TOWARD IMPROVED ACADEMIC PERFORMANCE IN TLE-COOKERY USING SIMPLIFIED COMIC COMPETENCY-BASED LEARNING MATERIAL

[1]Jems Reymon Linggi-en Delante and [2*]Sarah O Namoco
University of Science and Technology of Southern Philippines
*Corresponding Author e-mail address: sara.namoco@ustp.edu.ph

ABSTRACT. *This study developed and tested the effectiveness of a Simplified Comic Competency-Based Learning Material (SCCBLM) for Grade 7 Technology and Livelihood Education (TLE) Cookery in a Philippine public high school. Grounded in Mayer's Cognitive Theory of Multimedia Learning and developed through the ADDIE model, the material was designed to address learners' low academic performance, difficulty with text-heavy modules, and preference for visual learning. A quasi-experimental pre-test–post-test control group design was employed. Two intact Grade 7 sections were selected from five sections and randomly assigned as control and experimental groups. The study used a researcher-made 40-item achievement test validated through a Table of Specifications and expert review, with acceptable reliability across the three competency areas. The intervention was implemented for six weeks, during which the experimental group used the SCCBLM while the control group received conventional instruction. Results showed significant improvement in both groups; the experimental group achieved a significantly higher post-test mean than the control group. These findings indicate that the SCCBLM was more effective than conventional instructional material in improving students' academic performance in TLE Cookery. The study concludes that comic-based, competency-oriented materials can serve as an effective and learner-responsive innovation for performance-based subjects in junior high school.*

Keywords: Cookery; Junior High School, Philippine Public High School, Quasi Experimental, Technology and Livelihood Education

INTRODUCTION

Technology and Livelihood Education (TLE) remains a significant component of the Philippine basic education curriculum because it is designed to develop learners' practical knowledge, work values, creativity, and life skills through hands-on and performance-based learning experiences. As designed by the Department of Education's (DepEd) K to 12 Basic Education Curriculum [1], in the junior high school curriculum, TLE introduces learners to broad areas such as Home Economics, Agri-Fishery Arts, Industrial Arts, and Information and Communication Technology, thereby laying the foundation for future specialization and lifelong employability. More specifically, Cookery under Home Economics is structured not only to develop conceptual understanding but also to cultivate procedural knowledge, psychomotor competence, and workplace-oriented attitudes aligned with competency standards. This curricular orientation implies that learning resources in TLE Cookery should not merely transmit information but should also support guided practice, visualization, and skill acquisition in ways that are developmentally appropriate and instructionally meaningful

The shift in educational delivery during and after the COVID-19 pandemic, however, exposed serious limitations in how such competencies were taught and learned. During the modular distance learning period, learners depended largely on self-learning modules with limited teacher explanation, demonstration, and real-time feedback [2], [3]. Philippine studies on modular instruction consistently reported that both teachers and learners experienced difficulties related to unclear instructions, heavy learning tasks, weak monitoring, limited interaction, and the demanding nature of independent learning [4], [5]. Teachers likewise faced substantial burdens in preparing, revising, distributing, and assessing modules under constrained conditions [6]. While modular delivery helped sustain continuity of schooling, these limitations were especially problematic in practical subjects such as TLE Cookery, where students benefit from seeing procedures demonstrated and from receiving immediate clarification on processes and outputs [5].

These instructional difficulties become more pressing when considered alongside learner performance. In Dangcagan National High School in the province of Bukidnon, Philippines, the Curriculum Management Support System data showed that a large proportion of Grade 7 learners in TLE Cookery remained only at the fairly satisfactory level, with 60% in the first quarter and 56.61% in the second quarter falling within this band (Figure 1).

