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A Study on The Effectiveness of Project-Based Learning in Enhancing Entrepreneurial and Livelihood Skills Among Technology and Livelihood Education (TLE) Students

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I. BACKGROUND AND RATIONALE

Project-Based Learning is defined as a learner-centered instructional approach in which students actively engage in real-world, meaningful projects over an extended time frame, culminating in a public product or presentation (PBLWorks, n.d.; New Tech Network, n.d.). Unlike traditional teacher-led instruction, PBL situates students as designers, investigators, and problem solvers; such authentic engagement can support deeper understanding, creativity, collaboration, and self-regulated learning (New Tech Network, n.d.). A recent meta-analysis spanning 66 empirical studies found that PBL yields a moderate positive effect overall (standardized mean difference = 0.441, $p < .001$) on students' learning outcomes, especially in terms of academic achievement, thinking skills, and affective attitudes (Zhang et al., 2023; see also Zhang, 2023 via PMC) , and is particularly potent in engineering and technology disciplines and in Asian settings (Zhang et al., 2023).

While most research on PBL focuses on cognitive or affective gains, fewer studies examine its impact on entrepreneurial competencies, though the alignment is promising. An integrative review on PBL in entrepreneurship education argues that the active, inquiry-driven, collaborative nature of PBL is well-suited to fostering entrepreneurial mindsets, including innovation, risk-taking, leadership, and resilience (Project-Based Learning and The Development of Entrepreneurial Skills, 2024). Sequential empirical studies corroborate this: for example, in a quasi-experimental study among "Package C" learners in Indonesia, a PBL intervention produced statistically significant gains in creativity, decision-making, communication, leadership, and risk management relative to a traditional instruction group (Azizah et al., 2024 In the vocational education context, a study in Bali showed that PBL, coupled with students' self-efficacy, enhanced entrepreneurial readiness in vocational high school students (Masdarini et al., 2024).

In the TLE (or TVL) domain, some nascent studies highlight the potential of PBL to nurture innovation skills and technical engagement. For instance, Dullente and Namoco (2024) implemented an eight-week PBL intervention among Grade 8 TLE students in the Philippines and found significantly higher gains in learning and innovation skills compared to a conventional teaching group. Another study exploring "optimizing problem-based and project-based learning in TLE" reported that PBL's effect is moderated by variables such as class size, curricular domain (e.g., technology or vocational subjects), and the duration of implementation (Quinay & Briones, 2025). In terms of livelihood skills, a relevant example outside the Philippine context is the Ugandan study wherein school-based agripreneurship projects (i.e. farm enterprises) integrated with youth-adult partnerships allowed students to acquire both business knowledge and life skills (communication, leadership, conflict resolution) (Mukembo, Edwards, & Watters, 2020).

Despite these promising findings, several gaps and tensions remain. First, few studies explicitly locate themselves in the Philippine TLE or TVL milieu, where socio-economic, curricular, and institutional conditions may modulate PBL's impact. Second, extant research often measures entrepreneurial or livelihood skills via self-report or single-dimension tests, rather than multi-dimensional, performance-based rubrics. Third, past interventions tend to be short-term (e.g., 6–8 weeks), raising questions about sustainability and transfer into real livelihood pursuits. Moreover, theoretical viewpoints caution that PBL is not a panacea; its effectiveness depends heavily on scaffolding, teacher facilitation, resource availability, and alignment with authentic tasks (Issa et al., 2021).

Thus, the present study is designed to address these gaps by (a) implementing a PBL intervention within TLE classes in a Philippine secondary school context; (b) assessing multiple dimensions of entrepreneurial and livelihood skills, such as opportunity identification, financial planning, technical mastery,

marketing, resilience, and self-efficacy, through performance tasks and rubrics; and (c) using a quasi-experimental pretest-posttest controlled design over a longer timeframe (e.g., one semester) to examine both immediate and sustained effects.

Statement of the Problem

1. What is the perception of the Senior High School students on the effectiveness of using Project-Based Learning?

Review of Related Literature and Studies

On the Senior High School Students

Senior high school education represents a critical transitional phase in students' academic and personal development. In the Philippines, this period encompasses Grades 11 and 12 under the K–12 curriculum, marking the culmination of basic education and the bridge to higher education or employment. At this stage, students undergo cognitive, socio-emotional, and behavioral transformations that prepare them for more specialized learning and practical life demands (Pillay & Panth, 2022). According to Mancio (2023), the primary purpose of the Senior High School (SHS) program is to ensure that graduates are equipped with foundational competencies, employable skills, and the capacity for lifelong learning. Even in terms of research skills, Saavedra, Alejandro, and Espinosa (2022) found that students still require further mentoring to improve this essential competency. Their ability to critically analyze information must be strengthened to enable them to produce high-quality research outputs.

