structured questionnaires, while qualitative evidence was obtained from classroom observations and semi-structured interviews, allowing for a comprehensive evaluation of the interventions. Qualitative data from observations and interviews were systematically coded and analyzed thematically to complement and explain the quantitative findings. Ethical considerations were rigorously observed throughout the study: informed consent was obtained from all participants and school authorities, participation was voluntary, anonymity and confidentiality were ensured through the use of pseudonyms, and the research procedures complied with institutional ethical guidelines.

Participants consisted of a purposive sample of 33 tenth-grade students drawn from a larger cohort of 330, ensuring representation of learners at an early stage of technical and language development. A preliminary pilot study with six students was conducted to refine research instruments prior to full-scale implementation. Data collection proceeded sequentially: questionnaires were first administered, followed by classroom observations to capture real-time learning interactions, and concluded with semi-structured interviews with six students to contextualize and validate the survey findings.

Three main instruments were employed: (1) Likert-scale questionnaires adapted from established studies on PjBL and CTL, each demonstrating strong reliability ($\alpha = 0.83$–0.87) and validity (0.85–0.90); (2) structured observation checklists focusing on verbal and non-verbal indicators of engagement; and (3) interview guides designed to explore themes such as real-world application, collaboration, communication, critical thinking, and confidence in using English. Triangulating these instruments enhanced both the trustworthiness and depth of the findings.

Quantitative data analysis involved descriptive statistics to identify engagement patterns and inferential statistics to explore potential associations between teaching approaches and outcomes. Qualitative data were analyzed thematically, following Braun and Clarke's (2006) framework, to identify recurrent themes related to motivation, skill acquisition, and vocational relevance. The integration of statistical results with thematic findings provided a multi-dimensional understanding of how PjBL and CTL contribute to student engagement in vocational EFL settings.

3. Results and Discussion
3.1 Results

This section reports and interprets the principal findings gathered from questionnaires, classroom observations, and interviews. Data from both PjBL and CTL implementations are integrated to answer the study's research questions. The presentation is organized around three main focal areas that capture the central outcomes and implications for teaching and learning in a vocational EFL context.

The Effectiveness of PjBL in Enhancing Student Engagement in Learning English

Project-Based Learning (PjBL) has attracted attention in EFL instruction for its capacity to heighten student engagement, especially within vocational programs. In this research, PjBL's impact was evaluated through descriptive statistics and analyses of learners' perceptions, providing a structured account of how project tasks affect motivation, confidence, and the practical use of English. Mean scores and standard deviations from 33 respondents were used to chart central tendencies and variation in engagement indicators, forming the empirical basis for deeper interpretation.

Table 1. Mean & Standard Deviation on PjBL

No	Items	Mean	SD
1	I enjoy learning English more when I do project-based activities.	3,18	0,58
2	Doing projects helps me understand English better.	3,45	0,56
3	I feel more interested and active in English class when working on projects.	2,97	0,68
4	Working on projects helps me improve my English speaking and writing.	3,61	0,50
5	I feel more motivated to learn English through projects.	2,97	0,77
6	Projects help me use English in real-life situations related to my future job as a chemical analyst.	3,36	0,65
7	Working on projects with my classmates helps me improve teamwork and communication in English.	3,39	0,75
8	Project-based learning helps me think critically and solve problems using English.	3,18	0,64
9	I remember English skills better when I learn through projects.	3,00	0,87
10	Doing projects helps me feel more confident using English in professional situations, like internships or jobs.	2,88	0,78
11	Project-based learning encourages me to make decisions and solve problems using English.	2,82	0,77
12	Through project-based learning, I can research/ find deep information, analyze information, and present my ideas in English.	3,00	0,79
13	PjBL helps me adjust to difficult English situations, like understanding technical words or professional language.	3,21	0,65
14	Learning through projects helps me connect English with my vocational studies (chemical analyst) easily.	3,30	0,64
15	Project-based learning helps me understand my English progress and what I need to improve.	3,55	0,67

Note: SD = Standard Deviation

Table 1 indicates an overall positive student stance toward PjBL, with variation across specific dimensions. The highest means were observed for improvements in speaking and writing (M = 3.61, SD = 0.50) and for increased awareness of personal learning progress (M = 3.55, SD = 0.67), which suggests that students perceive PjBL as particularly effective for skill development and metacognitive monitoring. Conversely, the lowest means relate to decision-making/problem solving in English (M = 2.82, SD = 0.77) and confidence in professional English settings (M = 2.88, SD = 0.78), pointing to areas where implementation can be strengthened. The generally modest SDs show reasonably consistent perceptions, though some items (e.g., retention and confidence) reveal greater variability and therefore merit pedagogical attention.

