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Exploring Pre-Laboratory Engagement in Higher Education through a Validated Qualitative Approach

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A B S T R A C T

This qualitative study explored how higher education TVET students and instructors engage during pre-laboratory idle time, a phase often overlooked in laboratory-based instruction. Guided by Engagement Theory and Self-Determination Theory, data were gathered through semi-structured interviews, non-participant observations, and institutional documents in two Philippine state universities. Interview protocols were pre-tested through cognitive interviews to ensure clarity, construct alignment, and contextual fit. Thematic analysis revealed four themes: proactive behavior and routine, instructor presence, emotional and motivational tensions, and environmental and institutional influences. Results show that idle time can foster readiness, self-regulation, and collaboration when supported by clear expectations, instructor visibility, and enabling environments. The study highlights the value of structuring idle time as a vital component of TVET pedagogy.

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INTRODUCTION

Student engagement continues to occupy a central position in higher education discourse, particularly in practice-oriented fields such as Technical and Vocational Education and Training (TVET). As universities aim to enhance learning outcomes, readiness, and learner independence, most interventions have centered on formal classroom instruction and hands-on laboratory work (Van den Beemt et al., 2023). Yet, a quieter segment of the instructional process—the idle period that occurs before laboratory sessions begin—has received far less pedagogical attention (Cagliero et al., 2023). This brief interval, emerging from rotational scheduling, limited equipment, or staggered activity preparation, often unfolds without structured guidance (Rathnayaka et al., 2024). Although it is commonly regarded as an unavoidable logistical gap, its potential to support learning has rarely been examined in depth.

Within Philippine TVET programs, where laboratory experiences are vital to developing occupational and teaching competencies, such idle time is a familiar occurrence (Rivera et al., 2025). Students enrolled in degree programs like the Bachelor of Technical-Vocational Teacher Education (BTVTEd) and the Bachelor of Technology and Livelihood Education (BTLEd) frequently wait for equipment availability, instructor prompts, or group turn-taking before performing tasks (Comingking et al., 2024). These transitional moments—unregulated by formal instruction—are often perceived as passive or unproductive instead of being recognized as opportunities for preparation and reflection (Imeraj et al., 2016). Emerging studies, however, indicate that learners may engage in meaningful actions during these intervals, such as mentally rehearsing procedures, organizing tools, or exchanging informal guidance with peers (Lashley & McCleery, 2020). For many, these moments also carry emotional significance, as anticipation and uncertainty can produce varying degrees of motivation, anxiety, or disengagement.

In contemporary scholarship, engagement is conceptualized as a multidimensional process involving behavioral, cognitive, and emotional investment in learning (Fredricks, 2022). Much of the existing research focuses on engagement within lectures, collaborative projects, or online environments, leaving the unstructured phases of learning largely unexamined (Li & Lajoie, 2022; Ramatsetse & Zenda, 2024). This omission is notable in TVET contexts, where instructional frameworks emphasize performance and skill demonstration but often neglect the psychological and situational factors that precede those performances. Similarly, limited research has explored how teacher presence, peer dynamics, and environmental conditions shape engagement before formal activities commence (Werang & Radja Leba, 2022).

Addressing this oversight calls for a closer examination of how both students and instructors perceive and utilize idle time in laboratory environments. Rather than presuming inactivity, it is essential to understand the range of cognitive, emotional, and social responses that surface during these moments and how they contribute to readiness for learning tasks. This study answers that call by exploring the lived experiences of higher-education TVET students and instructors as they navigate pre-laboratory idle time.

The present qualitative inquiry investigates how engagement manifests during the period immediately preceding laboratory instruction, drawing from first-hand accounts, direct observations, and institutional records. Grounded in Engagement Theory (Fredricks, 2022) and Self-Determination Theory (Deci & Ryan, 2015), it identifies patterns of behavior, emotion, and perception that can inform instructional design. Specifically, the research asks: How do students and instructors experience and respond to pre-laboratory idle time in TVET programs?

Understanding the subtleties of idle-time engagement carries practical value for improving teaching and learning in higher education. It contributes to efforts to strengthen active and student-centered laboratory environments by reframing idle time as a space for intentional engagement rather than as an instructional void. Through this perspective, the study enriches theoretical discourse on engagement and offers actionable insights for pedagogical innovation within TVET settings.

