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THE USE OF REAL-WORLD APPLICATION IN TECHNOLOGY AND LIVELIHOOD EDUCATION INSTRUCTION IN RELATION TO STUDENTS' PERFORMANCE

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Abstract

This study used the real-world applications in Technology and Livelihood Education (TLE) instruction at Cluster 4, Division of Las Piñas, Philippines. A quantitative descriptive-correlational study was utilized with sixty-one (61) TLE teachers. The results show that most of the young female respondents specializing in Home Economics and Industrial Arts have moderate exposure to professional development. The integration of real-world applications in TLE is hindered by a combination of institutional, logistical, and pedagogical challenges. The most critical barriers, including time constraints, large class sizes, resource limitations, and insufficient training, point to systemic issues that need to be addressed to enhance the effectiveness of TLE instruction. Additionally, challenges related to curriculum design, administrative support, and student preparedness highlight the need for a more holistic approach that considers not only teachers' competencies but also the broader educational environment. Addressing these challenges may require curriculum adjustments, increased funding, enhanced teacher training, and stronger administrative support to create a more conducive learning environment for real-world applications in TLE.

INTRODUCTION

The use of real-world applications in Technology and Livelihood Education (TLE) instruction has become an essential component of modern education. In an increasingly dynamic global economy, the demand for a skilled, adaptable workforce has intensified, prompting educational systems worldwide to shift towards more practical and applied learning approaches. Integrating real-world applications in technical-vocational subjects like TLE bridges the gap between theoretical knowledge and practical experience, fostering students' critical thinking, problem-solving, and technical competencies necessary for success in various industries.

Amiri (2025) explores how real-world applications can significantly improve students' ability to retain knowledge and develop critical life skills. Amiri (2025) discusses how the application of theoretical knowledge in practical, real-world contexts helps students understand the utility of their learning. This is particularly important in instruction, where

students are expected to acquire hands-on skills that are directly applicable in various industries. The integration of real-world applications leads to better student outcomes, including improved problem-solving abilities and greater motivation to learn. However, Arroz (2024) believed that a lack of experience with multimedia might make it difficult for students who need to get better at it to read textbooks, participate in online forums, or even use the internet safely.

To build teachers' capacity for integrating real-world applications, Putra et al. (2024) discuss the need for ongoing teacher training that goes beyond theoretical knowledge and equips educators with practical tools and strategies for applying real-world scenarios in the classroom. Workshops, mentorship programs, and collaborative teaching communities can help teachers improve their ability to integrate real-world applications effectively. Such capacity-building efforts are essential to enhancing the quality of instruction. Cho et al. (2015) emphasize authentic practice, which emphasizes authentic experience and innovative practices of authentic problem solving that affect learning development. Dordas & Accad (2025) on the professional development, needs of TLE teachers, specifically regarding the integration of real-world applications, should focus on developing teacher capacity through workshops, seminars, and training that focus on real-world applications relevant to TLE topics.

Moreover, the findings of Blando (2025), in the gap between classroom instruction and real-world applications, he discussed the growing role of digital tools in classrooms, where educators are integrating simulations, online workshops, and virtual apprenticeships to expose students to practical work environments. He stressed that with the right resources and training, teachers can better equip students for the demands of industries such as agriculture, information technology, and hospitality. Ababa et al. (2021) revealed that gamified lessons resulted in increased motivation and improved student learning outcomes. Teachers who received training in gamification techniques reported greater confidence in implementing these strategies, which positively affected their teaching effectiveness. This study aligns with the findings of other research that suggests real-world applications, such as gamification, enhance not only student motivation but also teacher effectiveness in the classroom

The study by Rathore (2024) about the integration of real-world applications into pre-service teachers' teaching practices found that gamification boosted the participants' confidence in utilizing educational technologies and enhanced their motivation to integrate real-world applications into future classrooms. This underscores the importance of innovative instructional strategies and provides insights into improving teacher training by incorporating real-world technology use.

In the Philippine context, where technical and vocational skills are highly valued in both local and international labor markets, implementing real-world applications in TLE instruction is vital for enhancing student performance and improving workforce readiness. The Philippine education system acknowledges the importance of applied learning through policies such as the K–12 curriculum and DepEd Order No. 42, s. 2017, which emphasizes experiential, hands-on, and competency-based instruction, particularly in TLE subjects.

