

# Learning Environment Readiness: Sufficiency of Tools, Equipment, and Facilities and Academic Performance among TVL Senior High School Learners

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## Abstract

This study determined the relationship between learning environment readiness and academic performance among Technical–Vocational–Livelihood (TVL) Senior High School learners. Anchored on Constructivist Learning Theory, Experiential Learning Theory, and the School Learning Environment Framework, the study examined learning environment readiness in terms of the sufficiency of tools, equipment, and facilities. It employed a descriptive-correlational research design involving 50 TVL learners from Bintawan National High School in the Division of Nueva Vizcaya during School Year 2025–2026. Data were gathered using a researcher-made survey questionnaire and learners' General Weighted Average (GWA) from official academic records. The data were analyzed using frequency, percentage, mean, standard deviation, and Pearson Product–Moment Correlation. Findings showed that learning environment readiness was generally Sufficient, with an overall mean of 3.03. Tools obtained the highest mean of 3.10, followed by facilities with 3.08, while equipment recorded the lowest mean of 2.92. Learners' academic performance was generally Satisfactory, with a mean GWA of 84.70. A significant moderate positive relationship was found between learning environment readiness and academic performance, with a correlation coefficient of 0.581 and a p-value of 0.002. The study concludes that learners with access to more sufficient tools, equipment, and facilities tend to achieve better academic performance. It recommends improving the provision, maintenance, and upgrading of TVL instructional resources and facilities. The study supports SDG 4, SDG 8, SDG 9, and SDG 10 by promoting quality education, skills development, educational infrastructure, and equitable access to learning resources. Its sustainability impact lies in strengthening educational, socio-economic, technological, infrastructure, and institutional support for TVL education.

**Keywords:** Academic Performance, Educational Sustainability, Learning Environment Readiness, Sufficiency of Resources, Technical–Vocational–Livelihood

## 1. Introduction

This study examines learning environment readiness in the Technical–Vocational–Livelihood (TVL) track, particularly the sufficiency of tools, equipment, and facilities, and its relationship with the academic performance of Senior High School learners. Since TVL education is competency-based and performance-oriented, adequate instructional resources are essential in helping learners apply theoretical concepts, complete academic tasks, and develop practical competencies.

The K to 12 Basic Education Program in the Philippines aims to prepare learners for employment, entrepreneurship, and higher education. Within this program, the TVL track develops practical and academic competencies aligned with industry standards. Its effectiveness depends largely on the readiness of the learning environment, especially the availability of functional tools, appropriate equipment, and well-maintained facilities. In TVL education, learners are expected to demonstrate understanding through hands-on tasks, projects, and practical assessments; therefore, insufficient resources may limit their exposure to actual applications and negatively affect academic achievement.

The literature consistently emphasizes that the physical learning environment affects student achievement, engagement, and performance. Earthman (2002) established that the condition and adequacy of school facilities significantly influence student achievement and engagement. In the Philippine context, Mañanita (2021) found that the adequacy and utilization of instructional tools and equipment in Technical–Vocational and Livelihood Education were significantly related to students' academic performance. Similarly, Baltazar et al. (2025) reported that inadequate tools and equipment limited students' opportunities to practice essential skills, which affected academic outputs and overall performance. Recent literature also supports the importance of learning environment readiness in vocational education. Cleveland and Fisher (2014) explained that learning spaces equipped with appropriate tools and instructional resources foster active learning, deeper understanding, and higher academic performance. Tool sufficiency enables learners to participate actively, complete academic requirements, and engage in independent practice, while insufficiency leads to shared usage, limited practice time, and reduced mastery (Ytac, 2025). Equipment sufficiency is also important because access to functional and updated

equipment helps learners connect conceptual knowledge with real-world application, improving academic outcomes (Morris (2020). Facilities such as classrooms, laboratories, and workshops provide safe and organized spaces that support focus, behavior, academic engagement, and structured instruction (Essien, 2024). Equity is likewise a key concern, as Adejumbi and Aligwo (2025) argued that disparities in tools, equipment, and facilities contribute to unequal academic outcomes among learners. Empirical studies further show that instructional resource sufficiency supports academic performance. Alarcon et al. (2024) found that learners who perceived higher sufficiency in instructional resources demonstrated better academic engagement and performance. Vallesteros (2022) reported a significant relationship between material system readiness, including tools and facilities, and learner outcomes among Grade 12 TVL students. Cano (2022) found that learners with access to adequate facilities and instructional resources achieved significantly higher academic performance than those in resource-constrained settings. Baltazar et al. (2025) confirmed that insufficient materials affected both written assessments and performance tasks. Saro et al. (2022) also found that limited tools, equipment, and facilities made it difficult for TVL learners to understand lessons and perform academic tasks effectively.