LITERATURE REVIEW

Engagement Theory and Self-Determination Theory

Student engagement is widely recognized as a dynamic process that reflects the effort, persistence, and emotional energy learners invest in their studies (Fredricks, 2022). Engagement Theory explains that meaningful learning emerges when learners actively participate, collaborate with peers, and produce outcomes that possess both personal and social relevance (Nguyen-Viet & Nguyen-Viet, 2025). Complementing this view, Self-Determination Theory (SDT) posits that sustained engagement occurs when the learner's psychological needs for autonomy, competence, and relatedness are adequately supported (Zenouzagh, 2023). When viewed together, these frameworks reveal that engagement is not a single act of participation but the cumulative result of motivational forces shaped by classroom climate, instructional design, and interpersonal relationships (Nguyen et al., 2021).

Empirical findings further underscore that teachers who adopt autonomy-supportive approaches cultivate stronger learner engagement across both in-person and online modalities (Phan et al., 2022; Zenouzagh et al., 2023). Students respond positively when learning environments encourage choice, recognize capability, and foster meaningful connection. These conditions extend beyond structured lectures, suggesting that engagement can also flourish during transitional or unstructured learning moments when students exercise agency and initiative.

Idle Time as a Pedagogical Space

Despite extensive inquiry into engagement during formal instruction, the periods that occur before active learning—often referred to as idle time—have received comparatively little empirical attention (Winter et al., 2021). Such intervals typically appear in laboratory settings while students await demonstrations, equipment setup, or group rotation. Rather than being viewed as lost instructional time, these brief pauses can serve as reflective spaces that

influence readiness, self-regulation, and motivation. Ricci et al. (2019) noted that the emotions students experience during anticipation can shape their subsequent engagement levels. In a similar vein, Rotgans and Schmidt (2017) observed that curiosity and self-questioning during short waiting periods stimulate cognitive preparation for upcoming tasks. When instructors provide light guidance or structure, these moments may encourage collaboration and metacognitive reflection that enhance understanding (Comingking et al., 2024).

However, unregulated waiting time may produce disengagement, frustration, or anxiety—particularly in performance-driven environments where students rely heavily on teacher feedback or limited resources (Lashley & McCleery, 2020). This contrast demonstrates why idle time deserves focused investigation: it reveals how engagement may arise or diminish outside formal instruction. Conceptualizing idle periods as potential zones of learning broadens both Engagement Theory and SDT by highlighting how motivation operates before the start of observable performance.

Engagement within the TVET Context

Technical and Vocational Education and Training (TVET) programs offer a distinctive lens for examining pre-activity engagement. Learning in these programs centers on laboratory and workshop practice, where direct participation determines the mastery of technical and pedagogical skills. Consequently, the factors influencing engagement extend to spatial, social, and temporal elements within the learning environment (Cagliero et al., 2023). Studies across Southeast Asia report that limitations in facilities, rotational laboratory schedules, and large class sizes often produce unavoidable idle periods that challenge students' focus and readiness (Rathnayaka et al., 2024). For Generation Z learners—who value immediacy, collaboration, and digital interactivity—such pauses may either stimulate informal cooperation or lead to distraction and disinterest (Chavez, 2025).

Recognizing and structuring engagement during pre-laboratory idle time is therefore vital for improving teaching strategies in resource-constrained TVET settings. The integration of Engagement Theory and SDT within this context enables educators to design preparatory tasks and peer interactions that meet learners' psychological needs while transforming idle moments into purposeful activity. Addressing this often-neglected aspect of the learning process contributes to a deeper theoretical understanding of engagement and supports pedagogical practices that enhance both motivation and skill development in vocational higher education.

METHODOLOGY

This study adopted a qualitative research design grounded in an interpretivist paradigm to examine how higher-education TVET students and instructors experience engagement during periods of pre-laboratory idle time. This approach was chosen to capture the complex interplay of behaviors, perceptions, and contextual factors that shape engagement within unstructured laboratory situations.