Locally, in Cluster 4 of the Division of Las Piñas, there is a pressing need to ensure that TLE instruction meaningfully incorporates real-life applications to maximize learning outcomes and prepare students to meet real-world challenges.

In adopting TLE, teachers in Cluster 4, Division of Las Piñas, encounter various difficulties in fully utilizing real-world applications in TLE instruction. From classroom observations and discussions with fellow educators, it has been noted that many teachers

struggle to align practical applications with curriculum requirements due to limited resources, inadequate training, and the absence of strong industry linkages. While TLE subjects such as Home Economics, Information and Communication Technology (ICT), Industrial Arts, and Agri-Fishery Arts require experiential learning, some teachers rely heavily on traditional teaching methods due to a lack of access to updated instructional materials, tools, and facilities. Additionally, the rapid advancements in technology and industry standards present another challenge, as some teachers feel underprepared to effectively integrate new technologies and industry practices into their lessons.

The implementation gap in the use of real-world applications in TLE stems from multiple factors, including inconsistencies in teacher preparedness, variations in school resources, and the absence of structured professional development programs focused on experiential and applied learning. As observed by the researchers, the degree to which teachers implement these applications in TLE classrooms remains unclear, particularly in Cluster 4, Las Piñas Division. This gap in implementation raises concerns about whether students are truly benefiting from TLE instruction as intended by the K–12 curriculum.

This study evaluates the use of real-world applications in TLE instruction within Cluster 4, Division of Las Piñas, focusing on three key areas: skills acquisition, knowledge application, and project completion. It also identified the challenges teachers face in incorporating real-world applications into their teaching practices and proposed a capacity-building program designed to enhance their ability to effectively integrate real-world applications into Teaching and Learning in Education (TLE) instruction.

METHODS

Research Design

This study employed the quantitative-descriptive research method as outlined by Creswell (2002), noting that quantitative research is the process of collecting, analyzing, interpreting, or processing phenomena. The focus was on understanding prevailing conditions and how teachers in Cluster 4, Division of Las Piñas, integrate real-world applications into their teaching practices in Technology and Livelihood Education (TLE). This research method is suitable as it provides a clear and systematic way to gather data and analyze the perceptions of teachers.

Respondents and Locale of the Study

In this study, a census or complete enumeration method was employed to gather comprehensive data on the population of interest. This approach involved collecting information from every teacher within the public junior high schools in Cluster 4, Division of Las Piñas. Utilizing the census, the researcher ensures that the study reflects the entire population of TLE teachers, thereby eliminating sampling bias. The inclusion of all teachers provided a thorough understanding of their perceptions, experiences, and challenges when integrating real-world applications into TLE instruction. This targeted approach strengthens the validity and applicability of the findings, making them valuable for informing capacity-building programs and improving teaching practices within the division.

Research Instrument

A survey questionnaire was employed and carefully structured into three (3) sections to comprehensively gather the necessary information. Part I focuses on the demographic profile of the respondents. Part II determined the common real-world applications used in TLE, focusing on Home Economics, ICT, and Industrial Arts. Part III delved into the level of use of real-world applications towards students' learning in terms of skills acquisition, knowledge application, and project completion. To capture the data effectively, the questionnaire employed a five-point Likert scale, enabling respondents to express their level of agreement or disagreement with various statements systematically and measurably.

Data Gathering Procedure and Analysis

To investigate teachers' use of real-world applications in TLE instruction, the researcher undertook the following steps to gather the necessary data.

First, the researcher sought approval from the Schools Division Superintendent of the Division of Las Piñas to conduct the study, with the request noted by the school principal and cluster head for the administration of the survey questionnaires to the respondents. Second, an orientation session was conducted to inform the respondents about the purpose of the study, the confidentiality of their responses, and the proper procedures for completing the questionnaire. Third, the researcher distributed the validated survey questionnaires to the teacher-respondents from Cluster 4 schools in the Division of Las Piñas. Meanwhile, the researcher also asked for the copies of the grades of their learners in TLE. Fourth, after an appropriate period, the researchers personally retrieved the complete questionnaires to ensure all responses are accounted for. Finally, the collected data were tabulated and validated for accuracy before proceeding with the analysis, interpretation, and formulation of conclusions and recommendations based on the findings. The researchers used the frequency distribution, percentage, weighted mean, and ANOVA to determine the significant relationship between the common real-world applications used and students' academic performance.