Locally, the study focuses on TVL Senior High School learners in Bintawan National High School within the Division of Nueva Vizcaya during School Year 2025–2026. Nationally, the study is situated within the implementation of the K to 12 Basic Education Program and the TVL track, where resource sufficiency is essential for competency-based instruction. Globally, the study aligns with broader educational concerns on technical-vocational education, learning space quality, instructional resource readiness, and equitable access to learning environments that support academic and practical competencies.

The study is anchored on Constructivist Learning Theory, which views learners as active constructors of knowledge through interaction with their learning environment. In TVL education, learners construct understanding more effectively when they interact with sufficient tools, equipment, and facilities that allow them to explore concepts, perform tasks, and apply theories in practical settings. The study is also supported by Experiential Learning Theory, which emphasizes learning through direct experience, reflection, and application. In this context, sufficient resources allow learners to connect classroom concepts to actual practice and demonstrate understanding through performance-based activities. The School Learning Environment Framework further supports the study by emphasizing that academic performance is influenced by the quality and readiness of the physical learning environment. Conceptually, the study follows an Independent Variable–Dependent Variable model, where learning environment readiness in terms of tools, equipment, and facilities is treated as the independent variable, while learners’ academic performance serves as the dependent variable.

Although studies have examined instructional resources, many focus on technical skills, practicum performance, curriculum implementation, employability, or learning experiences rather than academic performance as the primary outcome. Few studies examine learning environment readiness as an integrated construct that includes tools, equipment, and facilities simultaneously. There is also limited localized research on the relationship between learning environment readiness and academic performance among TVL Senior High School learners in public secondary schools, particularly in contexts where resource limitations are frequently observed. Addressing this gap can help guide educational planning, resource allocation, instructional delivery, and TVL program improvement.

This study aligns most directly with SDG 4 – Quality Education because it focuses on the adequacy of learning resources needed to improve academic performance and meaningful learning among TVL learners. It also relates to SDG 8 – Decent Work and Economic Growth because the TVL track prepares learners for employment, entrepreneurship, and skills-based pathways. The study connects with SDG 9 – Industry, Innovation and Infrastructure because tools, equipment, laboratories, workshops, and instructional facilities form part of the educational infrastructure necessary for technical-vocational learning. It also supports SDG 10 – Reduced Inequalities because resource disparities may create unequal academic outcomes among learners, as emphasized by Adejumbi and Aligwo (2025).

The study contributes to educational sustainability by emphasizing the need for adequate and functional learning environments that can continuously support academic achievement in TVL education. It supports socio-economic sustainability by strengthening TVL learning conditions that prepare learners for employment, entrepreneurship, and productive participation in society. It also contributes to technological and infrastructure sustainability by highlighting the role of tools, equipment, and facilities in maintaining relevant and effective technical-vocational instruction. Finally, it advances institutional and governance sustainability by providing evidence that may guide DepEd, school administrators, teachers, and LGUs in planning resource allocation, facility improvement, and instructional support for public schools offering the TVL track.

## 2. Material and methods

### 2.1 Research Design

The study employed a descriptive-correlational research design. The descriptive component was used to determine the level of learning environment readiness in terms of the sufficiency of tools, equipment, and facilities, as well as the level of academic performance of TVL Senior High School learners. The correlational component was used to determine whether a significant relationship existed between learning environment readiness and learners' academic performance without manipulating any variable.

### 2.2 Locale of the Study

The study was conducted in a selected public secondary school offering the TVL track in the Division of Nueva Vizcaya. The locale was chosen because its TVL learners were directly exposed to instructional tools, equipment, and facilities needed for technical-vocational education. Limiting the study to one school allowed a focused examination of the actual learning environment experienced by the respondents during School Year 2025–2026.

### 2.3 Respondents of the Study

The respondents were Technical–Vocational–Livelihood Senior High School learners enrolled in the selected school in the Division of Nueva Vizcaya during School Year 2025–2026. The study involved 50 TVL learners whose perceptions of learning environment readiness and academic performance were used as the main sources of data.