Research Setting and Participants

The investigation took place in two Philippine state universities offering the Bachelor of Technical-Vocational Teacher Education (BTVTEd) and the Bachelor of Technology and Livelihood Education (BTLEd) programs. A total of 12 students and 4 instructors participated, all purposively selected because of their direct involvement in laboratory-based instruction (Ricci et al., 2019). Following Ricci et al. (2019), the selection ensured diversity across specialization areas, academic levels, and teaching experience while maintaining focus on environments where idle time routinely occurs.

Data Sources

To gain a comprehensive view of the phenomenon, three complementary data sources were employed, enabling both triangulation and depth of understanding (Eungoo & Hwang, 2021):

1. Semi-structured interviews with students and instructors explored personal experiences, coping strategies, and perceptions of engagement during idle periods.
2. Non-participant observations documented classroom and laboratory interactions, routines, and environmental conditions that emerged before formal instruction commenced.
3. Institutional documents, such as laboratory guidelines and class timetables, provided contextual insight into structural and procedural factors influencing idle time.

Instrument Development and Pre-Fieldwork Validation

Interview protocols were anchored in the core principles of Engagement Theory (Fredricks, 2022) and Self-Determination Theory (Ryan & Deci, 2000), ensuring that behavioral, cognitive, and emotional engagement dimensions—as well as autonomy, competence, and relatedness—were adequately represented. Each item was designed to prompt detailed accounts of how students and instructors behaved, felt, and remained motivated during idle moments.

Before the main data collection, the protocols underwent a cognitive interviewing process with five students and two instructors (Meadows, 2021). Following the procedures described by Meadows (2021) and Balza et al. (2022), participants were asked to articulate their thought processes while responding to each question, highlighting ambiguities or misinterpretations. Additional probing questions helped identify culturally specific expressions or wording that could lead to confusion. Feedback from this validation phase resulted in refined phrasing, a more logical sequence of items, and the inclusion of context-sensitive prompts (Balza et al., 2022). These adjustments ensured conceptual clarity, contextual relevance, and linguistic precision, reinforcing the credibility and validity of the research instruments (Meadows, 2021).

Data Collection Procedures

Thematic analysis was employed following Braun and Clarke's (2021) six-phase framework: familiarization, initial coding, theme development, review,

definition, and reporting. Both deductive and inductive strategies were applied—deductive coding was guided by constructs from Engagement Theory and SDT, while inductive coding allowed new themes to surface directly from participant accounts (Naeem et al., 2023). Emerging categories were discussed and refined collaboratively to ensure coherence with research objectives and theoretical alignment.

Data Analysis

Thematic analysis was employed following Braun and Clarke's (2021) six-phase framework: familiarization, initial coding, theme development, review, definition, and reporting. Both deductive and inductive strategies were applied—deductive coding was guided by constructs from Engagement Theory and SDT, while inductive coding allowed new themes to surface directly from participant accounts (Naeem et al., 2023). Emerging categories were discussed and refined collaboratively to ensure coherence with research objectives and theoretical alignment.

Trustworthiness

Multiple strategies were implemented to enhance the rigor of the study. Credibility was strengthened through triangulation of interviews, observations, and documents; peer debriefing during the analytic phase; and member checking with all participants to verify interpretations (Naeem et al., 2023). The cognitive interviewing step also reinforced instrument validity before full-scale data collection (Meadows, 2021). Transferability was ensured through detailed contextual descriptions of research sites, while dependability and confirmability were maintained by keeping an audit trail of methodological and analytical decisions.

RESEARCH RESULTS

The analysis of interview transcripts, observation notes, and institutional documents revealed four interrelated themes that characterize engagement during pre-laboratory idle time in higher education TVET programs. These themes reflect the behavioral, cognitive, and emotional dimensions of engagement as well as the motivational drivers of autonomy, competence, and relatedness identified in Self-Determination Theory.

The themes are: (1) engagement through proactive behavior and routine, (2) instructor presence as a catalyst for engagement, (3) emotional and motivational tensions during idle moments, and (4) environmental and institutional factors affecting idle time. While each theme is distinct, they are interconnected, collectively illustrating how students navigate the unstructured moments before formal laboratory activities commence (Naeem et al., 2023). The findings highlight that idle time is not merely an interval of inactivity but a dynamic space where preparation, interaction, and affective states influence readiness for subsequent learning tasks (Braun & Clarke, 2021).