The quantitative results show that PjBL shifted learners' views of English from an abstract, exam-centered subject toward a practical, career-relevant competency. Authentic project tasks such as podcasts, lab descriptions, and role-plays, were repeatedly cited as motivating and relevant, reinforcing students' willingness to use English beyond classroom exercises. These outcomes resonate with recent Indonesian studies (e.g., Sadad et al., 2024; Maulina, 2024) that link staged, scaffolded projects and peer collaboration to higher engagement and measurable gains in productive skills.

Interview data from six respondents further corroborated PjBL's positive influence on engagement and language development. Students consistently described how real-world projects made English feel functional and transferable. Authentic tasks generated a stronger sense of purpose and

immediacy, encouraging learners to apply English for both personal and vocational aims. This qualitative evidence aligns with the contextualized learning rationale that situates language practice within meaningful professional scenarios.

Beyond relevance, PjBL also catalyzed gains in confidence, communicative ability, and collaboration. Learners reported clearer improvements in fluency, accuracy, and expressive control when working on project outputs; the collaborative nature of projects lowered anxiety and promoted peer scaffolding for grammar, vocabulary, and pronunciation. Students moved from passive receivers to active co-creators of knowledge, developing interpersonal and communicative competences necessary for workplace interactions (Tamin & Mohamad, 2020).

PjBL additionally fostered higher-order cognitive skills. Project cycles required students to negotiate roles, resolve conflicts, and generate creative solutions in English, thereby demanding both cognitive flexibility and linguistic competence. These processes strengthened problem-solving capacity and resilience. Summarizing the PjBL outcomes, six interconnected dimensions emerged: real-world application, professional confidence, communication, collaboration, critical problem-solving, and sustained engagement, showing PjBL's holistic contribution to preparing vocational students for 21st-century professional demands.

The Effectiveness of CTL in Enhancing Student Engagement in Learning English

Contextual Teaching and Learning (CTL) enhances engagement by anchoring lessons in authentic, vocationally relevant situations. By situating English tasks in everyday and workplace contexts, CTL increases perceived relevance, motivates participation, and supports knowledge retention. The questionnaire data (means and SDs) provide quantitative confirmation of students' positive responses to this approach.

Table 2. Mean & Standard Deviation on CTL

No	Item	Mean	SD
1	Learning English through real-life contexts makes the subject more relevant to me.	3,42	0,61
2	Learning English with contextual teaching methods makes the class more engaging.	3,12	0,60
3	I can use what I learn in English class in daily life.	3,36	0,55
4	Learning English in real-life situations helps me remember words and grammar better.	3,27	0,63
5	I participate more in English class when we learn through real-life activities.	3,12	0,65
6	Real-life learning helps me think critically and solve problems using English.	3,03	0,68
7	Learning English through real-life examples gives me more confidence to use English at laboratory.	2,97	0,73
8	Real-life activities help me communicate better with my classmates in English.	3,00	0,66
9	Learning English through real-life situations helps me to remember what I learn in the English class longer.	3,18	0,58
10	This way of learning prepares me better for using English in my future job as a chemical analyst.	3,48	0,51
11	Learning English through real-life tasks helps me adapt to different work situations.	3,18	0,73
12	Learning English through real-life contexts helps me explain technical concepts in English more clearly.	3,39	0,66
13	Contextual teaching helps me solve complex problems in English that are related to my vocational field as chemical analyst.	3,09	0,68
14	Contextual learning improves my ability to communicate professionally in English, like writing reports for laboratory work.	3,24	0,66

15	Learning English through real-life activities helps me see my progress and what I need to improve for my future job.	3,30	0,64