RESULTS AND DISCUSSION

This section presents the data gathered from the respondents. The analysis and interpretation of data were made through the tabular presentation.

Table 1. Distribution of the Respondents

Schools	TLE Teachers	Percentage
1. Las Piñas National High School - Almanza (A)	21	34.43%
2. Equitable National High School (B)	11	18.03%
3. Lydia Aguilar National High School (C)	16	26.23%
4. Las Piñas City Technical Vocational High School (D)	13	21.31%
Total	**61**	**100%**

The distribution of responders from various schools is displayed in Table 1. Twenty-one TLE teachers, or 34.43% of the respondents, were employed at Las Piñas National High School-Almanza (A). There were 11 TLE teachers at Equitable National High School (B), making up 18.03% of the total. 16 TLE teachers, or 26.23% of the total, were employed at Lydia Aguilar National High School (C). Thirteen TLE teachers, or 21.31%, were employed at Las Piñas City Technical Vocational High School (D).

Table 2. Distribution of respondents in terms of Age

Age	Frequency	Percentage
1. 21-35	33	54.10%
2. 36-50	26	42.62%
3. 51 and above	2	3.28%
Total	**61**	**100%**

Table 2 shows the distribution of sixty-one (61) total respondents based on their age. Most of the people who answered are in their teens to middle age. The biggest group is people between the ages of 21 and 35, who make up 33 of the 54.10% of the total. The second biggest group is people between the ages of 36 and 50, who make up 26% of the total. The 51 and older age group is the smallest, with only 2 respondents, or 3.28% of the total. The data shows that most of the people who completed the survey are 50 years old or younger.

Table 3. Distribution of respondents in terms of Gender

Sex	Frequency	Percentage
1. Male	17	27.87%
2. Female	44	72.13%
Total	**61**	**100%**

Table 3 shows how the 61 people who answered were grouped by gender. The data shows a big difference, with the majority of respondents being women. In particular, 44 of the respondents were women, which is 72.13% of the total. On the other hand, only 17 of the respondents were men, which is only 27.87% of the total.

Table 4. Distribution of the Respondents in terms of their Length of Teaching Service

Length of Service	Frequency	Percentage
1. 1-10 years	39	63.93%
2. 11-20 years	21	34.43%
3. 21 and above years	1	1.64%
Total	**61**	**100%**

Table 4 shows how the 61 respondents are spread out based on how long they have been teaching. It shows that most of the respondents are teachers who are just starting in their careers. Most of the teachers, 39 out of 63.93%, have been working for 1 to 10 years. The next biggest group is the 11–20 years group, which has 21 people and makes up 34.43% of the total. On the other hand, only 1 person, or 1.64% of the total, has been teaching for 21 years or more. This distribution shows that most of the people who took part in the study have ten years or less of work experience.

Table 5. Distribution of the Respondents in terms of their Specialization in TLE

Specializations	Frequency	Percentage
1. Home Economics	28	45.90%
2. Information and Communication Technology	12	19.67%
3. Industrial Arts	21	34.43%
Total	**61**	**100%**

The 61 people who answered the question are shown in Table 5, along with their area of expertise in Technology and Livelihood Education (TLE). The data shows that the biggest group of specialists is in Home Economics, with 28 respondents, or 45.90% of the total. Industrial Arts is the second most popular specialization, with 21 respondents, or 34.43%. With only 12 respondents, Information and Communication Technology (ICT) is the smallest group of specialists, making up 19.67% of the total. In summary, almost half of the TLE teachers in the study are experts in Home Economics, and the ICT specialization has the fewest teachers.