### 2.4 Sample and Sampling Procedure

Simple random sampling was used to select the respondents. This procedure gave every TVL learner an equal chance of being included in the study, minimized selection bias, and improved the representativeness of the sample.

### 2.5 Research Instrument

The primary data-gathering instrument was a researcher-made survey questionnaire. It gathered information on the respondents' academic performance and their perceptions of the sufficiency of tools, equipment, and facilities in their school. The first part covered academic performance based on the learners' General Weighted Average (GWA) from academic records, while the second part measured learning environment readiness using a four-point Likert scale. The questionnaire was written in clear and simple language and was validated before administration to ensure content relevance and clarity.

### 2.6 Data Gathering Procedure

The researcher first secured official permission from the Schools Division Superintendent of Nueva Vizcaya. After approval, coordination was made with the school head to obtain consent and schedule the survey administration without disrupting regular classes. Before answering the questionnaire, the respondents were oriented on the purpose, scope, and significance of the study and were given instructions on how to complete the instrument. The survey was personally administered to the randomly selected TVL learners, and sufficient time was given for completion. The researcher was present during administration to answer clarifications and retrieve the completed questionnaires. Academic performance data, specifically the respondents' GWA, were obtained from official school records with proper authorization.

### 2.7 Data Analysis Techniques

The completed questionnaires were checked, encoded, and analyzed using descriptive and correlational statistics. Frequency counts, percentages, means, and standard deviations were used to summarize learning environment readiness and academic performance. The four-point Likert scale responses were interpreted from Not Sufficient to Highly Sufficient. Pearson Product–Moment Correlation was used to determine the significant relationship between the sufficiency of tools, equipment, and facilities and the academic performance of TVL Senior High School learners.

### 2.8 Ethical Considerations

The study observed voluntary participation, informed consent, confidentiality, and anonymity. All collected data were treated with utmost confidentiality and reported in aggregate form to protect the identity of the respondents.

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## 3. Results and Discussion

### 3.1 Learning Environment Readiness and Academic Performance

#### 3.1.1 Sufficiency of Tools, Equipment, and Facilities

The level of learning environment readiness among TVL Senior High School learners was generally Sufficient, with an overall mean of 3.03. Among the three dimensions, tools obtained the highest mean of 3.10, followed by facilities with 3.08, while equipment recorded the lowest mean of 2.92. For tools, the learners rated the availability, functionality, safety, usefulness, and appropriateness of hand tools as sufficient, although the use of tools without excessive waiting or sharing

received a comparatively lower mean of 2.86. For equipment, all indicators were also rated sufficient, but the availability of machines and equipment obtained the lowest mean of 2.78. For facilities, the learning spaces were rated sufficient, with the highest rating given to safety, cleanliness, and organization at 3.21, while the appropriateness of facility size for the number of learners received a lower mean of 2.93. These results indicate that the school has already established a generally adequate learning environment that can support TVL instruction. The sufficient rating for tools suggests that learners have access to basic hand tools needed for their practical activities, which may help them participate in skills-based tasks and complete learning requirements. However, the lower rating for tool accessibility without excessive waiting or sharing implies that although tools are available, they may not always be enough for simultaneous use by all learners. In a TVL setting, this is an important concern because practical learning requires repeated hands-on exposure. When learners need to wait for their turn or share limited tools, the time intended for practice may be reduced, and this may affect their mastery of competencies.

The lower mean for equipment also deserves attention because machines and technical equipment are central to the performance-based nature of TVL education. While the equipment dimension was still interpreted as sufficient, it received the lowest mean among the three dimensions, which suggests that this area may be the most vulnerable aspect of the learning environment. Limited equipment availability may restrict learners' direct experience with actual machines or devices used in technical-vocational tasks. This may lead to dependence on observation rather than actual performance, which is less ideal in competency-based learning. Thus, improving equipment availability, functionality, and access may strengthen learners' opportunity to apply theoretical knowledge in actual practice. The facilities dimension also received a sufficient rating, particularly in terms of safety, cleanliness, and organization. This suggests that the learning spaces are generally conducive to instruction and may help learners feel secure and focused while performing academic and practical tasks. However, the lower mean for the appropriateness of facility size indicates that space may still be a concern, especially when the number of learners increases or when activities require movement, equipment setup, and group-based performance tasks. In TVL education, facilities are not merely physical spaces; they function as learning laboratories where students demonstrate applied competencies. Therefore, adequate space, proper layout, safety, and cleanliness are important in supporting both instructional efficiency and learner performance. Overall, the findings suggest that the school provides basic support for TVL instruction, but the lower ratings in equipment availability, tool accessibility, and facility size indicate areas for improvement. Since TVL learning depends heavily on practical demonstration, repeated practice, and performance assessment, resource sufficiency directly affects the quality of learning experiences. Strengthening the quantity, quality, maintenance, and accessibility of tools, equipment, and facilities may help learners engage more actively, practice more effectively, and improve their academic outcomes.