This stage is particularly significant within the Philippine context because it aligns with the country's national agenda for workforce readiness and economic participation. The Technology and Livelihood Education (TLE) track, in particular, emphasizes entrepreneurship, technical proficiency, and livelihood-oriented capabilities, designed to equip learners with practical skills applicable in local industries. As such, senior high school students are expected to balance academic rigor with applied skill acquisition, making them both learners and emerging practitioners (Bangayan et al., 2025).

The learning behavior of senior high school students differs significantly from that of junior high learners. As noted by Piaget's theory of cognitive development, this stage corresponds to the formal operational period, wherein individuals demonstrate advanced reasoning, abstraction, and problem-solving abilities (Ikyegh, 2023). Empirical studies affirm that senior high school students demonstrate higher levels of metacognition and strategic learning behaviors when provided with autonomy-supportive environments (Ryan & Deci, 2021). However, this developmental potential is only fully realized when pedagogical approaches cater to their growing need for independence, collaboration, and relevance in learning tasks. In this context, teachers must possess the necessary pedagogical competencies to facilitate students' independent learning using the resources available within the learning environment. Hence, it is equally important for the Department of Education to examine and strengthen teachers' capacity to effectively implement experiential learning approaches, particularly those that encourage students to learn through active engagement and hands-on activities (Banua, Saavedra, Ajibon, Aukasa, Muhajil, & Najam, 2022).

In a mixed-method study among Grade 12 students in Thailand, Clausen (2023) found that learners who participated in self-directed, project-based tasks developed stronger analytical reasoning and self-efficacy compared to those in traditional lecture-based classrooms. Similarly, in the Philippine context, Mendoza (2022) observed that SHS students exposed to performance-based learning exhibited heightened motivation and engagement, particularly when tasks were connected to real-world applications. These findings underscore the alignment between adolescents' developmental readiness and constructivist pedagogies such as Project-Based Learning (PBL).

Project-Based Learning (PBL)

Project-based learning (PBL) is a learner-centred instructional approach in which students engage actively in investigating real-world problems, designing and executing projects, collaborating in teams, and presenting tangible artefacts or outcomes (Das, 2025). Rather than passive reception of content, students in PBL cycles identify driving questions, plan and carry out investigations or tasks, monitor progress, troubleshoot, and present results. Theoretically, PBL is rooted in constructivist learning theory: knowledge is actively constructed through social interaction and authentic tasks (Mishra, 2023).

Empirical research, particularly meta-analytic work, supports the effectiveness of PBL. For example, Carter (2024) aggregated 66 experimental/quasi-experimental studies and found that PBL had a moderate positive effect on student learning outcomes (standardised mean difference, SMD = 0.441, $p < .001$), including academic achievement, thinking skills, and affective attitudes. The study further revealed that the effect of PBL

was more pronounced in high school settings (SMD ≈ 0.720), in Asia (especially Southeast Asia), and in technology/engineering-type subjects rather than purely theoretical courses. Moreover, optimum implementation involved small group sizes (4–5 students) and project durations of 9-18 weeks (Carter, 2024).

Despite the positive trend, PBL is not uniformly effective. Nantha et al. (2022) noted that some prior studies found no significant difference in achievement between PBL and traditional instruction (e.g., Kızkapan & Bektaş, 2017). Those variations are attributed to moderating variables such as class size, project duration, curriculum alignment, teacher training, resource availability, and student readiness.

Within senior high school contexts, several studies have focused on perceptions and resource utilisation of PBL. Blancia (2025) examined the utilisation of PBL resources among STEM teachers and administrators in senior high schools in Batangas (Philippines). They found that while human resources (teacher capability) were generally sufficient, material/financial resources were less adequate, and both teachers and administrators acknowledged the need for refined management of PBL implementation (Blancia, 2025). Another study from Indonesia (Hafizah et al., 2024) involving senior high school participants found that PBL significantly fostered critical thinking, collaboration, and intrinsic motivation, which in turn supported improved academic performance, but also emphasised that teacher involvement in project design and adequate learning resources were key success factors. These studies highlight a consistent theme: effective PBL is not automatic, it depends heavily on implementation fidelity, resource support, and contextual alignment.