Engagement Through Proactive Behavior and Routine

Many students reported using idle time as an opportunity to prepare for the upcoming laboratory session through self-initiated and habitual actions. These behaviors, such as checking tools, rehearsing procedures, or discussing the activity with peers, demonstrate behavioral engagement supported by a sense of autonomy and competence (Dunagan & Larson, 2021).

A BTVTEd student in Food and Service Management shared, *"Personally, I try to use my waiting time wisely… I often look up techniques on YouTube so that when the teacher explains, I already have an idea"* [Student 1]. This proactive approach reflects self-regulated learning, where idle time serves as a platform for building procedural readiness.

Several students indicated that preparation was not limited to individual efforts but extended to supporting peers. One student noted, *"I also help guide my classmates, especially if they're unsure. It's better to start right even before the actual activity"* [Student 1]. Such peer-oriented engagement aligns with the relatedness component of SDT, reinforcing social bonds and shared accountability.

Observations confirmed that many students had established routines during idle time, such as arranging materials or reviewing laboratory sheets before the instructor's formal briefing [Observation Notes]. These routines appeared to reduce uncertainty and allowed students to transition smoothly into task execution.

Some participants emphasized mental rehearsal as part of their preparation. A BTLEd student in ICT explained, *"I imagine the steps in my head, like a dry run… so when it's time to do it, I won't panic"* [Student 2]. This strategy indicates cognitive engagement, as students actively process procedural information in advance.

Overall, proactive behaviors and established routines illustrate that students are not merely passive recipients of instruction. Instead, they actively leverage idle time to enhance readiness, drawing on both individual strategies and collaborative practices (Gomes et al., 2023). These actions not only reflect effective engagement but also reveal how idle moments can be transformed into opportunities for learning when autonomy and competence are supported.

Instructor Presence as a Catalyst for Engagement

Instructor presence during idle time emerged as a significant driver of student engagement. Both students and teachers described how the mere visibility and accessibility of the instructor, whether through active interaction or quiet observation, served as a signal that preparation and attentiveness were expected. This aligns with the relatedness component of Self-Determination Theory, in which interpersonal connection fosters motivation, and with the behavioral engagement dimension of Engagement Theory, where external cues shape participation (Lai, 2021).

Several students shared that when instructors were physically present in the laboratory before the formal start, they felt more motivated to prepare. One BTVTEd student in Food and Service Management explained, *"When our teacher is around, we become more serious… we feel like we have to be ready"* [Student 1]. The

sense of accountability was not necessarily tied to direct verbal instructions but to the implicit expectation created by instructor proximity.

This was echoed by a BTLEd student in ICT, who observed, "*Ma'am doesn't have to say anything. Just seeing her walking around makes us feel we need to act responsibly*" [Student 2]. In this way, presence alone functioned as a subtle yet powerful behavioral cue, prompting students to engage in preparatory actions such as reviewing notes, checking tools, or arranging materials.

From the instructors' perspective, being present during idle time was intentional. One teacher described, "*I try to be visible before we start… it shows them that I'm ready, and they should be too*" [Teacher1–USEP]. Another added, "*Sometimes I don't instruct right away, but I'm there observing… it encourages them to move without me having to tell them everything*" [Teacher2-USEP]. This reflects a pedagogical choice to promote autonomy while maintaining a guiding presence.

Observations supported these accounts, with multiple instances of students visibly shifting from casual conversation to focused preparation when the instructor entered the space [Observation Notes]. The behavioral shift was often immediate and collective, underscoring the potency of instructor presence as a catalyst for engagement.

Overall, instructor presence during idle time serves as more than a supervisory role; it is a relational and motivational anchor (Nguyen et al., 2018). By being visibly prepared and attentive themselves, instructors set a behavioral tone that students internalize, enhancing both readiness and the perceived value of the upcoming laboratory activity (Nordin & Omar, 2024).

Emotional and Motivational Tensions During Idle Moments

While many students used idle time productively, it was also a period marked by fluctuating emotions and motivational states. These moments could generate anticipation and focus for some, but anxiety, boredom, or uncertainty for others (Gómez-Ochoa de Alda et al., 2025). Such variations reflect the emotional engagement dimension of Engagement Theory and highlight how unmet needs for competence or autonomy in Self-Determination Theory can lead to disengagement.