Note: SD = Standard Deviation

Questionnaire outcomes for CTL indicate generally favorable perceptions, with means spanning 2.97–3.48. The highest score was for CTL's capacity to prepare students for future professional roles (M = 3.48, SD = 0.51), highlighting strong vocational relevance. High ratings for perceived relevance (M = 3.42, SD = 0.61) and clarity in explaining technical concepts (M = 3.39, SD = 0.66) further support CTL's role in bridging language instruction and occupational tasks. Lower means were observed for confidence in lab contexts (M = 2.97, SD = 0.73) and peer communication (M = 3.00, SD = 0.66), indicating that while CTL strengthens contextual understanding, additional pedagogical strategies may be required to build interpersonal confidence and collaborative competence. The SDs (generally 0.55–0.73) suggest moderate agreement overall, with greater dispersion on confidence-related items.

Interview findings amplify the questionnaire evidence: students reported that CTL's alignment with everyday and laboratory scenarios made lessons more meaningful and memorable, which increased attention and motivation. This transition from rote memorization to application-driven engagement supports the argument that contextual relevance is a powerful lever for participation in vocational settings (Putra & Suherdi, 2020; Sari & Atmojo, 2023).

Beyond engagement, CTL contributed directly to professional preparedness. Respondents described improved ability to articulate technical procedures, compose laboratory reports, and conduct professional exchanges in English, skills that are central to vocational performance. Embedding technical vocabulary and workplace communicative tasks into lessons therefore bolstered both linguistic capability and job-readiness.

Moreover, CTL supported longer-term retention of vocabulary and grammar by repeatedly situating language in meaningful tasks (e.g., lab writing, simulations). Students reported better recall and more frequent use of target language when it was tied to concrete vocational activities rather than isolated textbook exercises. This experiential repetition also reinforced vocational confidence in tasks ranging from reporting to technical discussion, further evidence of CTL's role in building durable language skills aligned with workplace demands.

Key Factors Supporting the Success of PjBL and CTL in Vocational Schools and Recommendations for Optimization

Successful adoption of PjBL and CTL in vocational English classrooms depends on interrelated conditions that shape engagement and outcomes. These approaches work best when they explicitly address vocational students' needs, that is, to treat English as a tool for professional communication rather than only an academic subject. Three principal factors emerged from the data: relevance to career contexts, active learning strategies, and student-centered pedagogy. Addressing these dimensions directly targets common challenges in vocational settings, such as low motivation, limited authentic practice, and insufficient professional confidence, thereby maximizing both engagement and transferability.

Key factors contributing to success include: (1) Relevance to real-life and career contexts, in which students are more motivated when lessons clearly link English to future work environments (e.g., laboratory practice, international collaboration, access to scientific literature). (2) Active learning methods in the scope of collaborative tasks, problem-solving, and creative output stimulate critical thinking and communication, mirroring workplace interactions and promoting retention of language within meaningful use; such strategies also cultivate soft skills like adaptability and teamwork. (3) Student-centered approaches that offered autonomy and shared responsibility encourage deeper engagement and confidence. To optimize implementation, teachers should design projects and contextual tasks that align closely with vocational competencies, provide sustained feedback, and create safe spaces for risk-taking. Integrating industry vocabulary, digital tools, and real-life resources further strengthens authenticity and practical value.

Quantitative analysis summarized earlier confirms generally positive perceptions of both methods: PjBL scored particularly high for speaking/writing improvement (M = 3.61, SD = 0.50) and awareness of learning progress (M = 3.55, SD = 0.67), while CTL received strong ratings for career preparation (M = 3.48, SD = 0.51) and clarity in explaining technical concepts (M = 3.39, SD = 0.66).

Qualitative findings provided nuance: interviews revealed that PjBL promoted active participation, peer scaffolding, and practical application of English in authentic laboratory projects, whereas CTL enhanced comprehension and memory by contextualizing language within vocational scenarios.

Observational data corroborated and contextualized these results. In PjBL sessions, student engagement peaked during problem-solving phases and presentations where English was used spontaneously; CTL lessons generated highest engagement when activities closely mirrored workplace tasks such as drafting lab reports or conducting safety briefings. Collectively, the evidence suggests complementary strengths: PjBL is particularly effective for collaborative problem-solving and creative product development, while CTL excels at linking instruction to vocational relevance. Together, they address cognitive, behavioral, and affective dimensions of engagement and function as mutually reinforcing strategies for vocational English instruction.