Theoretical Framework

This study is anchored on both pivotal and educational reformer John Dewey's "Learning by Doing" Theory and David Kolb's Experiential Learning Theory (ELT).

Dewey (1938) believes that education must be founded on real-life experiences. He contends that actual learning occurs when pupils are confronted with real-world situations that require practical answers rather than passive absorption of data. This encourages the use of Project-Based Learning (PBL) in Technology and Livelihood Education (TLE) since it transforms students from theoretical observers to active participants in their trade.Kolb's Experiential Learning Theory (1984), which describes learning as "the process through which knowledge is created by transforming experience."

Kolb's cycle: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation, reflects the PBL process. When TLE students participate in a project (Concrete Experience), consider the results (Observation), strategize for enhancements (Conceptualization), and executes the final result (Experimentation), they are expected to achieve greater skills and retention compared to other conventional lecture approaches used in the delivery of learning.

Moreover, this study draws upon Vygotsky's Constructivism, especially Social Constructivism which implies that learning is a social activity. Project-Based Learning cultivates this by requiring students to collaborate, solve problems in groups, negotiate that is highly critical for building entrepreneurial soft skills like communication and leadership skills.

II. METHODOLOGY

The study uses a quantitative descriptive-correlational approach to understand how TVL Senior This study takes a quantitative descriptive-correlational approach to explore how Senior High School students in the TVL strand in Zamboanga City perceive Project-Based Learning (PBL) and whether those perceptions relate to their academic performance. Importantly, the researchers didn't alter or control any teaching methods; they simply observed and measured what was already happening in the classrooms. From an estimated population of about 5,200 TVL students in Grades 11 and 12, they set a target sample size of at least 360 using Slovin's formula. To make sure the sample fairly represented different groups, participants were chosen through stratified random sampling. Only students who had actual experience with PBL and who gave their consent were included.

Data was collected through perception questionnaires, a performance rubric scored during PBL presentations, and official academic records. The survey tools were adapted from two recent studies and designed to capture both teacher and student views on how PBL was implemented, how engaged students were, and the outcomes achieved. To ensure these tools were reliable and credible, they underwent expert validation, resulting in a content validity index of 0.93. They were then pilot-tested with 40 students, yielding reliability scores above 0.89 and a rubric agreement score of 0.87—all strong indicators of solid measurement quality.

Data collection lasted over the course of eight weeks with a proper permissions process and orientation before transitioning into administering the questionnaire and scoring rubric when students presented their projects. The analysis was performed using descriptive statistics in addition to the Pearson's r correlation and t-tests or one-way ANOVA when group comparisons were required, all computed via IBM SPSS v29 at a 0.05 significance level. The researchers maintained strict ethical standards throughout (the data were anonymized, AES-256 encrypted and access restricted; data were disposed after a year of storage), all in accordance with the Data Privacy Act [RA 10173] and declared no conflict of interest.

III. RESULTS AND DISCUSSIONS

On the Engagement and Learning Motivation

The data in Table 1 reveal a differentiated pattern in students' perceptions of Project-Based Learning (PBL) as it relates to engagement and learning motivation, suggesting that while PBL is meaningfully energizing certain motivational dimensions, it does not uniformly transform students' perceptions of classroom interest or creative expression. The median rating of 4 ("Agree") for statements indicating that project work motivates students to study harder, enhances their confidence, and fosters enjoyment in collaboration reflects a generally affirmative stance toward PBL as a motivational catalyst.

This finding resonates strongly with contemporary motivational frameworks, particularly Self-Determination Theory, which posits that learning environments supporting autonomy, competence, and relatedness tend to elevate intrinsic motivation and sustained engagement (Ryan et al., 2022). In the present context, agreement with statements linked to confidence and collaborative enjoyment suggests that PBL may be fulfilling students' needs for competence and relatedness, two pillars known to predict academic persistence and deeper learning engagement. Empirical evidence supports this pattern: a recent meta-analysis by Zhang and Ma (2023) found that PBL significantly enhances students' affective learning outcomes, including motivation and engagement, particularly in secondary education settings.