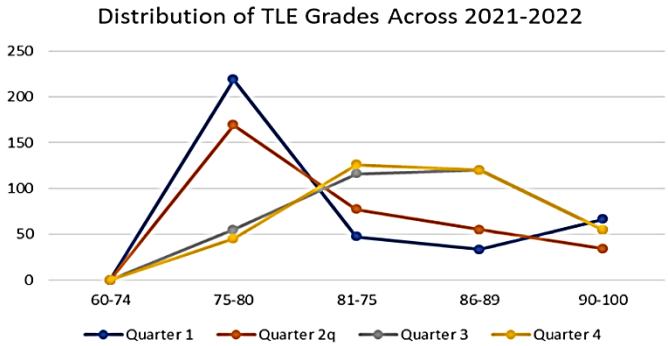

Figure 1. Comparison of Academic Performance of Students in TLE Cookery

Although these school-based figures are context-specific, they suggest that many learners were not yet attaining stronger mastery of cookery competencies. In a subject where performance depends on understanding sequences, procedures, safety standards, and product expectations, such results may reflect persistent issues in comprehension, motivation, and competency development. This concern is also consistent with broader curriculum reform efforts in EPP/TLE, where DepEd's MATATAG documents explicitly note the need to address gaps, issues, and concerns in order to improve learner engagement, experiences, and outcomes.

One plausible explanation for this pattern is the mismatch between conventional instructional materials and the learning preferences of many present-day learners. Students in secondary schools today are commonly identified with Generation Z, a cohort often described in contemporary literature as being more responsive to digital, visual, interactive, and multimodal forms of learning. Empirical work has shown that many Gen Z learners demonstrate a strong preference for multimodal learning environments rather than single-mode text-based instruction, [2-8]. This tendency has important implications for TLE Cookery, where learners must recognize tools, ingredients, steps, demonstrations, and expected outputs in concrete and visual ways [1]. When instructional materials rely heavily on dense textual explanations without adequate visual scaffolds, students may find it more difficult to understand and internalize procedural content [9, 10]. Thus, for practical and performance-based learning areas, visual support is not merely an enhancement but may function as a necessary instructional bridge toward comprehension and skill mastery.

In this regard, a simplified comic competency-based learning material (SCCLLM) offer a promising pedagogical response. Comics integrate concise text, sequential images, dialogue, symbols, and visual cues into a coherent narrative structure that can simplify complex information and make learning more engaging [11]. Recent literature suggests that comics and other multimodal visual texts can improve comprehension, sustain learner attention, and support participation, particularly when learners are required to process information through both verbal and visual channels[12, 13]. Recent studies have also shown that SCCLLM can promote stronger engagement and better interaction with academic content [14], while Philippine-based studies similarly report higher comprehension and engagement among learners exposed to comic-strip materials[15, 16]. For a subject such as TLE Cookery, where students must follow ordered procedures and visualize actual tasks, the comic format may be especially useful because it presents competencies and activities in a clearer, more concrete, and more learner-friendly way than conventional text-heavy modules.

Given these conditions, the development of a SCCLLM for TLE Cookery is both timely and pedagogically justified. Such an intervention directly addresses three interconnected concerns: the modest academic performance of learners in Cookery, the limitations of conventional modular materials for teaching skill-based content, and the preference of many present-day learners for multimodal and visually supported instruction. By simplifying lesson content and presenting competencies through a comic-based format, the material may provide clearer scaffolds for understanding, improve learner motivation, and better support mastery of cookery knowledge and skills. Hence, this study was undertaken to develop and use a SCCLLM as a learning material for Grade 7 TLE Cookery as an innovation intended to enhance the quality, accessibility, and learner-responsiveness of competency-based instruction in secondary education. Thus, this study seeks to answer the research question: Is there a significant difference in the academic performance of Grade 7 students in TLE Cookery, as measured by their pre-test and post-test scores, between the control group exposed to conventional instructional material and the experimental group exposed to the simplified comic competency-based teaching material?

METHODOLOGY

This study employed a quasi-experimental pre-test–post-test control group design to determine the effectiveness of the SCCLLM in Grade 7 TLE Cookery. This design is appropriate when an intervention is introduced in naturally existing classes where full individual randomization is not feasible [17].

The respondents were drawn from five Grade 7 sections, from which two intact classes were selected. One class was randomly assigned as the control group (n=30), while the other was assigned as the experimental group (n=31). The use of intact classes was necessary due to school-based classroom structures, while random assignment of groups helped reduce selection bias.

The study used a 40-item teacher-made summative test administered as both the pre-test and post-test. The test was based on the targeted Grade 7 TLE Cookery competencies. To establish content validity, a Table of Specifications (TOS) was prepared and evaluated by the school's TLE coordinator and two TLE teachers. For reliability, the instrument was pilot-tested among Grade 8 students who had already taken TLE Cookery, and internal consistency was analyzed using Cronbach's alpha in SPSS. The reliability result is presented in Table 1. It can be gleaned that the summative test used in the study demonstrated reliability across three competencies tested for TLE-Cookery exploratory subject.