Table 6. Distribution of the Respondents in terms of the Number of Trainings/Workshops Attended

Number of Trainings/ Workshops Attended	Frequency	Percentage
1. 0-5	7	11.48%
2. 6-10	42	68.85%
3. 11 and above	12	19.67%
Total	**61**	**100%**

Table 6 shows how the 61 respondents are spread out based on how many trainings or workshops they have attended. The data shows that most of the people who answered the survey are somewhat active in professional development. In particular, 42 of the 68.85% of respondents have gone to between 6 and 10 trainings or workshops. The second largest group, with 12 respondents or 19.67%, has attended 11 or more training or workshops. The smallest group, with only 7 people (11.48%), attended 0–5 trainings or workshops. In summary, almost seven out of ten people who answered the survey have taken part in between six and ten professional development activities.

Table 7. Summary of Respondents' Assessment of the Common Real-World Applications Utilized in Teaching TLE

No.	Variables	Weighted Mean	Interpretation	Rank
1	Home Economics	4.15	Frequently Used	2
2	Information and Communication Technology	3.89	Frequently Used	3
3	Industrial Arts	4.46	Frequently Used	1
Overall Weighted Mean		4.17	Frequently Used	
Standard Deviation		0.285		
Variance		0.081		

It is evident in Table 7 that among the variables, Industrial Arts received the highest weighted mean of 4.46, interpreted as "Frequently Used" and ranked first. This indicates that practical, hands-on applications, such as woodworking, electrical repairs, and safety protocols, are emphasized most prominently in Industrial Arts instruction. This finding suggests that teachers are providing extensive opportunities for students to engage in real-world tasks that develop technical and mechanical skills essential for industrial work and craftsmanship.

Home Economics, with a weighted mean of 4.15 and ranked second, is also interpreted as "Frequently Used." This finding implies that real-world applications in Home Economics, such as food preparation, budgeting exercises, nutrition planning, and small business management, are also well-integrated into teaching practices. The relatively high ranking of Home Economics suggests that practical skills essential for household management and entrepreneurial ventures are being effectively developed among learners, although not to the same extent as the technical applications in Industrial Arts.

In contrast, Information and Communication Technology (ICT) ranked third, with a weighted mean of 3.89, though it is still interpreted as "Frequently Used." This slightly lower score may reflect some limitations in integrating advanced real-world applications, such as coding, e-commerce simulations, and troubleshooting, into ICT instruction. This could indicate the need to further enhance ICT practices to keep pace with evolving digital technologies, particularly in preparing students for a tech-driven society.

The overall weighted mean for all three TLE components is 4.17, which falls within the "Frequently Used" range. This suggests that real-world applications are generally well-integrated across TLE instruction, providing students with practical, hands-on learning experiences that bridge classroom concepts with real-life tasks. The standard deviation of 0.285 and variance of 0.081 indicate relatively consistent responses from the respondents, reflecting a general agreement on the frequency of real-world applications utilized in teaching TLE. However, the slight variation among the three components suggests potential areas for strengthening specific applications, particularly in ICT, to achieve a more balanced integration across all TLE strands.

The findings indicate that real-world applications are "frequently used" in TLE instruction, aligning with the literature emphasizing the importance of integrating practical experiences into education. Riera et al. (2023) argue that teacher competence in applying real-world scenarios is crucial for successful implementation, suggesting that the high integration observed in the study may reflect effective teacher training or confidence. In the findings of Navasca et al. (2025), the integration of teachers' educational attainment, training, and instructional proficiency collectively and significantly influences and predicts students' performance in TLE.

Table 8. Result of ANOVA and p-Value on the Common Real-World Applications Used in Teaching TLE in Terms of Age

Variable	F-value	p-value	Alpha Level of Significance	Critical Value	Decision
Home Economics	1.185	0.056	0.05	2.579	Accept Ho
ICT	2.321	0.061	0.05	2.579	Accept Ho
Industrial Arts	1.894	0.055	0.05	2.579	Accept Ho

The analysis of variance (ANOVA), which was used to compare students' academic grades in TLE across the variables of Home Economics, ICT, and Industrial Arts, led to the conclusion that the Null Hypothesis (H_0) should be accepted for all three variables. This suggests that there is no statistically significant difference in students' academic grades in TLE when comparing their performance in Home Economics, ICT, and Industrial Arts.