Similarly, Tirado-Morueta et al. (2024) demonstrated that in PBL environments where teacher scaffolding is present, students' sense of self-determination correlates positively with engagement indicators. The alignment between these findings and the present data suggests that PBL, even when not perceived as universally transformative, successfully strengthens motivational and interpersonal dimensions of learning within TLE classrooms.

However, the neutrality observed in students' responses regarding whether PBL makes TLE classes more interesting and meaningful, and whether it allows them to express creativity and initiative, invites a more nuanced interpretation. A median of 3 ("Neutral") does not signal rejection; rather, it implies variability in experience and possibly uneven implementation fidelity. Research over the past five years underscores that the effectiveness of PBL in fostering creativity and perceived meaningfulness is highly contingent on design quality, authenticity of tasks, and cognitive challenge (Lonergan et al., 2022). When projects are overly structured, narrowly assessed, or disconnected from authentic community problems, students may comply with task requirements without experiencing the deeper sense of creative agency that PBL ideally cultivates. Erdem et al. (2025), in their meta-analytic review of problem-based learning models, reported that gains in higher-order thinking and creativity were significantly moderated by teacher facilitation strategies and task complexity.

Thus, the neutrality in creativity-related perceptions within this study may reflect a pedagogical space where projects are operationally implemented but not yet optimized for maximal cognitive openness or entrepreneurial innovation. In livelihood-oriented subjects such as TLE, where authentic problem contexts and community-based applications are pedagogically feasible, the absence of strong agreement on creativity and meaningfulness suggests an opportunity to recalibrate project design toward more contextually embedded, student-driven inquiries.

Taken collectively, the results portray PBL as moderately but not unequivocally transformative in the domain of engagement and motivation among senior high school TLE students. The strong endorsement of motivation, collaboration, and confidence indicates that PBL has successfully cultivated affective and interpersonal foundations that are indispensable for entrepreneurial and livelihood education. At the same time, the tempered responses regarding interest and creative initiative highlight the complexity of translating constructivist ideals into classroom realities. Recent scholarship emphasizes that engagement is multidimensional, comprising behavioral, emotional, and cognitive strands, and that improvements in one domain do not automatically extend to others (Rojas et al., 2023).

The present findings suggest that while behavioral and social engagement are robustly supported through collaborative project work, deeper cognitive engagement linked to creativity and perceived meaningfulness may require further instructional refinement. Therefore, rather than interpreting the results as indicative of limited effectiveness, they should be understood as reflective of an evolving implementation process, one that has successfully strengthened students' motivational infrastructure but still holds unrealized potential in fully activating the transformative, creative promise of Project-Based Learning in TLE contexts.

Table 1. Perception of the Senior High School students on the effectiveness of using Project-Based Learning in terms of Engagement and Learning Motivation

Statement	Median	Descriptor
PBL activities make my TLE classes more interesting and meaningful.	3	Neutral
Working on projects motivates me to study harder.	4	Agree
I enjoy collaborating with classmates during project work.	4	Agree
PBL allows me to express creativity and initiative in solving problems.	3	Neutral
I feel more confident in my learning abilities through project-based tasks.	4	Agree

Legend: 5- Strongly Agree, 4 - Agree, 3 – Neutral, 2 – Disagree, 1 - Strongly Disagree

On the Collaboration and Interpersonal Growth

The findings presented in Table 2 illuminate a compelling yet nuanced portrait of how Project-Based Learning (PBL) shapes students' collaborative competencies within the Technology and Livelihood Education (TLE) context. The consistent median rating of 4 ("Agree") across indicators of communication effectiveness, respect for teammates' ideas, teamwork and leadership development, and constructive conflict resolution suggests that students perceive PBL as a meaningful vehicle for cultivating specific interpersonal and group-process skills. These dimensions are not peripheral to TLE instruction; rather, they are central to its entrepreneurial and livelihood-oriented mandate, where collaborative planning, shared responsibility, and negotiated decision-making mirror authentic workplace dynamics. Contemporary research substantiates this pattern. A recent meta-analysis by Wu (2024) demonstrated that PBL exerts a statistically significant positive effect on collaborative competence and social learning outcomes, particularly in secondary education settings where structured group tasks are aligned with clear performance goals. Similarly, Utterback (2023) found that in PBL classrooms characterized by intentional teacher scaffolding, students reported heightened engagement and cooperative efficacy, mediated by their sense of autonomy and peer interdependence. The present results resonate with these findings, indicating that when projects are sufficiently structured to require interaction, students internalize communication norms, leadership roles, and conflict-management strategies that extend beyond task completion into the domain of interpersonal growth.