### **3.1.2 Academic Performance of TVL Senior High School Learners**

The learners generally demonstrated a Satisfactory level of academic performance, with a mean GWA of 84.70 and a standard deviation of 4.62. Among the 50 respondents, 20 learners or 40.00% obtained grades within the 85 to 89 range, interpreted as Very Satisfactory. This was followed by 15 learners or 30.00% who obtained grades from 80 to 84, interpreted as Satisfactory. Meanwhile, 10 learners or 20.00% were in the 75 to 79 range, interpreted as Fairly Satisfactory, while only 5 learners or 10.00% reached the 90 and above range, interpreted as Outstanding. These results show that most TVL learners were able to meet the expected academic standards, as the majority of respondents were classified under the satisfactory and very satisfactory levels. The mean GWA of 84.70 indicates that learners generally performed acceptably in their academic requirements. This suggests that despite possible limitations in tools, equipment, and facilities, the learners were still able to comply with classroom tasks, assessments, and performance requirements. However, the limited number of learners who reached the outstanding level indicates that there remains room for improvement in maximizing learners' academic potential. The distribution of grades also shows variation in learners' academic achievement. The presence of learners in the fairly satisfactory category suggests that some students may need additional academic support, instructional guidance, or better access to learning resources. Since TVL subjects require both theoretical understanding and practical application, differences in achievement may be influenced by how effectively learners are able to practice skills, use available resources, and receive feedback from teachers. In this context, academic performance should not be viewed only as a result of individual ability, but also as a possible reflection of the learning conditions that support or limit student performance.

The standard deviation of 4.62 suggests moderate variability in the learners' GWA. This means that while many learners performed within the satisfactory to very satisfactory range, their academic outcomes were not entirely uniform. Some learners performed considerably better, while others remained closer to the minimum passing level. This variation may indicate differences in readiness, motivation, prior learning, learning habits, teacher support, and access to instructional resources. For TVL learners, consistent exposure to tools, equipment, and facilities may help reduce performance gaps by giving all students more equal opportunities to practice, apply concepts, and complete performance-based requirements. Overall, the academic performance results suggest that the learners are generally achieving acceptable outcomes, but there is still a need to strengthen the learning environment to help more students move toward very satisfactory and outstanding

performance. Improving access to instructional resources may provide learners with more meaningful learning experiences, which can contribute to better comprehension, stronger practical skills, and improved academic achievement.

### 3.2 Relationship Between Learning Environment Readiness and Academic Performance

The analysis revealed a significant moderate positive relationship between the sufficiency of tools, equipment, and facilities and the academic performance of TVL Senior High School learners. The Pearson correlation coefficient was 0.581, with a p-value of 0.002. Since the p-value was lower than the 0.05 level of significance, the null hypothesis was rejected. This indicates that as the sufficiency of tools, equipment, and facilities increases, learners' academic performance also tends to improve. This finding demonstrates that learning environment readiness is meaningfully associated with academic success among TVL learners. The moderate positive correlation means that the relationship is not weak or accidental; rather, it suggests that learners who perceive their tools, equipment, and facilities as more sufficient are also more likely to obtain higher academic performance. In practical terms, this implies that instructional resources are not merely support materials but important contributors to learning outcomes in technical-vocational education. The result is highly relevant to TVL education because this track requires learners to perform actual tasks, manipulate tools, use equipment, and work within appropriate learning facilities. When these resources are sufficient, learners are given more opportunities to practice, make corrections, receive feedback, and develop confidence in performing required competencies. These experiences may strengthen both academic understanding and practical skill development. Conversely, when resources are limited, learners may experience reduced practice time, limited exposure to actual tools and machines, and difficulty connecting classroom concepts with real-life application.