Hence, the students' grades in school are the same no matter what TLE specialization they are studying (Home Economics, ICT, or Industrial Arts). The small differences in the average grades across these three areas are probably just random chance and aren't big enough to be important or systematic.

The findings indicate that the level of difficulty, the criteria for success, or the grading methods among the various TLE specializations (modules or components) are consistent. Students are doing about the same level of work in all three main TLE fields. The outcomes suggest that immediate, significant curriculum restructuring is unnecessary due to performance disparities, as all three strands seem equally accessible and academically demanding.

Table 9. Relationship Between Common Real-World Applications Used and the Students' Performance

Variable	r-value	p-Value	Alpha Level of Significance	Critical Value	Decision
Home Economics	2.755	0.008	0.05	2.000	Reject Ho
ICT	-0.109	0.914	0.05	2.000	Accept Ho
Industrial Arts	0.635	0.528	0.05	2.000	Accept Ho

The analysis investigating the relationship between the use of common real-world applications and students' academic grades in TLE yielded mixed results. The results showed a statistically significant relationship only in Home Economics. Since the p-value is less than 0.05, the H_0 was rejected, indicating a significant link. Conversely, both ICT and Industrial Arts showed no statistically significant relationship with the use of real-world applications. Since both p-values were much greater than 0.05, the H_0 was accepted, signifying that the use of common real-world applications in these two strands is not significantly correlated with students' academic grades.

The pedagogical benefit of including common real-world applications is not the same throughout the TLE curriculum. The important thing to note about Home Economics is that its specific uses (which often involve very practical, hands-on tasks like cooking or managing a home) are good at helping students learn and remember things that are measured by grades. The non-significant findings in ICT and Industrial Arts indicate a significant disconnection. In these two areas, using common, maybe even generic, real-world examples is not enough to get better grades in school. This implies that the grading criteria in ICT and Industrial Arts may prioritize other factors (such as theoretical knowledge, advanced technical skills, or access to superior equipment), or that the current real-world applications employed are overly simplistic or inadequately integrated to effectuate significant academic improvement. Therefore, efforts to enhance academic outcomes in ICT and Industrial Arts should prioritize the evaluation of the quality, complexity, and direct alignment of practical tasks with assessment objectives, rather than simply increasing their frequency of application. Costley (2022) believed that

integrating real-world applications significantly contributed to student engagement and academic success, and the importance of professional development in enabling teachers to successfully integrate real-world applications like real-world applications into their teaching strategies.

However, Bruxvoort et al. (2025) suggested maintaining the incorporation of real-world problem-solving activities in education to aid in closing the divide between theoretical concepts and their practical use.

Similar results were found by Feridun & Bayraktar (2024), who explored the capabilities of virtual reality (VR) as a developing instructional tool and underscored its ability to deliver immersive, interactive, and captivating learning opportunities across various fields. However, the study also identified significant barriers to effective implementation, such as insufficient training for educators.

Table 10. Challenges Faced by Teachers in Incorporating Real-World Applications into Their TLE Teaching Methods

Identified	Frequency	Rank
1. Time constraints make it difficult to integrate real-world applications into TLE.	61	2.5
2. Lack of resources limits the use of real-world applications in TLE instruction.	61	2.5
3. Limited access to training hinders my ability to implement real-world applications.	61	2.5
4. Students' diverse learning needs pose challenges in real-world application activities.	50	9
5. Industry-related materials are difficult to acquire for TLE lessons.	51	8
6. The curriculum provides insufficient guidance on real-world integration.	55	6
7. Large class sizes make it challenging to conduct real-world tasks in TLE.	61	2.5
8. Limited support from the school administration affects real-world application efforts.	40	10
9. Budget constraints hinder the implementation of real-world applications.	55	6
10. Students' lack of prior knowledge impacts their engagement with real-world tasks.	55	6

The data revealed that TLE teachers face several severe constraints when attempting to integrate real-world applications into their lessons, with four challenges being unanimously identified by all 61 respondents and receiving the highest rank of 2.5 (indicating a tie for the most pressing issue). These top challenges are Time constraints, Lack of resources to limit the use of applications, Limited access to training, and large class sizes.