Yet, the neutrality observed in the statement "I learn more when I collaborate with my peers" (median = 3) introduces an important conceptual distinction between perceiving collaboration as skill-enhancing and perceiving it as academically superior to individual learning. This divergence suggests that while students recognize the social and procedural benefits of group work, they may remain ambivalent about its direct contribution to content mastery. Such a pattern is not anomalous. Siregar et al. (2025) emphasized that the success of collaborative PBL hinges on the quality of task interdependence; when roles are unevenly distributed or cognitive accountability is diffuse, students may experience collaboration as organizationally necessary but not intellectually transformative. Furthermore, recent syntheses of problem- and project-based learning models have underscored that positive social outcomes do not automatically translate into perceived academic gains unless collaborative processes are tightly integrated with conceptual rigor (Sánchez-García & Reyes-de-Cózar, 2025).

In TLE settings, where projects often involve production, demonstration, or entrepreneurial simulation, students may value teamwork for its pragmatic utility while still associating deeper conceptual understanding with individual reflection or teacher explanation. This nuanced response, therefore, should not be interpreted as resistance to collaboration but rather as an indication that collaborative structures may require more explicit cognitive alignment to strengthen students' perception that peer interaction enhances, not merely accompanies, learning.

Taken together, the results portray PBL as an effective scaffold for interpersonal development while revealing subtle tensions in how collaborative learning is academically construed. The strong agreement on communication, respect, leadership, and conflict resolution affirms that PBL functions as a microcosm of real-world professional environments, fostering social capital and relational competencies essential for 21st-century employability. Indeed, recent scholarship underscores that collaborative competence is increasingly recognized as a core educational outcome, particularly in technical-vocational and entrepreneurship-focused programs. However, the neutrality regarding learning gains from collaboration signals the need for more deliberate pedagogical calibration, ensuring that group interactions are intellectually demanding, equitably structured, and accompanied by reflective processes that help students cognitively attribute their understanding to peer exchange.

In this sense, the findings do not diminish the value of PBL; rather, they highlight its developmental trajectory within the TLE classroom. PBL appears to have successfully institutionalized collaborative norms and interpersonal growth, yet its next evolution may lie in deepening students' awareness of collaboration as a catalyst for higher-order thinking and disciplinary mastery.

Table 2. Perception of the Senior High School students on the effectiveness of using Project-Based Learning in terms of Collaboration and Interpersonal Growth

Statement	Median	Descriptor
I learn more when I collaborate with my peers.	3	Neutral
My group communicates effectively to complete our tasks.	4	Agree
I listen to and respect the ideas of my teammates.	4	Agree
PBL helps me develop teamwork and leadership skills.	4	Agree
Through PBL, I have learned to resolve conflicts and make group decisions constructively.	4	Agree

Legend: 5- Strongly Agree, 4 - Agree, 3 – Neutral, 2 – Disagree, 1 - Strongly Disagree

On the Skill Acquisition and Application

The results in Table 3 present a layered and somewhat paradoxical picture of how students construe the impact of Project-Based Learning (PBL) on their skill acquisition and practical application within the TLE curriculum. On one hand, respondents agreed that project work enhances their ability to manage time and resources efficiently and that their academic performance has improved since the integration of PBL. These affirmative responses signal that students recognize tangible procedural and performance-related benefits associated with project implementation. Time management and resource allocation are core executive skills, often classified under self-regulated learning competencies, which are known to be strengthened in inquiry-driven environments that require planning, monitoring, and iterative refinement (Huang et al., 2025).

Recent empirical work supports this interpretation: Meng (2023), in a comprehensive meta-analysis, reported that PBL significantly improves students' academic achievement and metacognitive regulation, particularly in secondary education contexts where projects demand structured timelines and deliverable-based outputs. In technical-vocational programs, such as TLE, where performance outputs are integral to assessment, structured project cycles inherently compel learners to coordinate materials, manage deadlines, and assume responsibility for task completion. The present findings thus align with contemporary scholarship indicating that PBL fosters organizational competence and performance gains, even when deeper cognitive or entrepreneurial outcomes are less uniformly perceived.