The finding is supported by Mañanita (2021), who found that the adequacy and utilization of tools and equipment had a significant relationship with students' academic performance in Technical-Vocational and Livelihood Education. This supports the present result by showing that access to instructional resources is closely tied to learners' academic outcomes in TVL contexts. The finding also agrees with Alarcon et al. (2024), who reported that learners with higher perceived sufficiency of instructional resources showed better academic engagement and performance. This means that when learners view their learning environment as adequate, they may become more engaged and better able to participate in academic and performance-based activities. Likewise, Baltazar et al. (2025) found that inadequate materials and equipment adversely affected students' academic outputs and performance, which further confirms that resource insufficiency can limit students' ability to complete tasks and demonstrate competencies effectively. The significant relationship also suggests that improving the learning environment may be a practical intervention for improving academic performance. Since the lowest ratings were found in equipment availability and tool accessibility, these areas may be prioritized in planning and resource allocation. Strengthening these areas may help reduce barriers to hands-on learning and allow learners to participate more fully in technical-vocational instruction. However, because the relationship is moderate rather than perfect, the findings also imply that academic performance may still be influenced by other factors, such as teaching strategies, learner motivation, study habits, and instructional supervision. Nevertheless, the results clearly show that the sufficiency of tools, equipment, and facilities is an important factor associated with better learner performance.

### 3.3 Synthesis of Findings

Overall, the findings show that the TVL learning environment was perceived as Sufficient, the learners' academic performance was generally Satisfactory, and a significant moderate positive relationship existed between learning environment readiness and academic performance. These findings suggest that the school provides a generally functional learning environment for TVL learners, but certain areas still require improvement, particularly equipment availability, tool accessibility, and facility adequacy. The synthesis of the results indicates that learning environment readiness plays an important role in supporting the academic performance of TVL learners. While the learners were generally able to meet academic expectations, the relatively low proportion of outstanding performers suggests that improved instructional resources may help further enhance academic outcomes. In TVL education, learning is strengthened when students are able to repeatedly practice, use appropriate equipment, and perform tasks in safe and adequate facilities. Therefore, the sufficiency of tools, equipment, and facilities should be treated as a key component of instructional quality and academic support. These findings further imply that improving the TVL learning environment is not only a matter of compliance or resource provision but also a way of strengthening learners' opportunity to succeed academically. When tools are accessible, equipment is available and functional, and facilities are safe and appropriate, learners can participate more effectively in practical activities and connect theoretical lessons with actual performance. Thus, sustained attention to resource improvement may contribute to better learning engagement, stronger technical-vocational competencies, and improved academic achievement among TVL Senior High School learners.

## 4. Conclusion & Recommendations

The study concludes that learning environment readiness is significantly related to the academic performance of TVL Senior High School learners. The sufficiency of tools, equipment, and facilities was generally rated as sufficient, while

learners' academic performance was generally satisfactory, with a mean GWA of 84.70. The computed correlation coefficient of 0.581 and p-value of 0.002 indicate a significant moderate positive relationship, showing that learners with access to more sufficient instructional resources and learning facilities tend to achieve better academic performance; therefore, the null hypothesis was rejected.

It is recommended that school administrators and educational stakeholders prioritize the provision, maintenance, and upgrading of instructional tools, equipment, and facilities to support improved academic performance among TVL learners. Teachers should maximize available resources through innovative and resource-efficient instructional strategies and regularly communicate resource needs to school administrators. Future researchers should examine other factors affecting TVL learners' academic performance, such as teaching practices, learner motivation, and parental support, and conduct similar studies with larger samples and different educational settings to validate and expand the findings.

The study was limited to TVL Senior High School learners in Bintawan National High School within the Division of Nueva Vizcaya during School Year 2025–2026. It focused only on learning environment readiness in terms of the sufficiency of tools, equipment, and facilities, while academic performance was based on learners' official academic records. It did not include other possible influences on academic performance, such as teaching strategies, socioeconomic background, parental involvement, motivation, or teacher qualifications; therefore, the findings are applicable only within the defined context and may not be generalized beyond similar settings.

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### **Compliance with ethical standards**

This study was conducted in accordance with institutional ethical standards and relevant school protocols. Permission to conduct the research was secured from the concerned authorities, and the participation of TVL Senior High School learners was voluntary and based on informed consent. The respondents were properly oriented on the purpose of the study, and all information gathered, including academic performance data, was treated with strict confidentiality and used only for research purposes. The researcher ensured that no respondent was harmed, identified, or disadvantaged in the conduct of the study. Proper acknowledgement is given to all individuals and institutions that contributed to the completion of the research. The researcher declares no conflict of interest, and the ownership and responsibility for the content, accuracy, and integrity of the study remain with the researcher.

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