3.2 Discussion

This section elaborates the findings of the study on the application of Project-Based Learning (PjBL) and Contextual Teaching and Learning (CTL) in English classrooms at SMK–SMAK Bogor. The discussion is structured according to three guiding questions: (1) the effectiveness of PjBL in English learning, (2) the effectiveness of CTL in English learning, and (3) the supporting factors that contribute to the success of both methods, along with recommendations for optimization. The discussion integrates both quantitative and qualitative results, connects them to previous studies, and outlines implications for pedagogy and future research.

Effectiveness of PjBL in English Learning

Quantitative data from the questionnaires demonstrated an overall positive perception of PjBL. Most of the 15 items received responses in the "Agree" and "Strongly Agree" categories. For example, 20 students strongly agreed that project work improved their speaking and writing skills, while 21 strongly agreed that it enabled them to reflect on their progress. Only a small proportion expressed hesitation, such as 12 students who were less confident about using English in professional contexts. These findings suggest that while PjBL effectively enhances skill development and engagement, some students still require scaffolding to transfer these gains into professional situations.

Qualitative evidence from interviews and observations supported these results. Students reported that PjBL fostered collaboration, problem-solving, and authentic language use. One student commented, *"When we did projects in groups, I practiced English more naturally because we had to solve problems together."* Another noted, *"It felt more meaningful when we connected English to our chemical analysis tasks."* Such feedback illustrates that PjBL facilitates authentic communication and vocational relevance. At the same time, challenges remained, as some students reported difficulty with technical vocabulary and low confidence in presenting. This confirms that while PjBL is effective, continuous teacher support is essential to maximize learning outcomes.

Taken together, PjBL can be considered effective in strengthening engagement, collaboration, and applied English skills. It creates an active learning environment that prepares students for real-world communication. However, the findings also highlight the importance of providing additional support to ensure that all students achieve confidence in professional contexts.

Effectiveness of CTL in English Learning

The findings on CTL also showed strong effectiveness. From 15 questionnaire items, no student selected "Strongly Disagree," reflecting universal acceptance of the method. Sixteen students strongly agreed that CTL prepared them for future careers and helped them explain technical concepts in English. The highest number of "Agree" responses (21 students) related to motivation and long-term retention, suggesting that CTL supports sustained learning of vocabulary and grammar.

Qualitative data reinforced these trends. One student remarked, *"When the teacher used real-life examples from the laboratory, I understood better and remembered the words longer."* Another explained, *"I felt more confident because what we learned was connected to my future job."* Such comments illustrate how CTL strengthens relevance and confidence by embedding language learning in authentic, career-related contexts. Nonetheless, challenges were also noted: nine students disagreed that CTL enhanced their confidence in laboratory communication. This indicates that while

contextualization aids comprehension, more practice is needed to translate learning into workplace communication skills.

Overall, CTL emerged as highly effective in improving motivation, contextual understanding, and language retention. Its strength lies in connecting English to real-world vocational situations. However, careful implementation is required to ensure that confidence and communicative competence are consistently strengthened.

Key Supporting Factors and Recommendations for Optimization

The effectiveness of PjBL and CTL was supported by several key factors. First, both approaches ensured vocational relevance, allowing students to directly link English with their specialization in chemical analysis. Quantitatively, 17–21 students agreed or strongly agreed that English learning through projects or contextual tasks prepared them for professional use. Qualitatively, one student noted, *"With CTL, I could imagine how English is used in my future career, so it feels useful and not just for exams."* This finding aligns with Johnson (2002), who emphasized that contextualized learning enhances relevance and long-term retention.

Second, engagement and collaboration were identified as significant contributors. In the PjBL survey, 20 students strongly agreed that project work improved speaking and writing, while 21 agreed that they could track their learning progress. CTL results also highlighted that students were more motivated and better retained vocabulary and grammar when linked to real-life contexts. These findings echo Bell (2010), who stressed PjBL's role in autonomy and confidence, and Crawford (2001), who highlighted CTL's capacity to foster participation. Together, they underline that active participation and teamwork play central roles in the effectiveness of both methods.