However, the neutrality expressed in students' perceptions regarding the application of TLE lessons to real-life livelihood tasks, enhancement of problem-solving and decision-making abilities, and development of entrepreneurial and technical skills warrants a more critical and interpretive lens. A median of 3 across these indicators suggests that while procedural and academic benefits are evident, students remain uncertain about the extent to which PBL translates into authentic vocational readiness. This finding echoes recent scholarship emphasizing that not all project-based designs are inherently authentic; authenticity depends on the degree to which projects are embedded in real-world contexts, simulate industry standards, and demand complex problem-solving beyond routine execution (Eswaran, 2024). Amiri (2025), in their meta-analysis of problem-based learning models, found that gains in higher-order thinking and applied problem-solving were significantly moderated by task authenticity and cognitive complexity. When projects are predominantly classroom-bound or product-oriented without meaningful engagement with community stakeholders or real market conditions, students may perceive them as academic exercises rather than genuine entrepreneurial rehearsals. In the context of TLE, which is explicitly designed to cultivate livelihood competencies aligned with employability and entrepreneurship, the neutrality on skill transfer suggests that project tasks may not yet fully mirror the unpredictability, decision-making demands, and risk assessment inherent in real entrepreneurial ventures. Thus, the findings point not to the absence of impact, but to a potential misalignment between project structure and the lived realities of livelihood practice.

Taken together, these results underscore the distinction between performance improvement and authentic skill internalization. Students appear confident that PBL has strengthened their academic standing and operational efficiency, yet they hesitate to affirm that it has substantially deepened their entrepreneurial or problem-solving capacities. This divergence is consistent with recent discourse in educational research, which cautions that while PBL can enhance achievement and engagement, its capacity to foster transferable vocational competence depends on fidelity of implementation and contextual integration.

In TLE settings, where the ultimate objective is not merely scholastic success but livelihood preparedness, the transformative promise of PBL lies in its ability to situate learning within authentic economic and community ecosystems. Therefore, the present findings may be interpreted as evidence of partial realization: PBL is successfully cultivating organizational discipline and supporting academic improvement, yet it has not fully actualized its potential as a conduit for entrepreneurial identity formation and applied decision-making mastery. This nuanced outcome invites pedagogical recalibration, specifically, the incorporation of community-based projects, market simulations, and reflective debriefing processes that make the connection between classroom output and livelihood competence both explicit and experientially grounded.

Table 3. Perception of the Senior High School students on the effectiveness of using Project-Based Learning in terms of Skill Acquisition and Application

Statement	Median	Descriptor
I can now apply my TLE lessons to real-life livelihood tasks.	3	Neutral
PBL has enhanced my problem-solving and decision-making abilities.	3	Neutral
I have developed stronger entrepreneurial and technical skills through projects.	3	Neutral
Project work helps me manage time and resources efficiently.	4	Agree
My academic performance in TLE has improved since we began using PBL.	4	Agree

Legend: 5- Strongly Agree, 4 - Agree, 3 – Neutral, 2 – Disagree, 1 - Strongly Disagree

d. Real-World Relevance and Empowerment

The findings in Table 4 reveal a subtle yet instructive tension between students' internal sense of empowerment and their perception of external real-world alignment within Project-Based Learning (PBL) implementation. The agreement reflected in the median score of 4 for statements indicating that PBL allows creative and innovative thinking and fosters pride and ownership over learning suggests that students experience a meaningful degree of psychological empowerment within project environments. These dimensions, creativity and ownership, are widely regarded as central affective outcomes of well-designed PBL frameworks. Contemporary research underscores that when learners are entrusted with sustained inquiry and product creation, they often develop a heightened sense of agency and task value (Lee, 2024). In line with this, Pantzos & Buckley (2025) found that student perceptions of autonomy and meaningful contribution in PBL settings significantly predicted engagement and self-determined motivation. The present findings suggest that within the TLE context, PBL is successfully cultivating this internalized sense of authorship and innovation, both of which are critical precursors to entrepreneurial thinking. The pride associated with project completion further signals that students perceive their outputs as personally significant, an outcome that aligns with motivational research linking ownership to persistence and deeper cognitive investment (Biswal et al., 2025).