Following these immediate constraints, other significant challenges were identified, including the curriculum providing insufficient guidance on real-world integration, budget constraints hindering implementation, and students' lack of prior knowledge impacting engagement, all of which were cited by 55 respondents and ranked 6. Slightly fewer respondents (51) found that industry-related materials are difficult to acquire (rank 8). The

least cited challenges were Students' diverse learning needs (50 respondents, rank 9) and Limited support from the school administration (40 respondents, rank 10). In essence, the most critical hindrances are structural and resource-based, affecting every teacher in the sample.

The results concerning challenges and their influence on the efficacy of real-world applications across TLE strands indicate that the variation in student performance is attributable not to teacher age, but to structural and resource limitations that adversely affect specific specializations. All TLE teachers agree that they have serious problems, like not having enough resources, not having enough time, having too many students in their classes, and not being able to get enough training. But these problems are especially bad for ICT and Industrial Arts, which depend on expensive, specialized, and often hard-to-find infrastructure (like computers, up-to-date software, machinery, and materials specific to the industry). Because of this, the apps used in these two areas are probably still too simple or unrelated to advanced skills to have a big effect on grades, which is why there is no significant relationship. In contrast, the applications used in Home Economics are more practical and fit with grading criteria even when resources are limited, because they don't rely as much on specialized, expensive infrastructure (like cooking or sewing). This maintains a statistically significant relationship with student performance. This means that for ICT and Industrial Arts to be taught well, it's not enough to just use apps. Teachers also need to fix infrastructure problems and give clearer, curriculum-aligned guidance (which was said to be lacking) to make sure that the apps are as complicated as the expected academic results.

Barcelona et al. (2023) explore the experiences of TLE educators in public schools and uncovered human, pedagogical, and material obstacles impacting teaching. Educators expressed challenges in implementing teaching methods, maintaining student engagement, and obtaining sufficient instructional materials. Despite these limitations, teachers showed resilience by utilizing resources, increasing instructional efforts, and collaborating with stakeholders while viewing vocational training as a chance for advancement.

Moreover, Popova et al. (2022) revealed that programs connected to career rewards targeting subjects, including lesson implementation and offering initial in-person training, resulted in greater improvements in student learning. They highlighted the need for sustained practice-oriented professional development to improve teaching quality and instructional effectiveness.

CONCLUSION AND FUTURE WORKS

The study shows that the main problems with the TLE curriculum are the structure and resources. One important finding is that students did well in all the TLE specialties, which are Home Economics, ICT, and Industrial Arts. This means that the strands are equally hard academically and have the same rules for grading. Teachers often use examples from the real world.

There was only a statistically significant link between the applications in Home Economics and the students' grades, $p=0.008$. There are problems that everyone agrees on, which include time constraints, resources, class sizes, and the curriculum. These problems have had a bigger impact on the ICT and Industrial Arts strands than on the other strands. This makes it harder to use complicated, specialized, and high-quality apps that could really help learners do better in school.

Based on these findings, further research needs to concentrate on specific treatments to address the identified structural challenges. Instead of just monitoring how often apps are

used, it is better to create and test a tool that can measure the quality, complexity, and authenticity of real-world applications, especially in the ICT and Industrial Arts strand. Moreover, action research is essential to measure the academic impact of supplying high-quality resources (such as industry-standard equipment and software) to ICT and Industrial Arts classes, hence validating necessary budgetary expenditures. Research must also address the lack of curricular support by comparing the TLE evaluation criteria to the learning objectives of "common" applications to make sure they are more in line with each other. Lastly, professional development needs to change to deal with the real-world problems of big classes and limited time. It should focus on teaching scalable and high-impact teaching methods, like using digital simulations or complex scenario-based training, that can work even with the current lack of infrastructure.

AI DECLARATION

The author(s) declare that the final content of this manuscript represents the sole intellectual efforts and original contributions of the authors. The authors used ChatGPT for language polishing, idea clarification, and literature search support during the preparation of the manuscript. All AI-generated content was thoroughly reviewed, fact-checked, and substantially revised by the authors to ensure accuracy, originality, and adherence to academic standards.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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