Several students described feelings of unease when idle time lacked structure. A BTLEd student in ICT admitted, "*Sometimes I just feel blank… I feel like I'm wasting time, but I don't know how to be productive*" [Student 2]. This sense of uncertainty suggests that without clear guidance or self-directed strategies, idle periods may erode focus rather than prepare students for learning.

Others linked their emotional state to the nature of the upcoming task. One BTVTEd student in Food and Service Management reflected, "*I get excited, but also nervous… The waiting makes it worse sometimes*" [Student 1]. This duality, anticipation mixed with anxiety, indicates that idle time can amplify pre-existing emotional responses to challenging tasks.

Instructors also observed these tensions. One teacher noted, "*You can see it in their faces… some are eager, but others look restless or distracted*" [Teacher2-USEP]. Such differences in emotional readiness underscore the need for differentiated support during idle time, ensuring that all students, regardless of confidence level, enter the lab activity prepared and focused.

Observation data revealed that in some cases, prolonged idle time led to visible disengagement—students chatting about unrelated topics, using their phones, or passively waiting for instructions [Observation Notes]. Conversely, in settings where the idle period was short or had embedded cues (e.g., visible equipment setup, posted instructions), students appeared more alert and task-focused.

Overall, idle moments function as an emotional hinge point between anticipation and action (Liu et al., 2024). When left unsupported, they can foster restlessness, apprehension, or detachment. However, with intentional structuring, such as short task previews or preparatory prompts, they can channel students' affective energy into readiness, strengthening both motivation and engagement (George-Williams et al., 2022).

Environmental and Institutional Factors Affecting Idle Time

Engagement during pre-laboratory idle time was also shaped by the broader environmental and institutional context. Factors such as rotational scheduling, equipment availability, laboratory space, and consistency of instructional routines influenced whether students could engage productively (Rivera & Baptista, 2024). These findings align with the behavioral engagement dimension of Engagement Theory, which recognizes the role of contextual affordances, and with Self-Determination Theory, which emphasizes the need for supportive conditions to fulfill autonomy, competence, and relatedness.

One of the most frequently cited issues was equipment scarcity. A BTLEd student in ICT explained, "*Sometimes we're grouped because there's not enough space or tools… the rest of us just wait*" [Student 3]. When resources were limited, idle time often became passive waiting rather than active preparation.

Rotational scheduling also impacted engagement. Instructors noted that while it ensured all students had access to materials, it unintentionally created long waiting periods for some groups. One teacher remarked, "*If Group 1 takes longer, Group 2 just sits there… and sometimes, they lose focus*" [Teacher -USEP]. Such delays could weaken the momentum and readiness built in earlier phases of the session.

Consistency in pre-lab expectations varied across instructors, contributing to uncertainty about how idle time should be used. A BTVTEd student commented, "*Some teachers allow us to prep ahead… while others tell us to wait. So sometimes we're not sure*" [Student 4]. Without clear or consistent guidance, students often defaulted to non-academic activities.

Physical layout and environmental cues also played a role. Observation notes showed that labs with clearly designated work areas and visible preparation zones encouraged students to engage in setup activities, while cramped or cluttered spaces limited movement and interaction [Observation Notes].

Institutional policies and scheduling constraints further shaped engagement opportunities. For example, fixed laboratory access times sometimes restricted students from entering early to prepare, even when they were willing to do so.

Overall, these environmental and institutional factors reveal that student engagement during idle time is not solely a product of individual motivation or instructor strategies (Lu et al., 2022). It is also contingent on the physical, procedural, and policy conditions that enable or constrain preparatory action (Hanaysha et al., 2023). Addressing these systemic factors could expand the capacity of idle time to serve as an intentional and productive phase in TVET laboratory learning.

The four themes collectively illustrate that engagement during pre-laboratory idle time is shaped by a complex interplay of individual initiative, interpersonal dynamics, emotional states, and environmental conditions. Table 1 summarizes these themes alongside their core codes and representative participant quotes, demonstrating how the analysis moved from raw qualitative data to higher-order thematic interpretations. This synthesis highlights both the diversity of engagement strategies and the contextual factors that either enable or constrain them. By distilling the findings in this way, the table provides a clear reference point for understanding the nuanced patterns of behavior and perception described in this study, setting the stage for a deeper interpretation of their significance in the Discussion section.