However, the neutrality expressed regarding the authenticity of projects, specifically whether they reflect real community or livelihood issues, prepare students for employment or entrepreneurship, or enhance conceptual understanding through authentic application, introduces a more complex evaluative layer. While students feel empowered at a personal level, they remain uncertain about the structural authenticity and career relevance of their project experiences. This distinction is critical. Educational literature increasingly differentiates between "task-based activity" and "authentic project work," the latter requiring genuine alignment with real-world contexts, stakeholder engagement, and problem conditions that mirror professional practice (Massey, 2022). Chang et al. (2022) noted that the magnitude of PBL's impact on applied learning outcomes is significantly moderated by authenticity variables, including community integration and interdisciplinary design. Similarly, recent analyses of problem-based models emphasize that transferability of learning, particularly in vocational tracks, depends on whether projects simulate authentic constraints such as market competition, client expectations, or resource scarcity (Ibrahim, 2025). In the present study, students' neutrality may reflect a perception that while projects are creatively engaging, they may not fully replicate the lived complexities of entrepreneurial or livelihood environments. Thus, PBL may be functioning as an internal empowerment mechanism without yet achieving full ecological validity within the TLE framework.

Taken together, these findings suggest that PBL implementation in this context has succeeded in strengthening psychological empowerment but has not entirely bridged the gap between classroom production and community-based applicability. This distinction is especially consequential for TLE, whose curricular mandate extends beyond academic enrichment to workforce readiness and entrepreneurial formation. Recent scholarship highlights that empowerment without contextual anchoring can yield high engagement but limited transfer of skills. Therefore, the neutrality on real-world preparation should not be interpreted as a failure of PBL per se, but rather as an indicator of unrealized potential, specifically, the opportunity to embed projects more deeply within local livelihood ecosystems, industry simulations, and authentic problem scenarios reflective of Zamboanga City's socio-economic landscape. When projects are explicitly linked to community enterprises, local market demands, or real entrepreneurial challenges, students are more likely to perceive a coherent trajectory between school-based learning and future occupational pathways. In this light, the present results illuminate a developmental inflection point: PBL has cultivated creativity and ownership, foundational elements of empowerment, yet its transformative capacity in preparing students for employment and entrepreneurship will depend on the deliberate integration of authentic, community-responsive project designs within the TLE curriculum.

Table 4. Perception of the Senior High School students on the effectiveness of using Project-Based Learning in terms of Real-World Relevance and Empowerment

Statement	**Median**	**Descriptor**
The projects we complete reflect real community or livelihood issues.	3	Neutral
PBL prepares me for future employment or entrepreneurial ventures.	3	Neutral
I understand TLE concepts better when they are applied in authentic projects.	3	Neutral
PBL activities allow me to think creatively and innovatively.	4	Agree
Completing projects gives me a sense of pride and ownership in my learning.	4	Agree

Legend: 5- Strongly Agree, 4 - Agree, 3 – Neutral, 2 – Disagree, 1 - Strongly Disagree

IV. CONCLUSIONS

In the context of Senior High School TLE/TVL, students generally have a positive view of Project-Based Learning (PBL), especially when it comes to boosting their motivation, confidence, teamwork skills, and

the overall vibe in the classroom. Project-Based Learning being used as a strategy in the classroom delivery, the academic performance of learners tends to become relatively high. However, this study discovered that students' views of Project-Based Learning do not significantly predict the actual grades of the learners, indicating that factors such as assessment design, scaffolding, peer dynamics, and grading standards have a bigger influence on achievement rather than perception alone. Furthermore, the researchers found that Project-Based Learning only had a limited impact in this setting, mainly because the projects lacked authenticity and meaningful ties to real-life and entrepreneurial settings. This, in turn, restricted how much the approach could actually influence student outcomes.

Recommendations

The authors of this study also recommend that to make PBL more situated, more challenging, and more vocational, educators should be encouraged to create project-based learning opportunities for their students that are based on the actual community and livelihood needs within their region; include a partnership with an organization from their region; and include formalized reflective learning experiences that will allow students to understand the skills (competencies) they have developed.

They suggest that curriculum developers/planners and education administration teams need to create alignment between school-based project-based learning models/structures (PBL framework(s)) and/or other structures for teaching and learning with regional livelihood systems such as those found in Zamboanga City; update modules with current information about what is happening in industries related to these modules; and move towards using assessment strategies that evaluate student performance through products and processes.

They recommend that policy makers need to provide funding for the resources/tools needed to support PBL; formalize partnerships between schools and industries; and provide support for research into the mediators/moderators of effective PBL practices.

Finally, the authors recommend that future researchers use longitudinal/mixed-methods approaches to conduct studies with larger sample sizes that would help identify mediators/moderators of effective PBL practices.

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