Third, the complementary nature of PjBL and CTL enhanced overall outcomes. While PjBL was stronger in communication, collaboration, and problem-solving, CTL proved more effective in contextualization, retention, and career readiness. As one student reflected, *"PjBL gave me the chance to solve problems and share ideas with my friends in English,"* while another explained, *"When the teacher used examples related to laboratory work, I understood better and remembered the English terms longer."* These comments highlight that integrating PjBL and CTL provides a balanced model for vocational English instruction.

To optimize implementation, teachers are encouraged to design lessons that integrate project-based tasks with real-world vocational contexts. This ensures that students not only practice communication and collaboration but also connect English learning directly to their field of expertise. As Beckett & Slater (2005) emphasized the adaptability of PjBL, and Johnson (2002) stressed contextual grounding, combining these approaches offers a powerful pedagogical model.

Furthermore, sustained teacher training is essential. Without adequate preparation, teachers may struggle to design authentic tasks, manage collaborative projects, or align technical content with English learning. Continuous professional development equips teachers with both theoretical understanding and practical strategies. Darling-Hammond, Hyler, and Gardner (2017) note that ongoing professional learning improves teaching quality, while Thomas (2000) stresses the necessity of teacher readiness in PjBL. Thus, teacher training is a vital step to ensure sustainable implementation of PjBL and CTL.

Another recommendation is to strengthen industry collaboration through guest lectures, field projects, or case studies. These activities connect classroom learning with workplace demands, allowing students to use English in authentic professional contexts. For vocational schools, such partnerships enhance motivation, provide authentic materials, and mirror real-world challenges. Tynjälä (2008) emphasized that workplace-integrated learning strengthens problem-solving, professional competence, and knowledge transfer. Hence, stronger industry collaboration is recommended to improve the contextual relevance of English learning.

4. Conclusion

Conclusions This study provides clear evidence that both Project-Based Learning (PjBL) and Contextual Teaching and Learning (CTL) are effective pedagogical approaches for enhancing English learning in vocational settings. PjBL was found to be particularly effective in fostering active student engagement, collaboration, and communication, as well as in developing problem-solving abilities through meaningful projects. Meanwhile, CTL proved highly effective in linking English learning with

real-world contexts, thereby strengthening vocabulary retention, grammatical accuracy, and students' preparedness for professional careers. Together, the findings confirm that both approaches contribute substantially to improving vocational students' linguistic and cognitive competencies, though in distinct and complementary ways.

Several key factors underpin the success of these approaches. The integration of vocational relevance ensured that students could directly connect language learning with their specialization in chemical analysis, thus enhancing both motivation and perceived usefulness. Student engagement and collaboration further supported effectiveness, as learners reported greater confidence, autonomy, and participation in classroom tasks. These results indicate that PjBL and CTL thrive when embedded in authentic, context-rich, and interactive learning environments. To optimize outcomes, the study recommends integrating PjBL and CTL strategically in lesson design, providing sustained teacher training to ensure meaningful implementation, and strengthening school & industry partnerships to expose students to authentic professional communication scenarios.

The comparative analysis highlights that PjBL and CTL contribute to student learning in different but mutually reinforcing ways. While PjBL primarily develops communication, teamwork, and critical problem-solving, CTL ensures relevance, long-term retention, and professional readiness. Their complementary strengths suggest that a blended application of the two approaches may represent the most powerful model for vocational English instruction.

The implications of these findings extend beyond this single context. For vocational education broadly, PjBL and CTL offer a pathway to align English instruction with workplace demands, thereby bridging the gap between academic learning and employability skills. However, further research is needed to expand these findings across diverse vocational disciplines, to assess long-term retention and professional application, and to examine the potential role of digital tools in supporting both PjBL and CTL. Additionally, including teachers' perspectives in future studies would provide a more comprehensive understanding of implementation challenges and best practices. In summary, this study underscores that PjBL and CTL are not competing approaches but complementary strategies that, when effectively integrated, can prepare vocational students to use English confidently, meaningfully, and professionally in both their studies and future careers.

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