Table 1. Summary of Themes, Codes, and Illustrative Quotes on Pre-Laboratory Idle Time Engagement

Theme	Codes	Quotes
1. Engagement Through Proactive Behavior and Routine	Tool/material preparation; Peer assistance; Mental rehearsal; Habitual setup	"I try to use my waiting time wisely… I often look up techniques on YouTube so that when the teacher explains, I already have an idea." (Student 1) "I imagine the steps in my head, like a dry run… so when it's time to do it, I won't panic." (Student 2)
2. Instructor Presence as a Catalyst for Engagement	Visible supervision; Non-verbal cues; Motivational anchor; Shared accountability	"When our teacher is around, we become more serious… we feel like we have to be ready." (Student 1) "Sometimes I don't instruct right away, but I'm there observing… it encourages them to move without me having to tell them everything." (Teacher 2)
3. Emotional and Motivational Tensions During Idle Moments	Anticipation; Nervousness; Boredom; Uncertainty; Emotional fluctuation	"Sometimes I just feel blank… I feel like I'm wasting time, but I don't know how to be productive." (Student 2) "I get excited, but also nervous… The waiting makes it worse sometimes." (Student 1)

Theme	Codes	Quotes
4. Environmental and Institutional Factors Affecting Idle Time	Equipment scarcity; Rotational scheduling; Space constraints; Policy limitations	"Sometimes we're grouped because there's not enough space or tools… the rest of us just wait." (Student 3) "If Group 1 takes longer, Group 2 just sits there… and sometimes, they lose focus." (Teacher 1)

DISCUSSION

This study explored how higher-education TVET students and instructors experience engagement during pre-laboratory idle time, an often neglected yet meaningful segment of the learning process. The analysis shows that idle moments are not simply pauses between activities; rather, they represent active spaces where preparation, reflection, and emotional adjustment can occur when supported by conducive instructional and environmental factors.

Proactive Behaviors and Self-Regulation

The first theme, Engagement Through Proactive Behavior and Routine, reveals that many students use idle periods productively by organizing tools, mentally rehearsing procedures, or assisting peers. These self-initiated actions reflect the behavioral and cognitive dimensions of Engagement Theory (Fredricks, 2022) and align with the autonomy and competence needs described in Self-Determination Theory (Ryan & Deci, 2000). The willingness to prepare without direct supervision suggests that autonomy fosters greater readiness for laboratory work. This finding resonates with research on self-regulated learning in vocational education, which links student initiative to higher performance and confidence (Li & Lajoie, 2022). Thus, idle time can function as a practical arena for exercising self-management skills essential to professional practice.

Instructor Presence as a Relational Anchor

The second theme, Instructor Presence as a Catalyst for Engagement, highlights the pivotal role of relational and environmental cues in shaping student motivation. The physical or perceptual presence of instructors—whether through brief guidance, observation, or non-verbal acknowledgment—acted as a motivational anchor that prompted students to prepare. This outcome reinforces Engagement Theory's assertion that social interaction sustains participation and affirms SDT's view of relatedness as central to intrinsic motivation. Instructor presence served as a subtle signal of expectation and accountability, echoing evidence that teacher immediacy enhances learner attention and effort (Cents-Boonstra et al., 2021). In this sense, presence itself becomes a pedagogical tool that sustains engagement even before formal instruction begins.

Affective Dynamics of Idle Time

The third theme, Emotional and Motivational Tensions During Idle Moments, uncovers the range of feelings students experience while waiting for laboratory activities to start. Participants described emotions spanning excitement, anticipation, nervousness, and at times, boredom or anxiety (Kowitlawakul et al., 2022). Such affective fluctuations, consistent with the emotional component of Engagement Theory, directly influence readiness to perform. When idle time lacked structure or purpose, students often reported uncertainty and decreased drive, reflecting SDT's claim that unfulfilled needs for competence and autonomy can undermine engagement (Liu et al., 2024). These insights underline the value of instructional strategies that channel emotional energy toward purposeful preparation rather than allowing distraction to set in.

Contextual Constraints and Opportunities

The fourth theme, Environmental and Institutional Factors Affecting Idle Time, situates engagement within broader contextual realities. Limited equipment, rotational schedules, and varying pre-laboratory expectations all determined how effectively idle periods were used (Hanaysha et al., 2023). Physical space limitations or inconsistent access procedures occasionally curtailed opportunities for preparation. Such findings affirm that engagement is not solely dependent on individual motivation or teacher behavior; it is equally shaped by systemic and environmental conditions. This echoes prior research emphasizing the ecological nature of engagement in vocational education, where institutional infrastructure and management policies significantly influence learner participation.

Integrating Theory and Practice

Overall, the findings suggest that engagement during pre-laboratory idle time can be best interpreted through the combined perspectives of Engagement Theory and Self-Determination Theory. Engagement Theory explains the observable behaviors, cognitive processes, and emotional patterns evident in idle periods, while SDT provides a motivational lens for understanding why those actions are sustained. The integration of both perspectives positions idle time as a pedagogically significant phase in which psychological needs, instructional design, and environmental support converge to sustain learning readiness.

Implications for TVET Pedagogy

For educators in TVET settings, the results emphasize the importance of purposefully organizing idle time as part of lesson planning. Simple interventions—such as pre-lab task lists, visible setup activities, or brief peer-discussion prompts—can transform waiting periods into structured preparation. Instructor presence should be intentionally leveraged as a subtle cue to maintain engagement, and institutional leaders should address structural barriers like equipment shortages or inconsistent policies. Reframing idle time as a legitimate component of the learning sequence moves it from being perceived as dead time to being recognized as a formative space that cultivates readiness, motivation, and skill development within laboratory-based education.

CONCLUSION AND RECOMMENDATION

This study examined how students and instructors in higher education TVET programs engage during pre-laboratory idle time, a phase often dismissed as non-instructional yet proven here to hold significant pedagogical value. The findings reveal that this period functions not merely as downtime but as a critical opportunity for preparation, collaboration, and emotional regulation. Grounded in Engagement Theory and Self-Determination Theory and supported by cognitive interview validation, the analysis yielded four interconnected themes: proactive behavior and self-regulation, instructor presence as a catalyst for engagement, emotional and motivational dynamics, and environmental and institutional influences on idle time.

When supported by clear expectations, visible instructor presence, and well-managed environments, idle time transforms into a productive stage that enhances readiness, concentration, and self-directed learning. In contrast, when such supports are absent, it can easily devolve into passivity or distraction. These findings highlight the pedagogical potential of idle periods and encourage educators to recognize them as intentional parts of the learning process rather than as wasted instructional gaps.

From a practical perspective, TVET instructors can strengthen student engagement during idle moments by (1) establishing consistent pre-laboratory routines, (2) maintaining an encouraging but unobtrusive presence that signals readiness expectations, (3) integrating brief preparatory tasks such as checklists, visual prompts, or peer-based readiness activities, and (4) addressing logistical challenges that limit engagement, including inconsistent equipment access and variable scheduling practices. Beyond the classroom, institutional leaders and program coordinators should embed the management of idle time into curriculum design, laboratory scheduling, and policy frameworks. Recognizing idle time as an integral component of instruction ensures equitable opportunities for preparation and reinforces engagement at both instructional and systemic levels.

ADVANCED RESEARCH

Although this research provided valuable insights into engagement during pre-laboratory idle time, certain limitations must be acknowledged. The qualitative design relied on self-reported narratives that may have been influenced by social desirability bias, as participants could have described their engagement behaviors in more favorable terms. Moreover, despite efforts to remain unobtrusive, the researcher's presence during classroom observations may have subtly influenced natural behaviors, an inherent challenge in field-based qualitative studies. The inquiry was also limited to two state universities in Mindanao, where institutional cultures, laboratory resources, and scheduling structures may differ from those of other regions. These contextual factors limit the transferability of findings to the wider TVET landscape.

Future research could expand this line of inquiry through mixed-methods designs, larger and more diverse participant groups, and comparative analyses across multiple regions. Such extensions would help validate the emergent

constructs identified here and provide a more comprehensive understanding of how engagement evolves during transitional phases of laboratory-based learning.

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