Table 1. Reliability Test Result for the Three Competencies of Home Economics

Competencies	Cronbach's Alpha	N of Items	Items Deleted
1. Utilize appropriate kitchen tools, equipment, and paraphernalia	0.707	16	0
2. Maintain appropriate kitchen tools, equipment and paraphernalia	0.721	7	11, 34
3. Carry out measurements and calculations in a required task	0.723	20	15, 13, 14, 17, 48

Development of the Simplified Comic Competency-Based Learning Material (SCCBLM)

The SCCLLM was developed using the ADDIE model [18] and anchored on Mayer's Cognitive Theory of Multimedia Learning [19]. In the analysis phase, the researcher reviewed students' low academic performance in TLE Cookery through CMSS data and conducted interviews with teachers and students, which revealed low motivation and difficulty understanding conventional text-heavy modules. Based on these findings, a SCCLLM was designed and developed to address learners' need for clearer and more visually engaging instruction.

Three comic-based materials were produced, each aligned with specific competencies in TLE Cookery: "Rest for Tools," "The Amazing Cookery Adventure of Harrington," and "Carry Out Measurements and Calculations in a Required Task." These materials covered the use and maintenance of

kitchen tools, equipment, and paraphernalia, as well as measurements and calculations in cookery tasks.

The intervention was implemented over six weeks. The experimental group used the SCCLLM, while the control group was taught using the conventional instructional material. Both groups took the pre-test before the intervention and the post-test at the end of Week 6. Weekly formative assessments were also administered. To minimize teacher-related bias, a trained colleague handled instruction in both groups.

Data were analyzed using paired-samples t-test to determine within-group differences between pre-test and post-test scores, and independent-samples t-test to determine differences between the control and experimental groups. Prior to inferential analysis, the assumptions of normality, independence, and homogeneity of variance were checked. All tests were conducted at the .05 level of significance [20].

Ethical requirements were observed throughout the study [21]. Permission was secured from the school head and concerned teachers. Since the participants were minors, parental consent and student assent were obtained. Participation was voluntary, and confidentiality and anonymity were maintained. Both groups continued to receive legitimate instruction aligned with the curriculum to ensure fairness and avoid educational disadvantage.

RESULTS AND DISCUSSION

Comparison of Pre-test and Post-test Scores for Control and Experimental Groups

The paired-samples t-test results showed a statistically significant increase in scores from pre-test to post-test in both groups. For the control group, the mean score increased from *M = 17.43, SD = 4.20* in the pre-test to *M = 30.17, SD = 3.36* in the post-test, and this difference was significant, *t(29) = -20.62, p < .001, 95% CI [-14.00, -11.47]*. For the experimental group, the mean score increased from *M = 19.61, SD = 4.29* in the pre-test to *M = 38.29, SD = 3.14* in the post-test, with a statistically significant difference, *t(30) = -20.13, p < .001, 95% CI [-20.57, -16.78]*. These results indicate that both groups obtained significantly higher post-test scores than pre-test scores.

Table 2. Descriptive Analysis for Control and Experimental Groups

		Mea	N	SD	Std. Error
Control Group *(n=30)*	Pre-Test	17.4	30	4.20	0.767
	Post-Test	30.1	30	3.36	0.614
Experimental Group *(n=31)*	Pre-Test	19.6	31	4.29	0.770
	Post-Test	38.2	31	3.14	0.565

Table 3. Paired Samples t-Test Analysis Results

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	SD	Std. Error Mean	95% CI Lower	95% CI Upper			
Pair 1	Pre-Test – Post-Test	-12.73	3.38	0.618	-14.00	-11.47	-20.62	29	0.000
Pair 1	Pre-Test – Post-Test	-18.68	5.17	0.928	-20.57	-16.78	-20.13	30	0.000

Comparison of Post-test Scores Between the Control and the Experimental Groups

An independent-samples t-test was conducted to compare the post-test scores of the control and experimental groups. The results showed that the experimental group *(n = 31, M = 38.28, SD = 3.09)* obtained a higher mean post-test score than the control group *(n = 30, M = 30.17, SD = 3.36)*. Levene's test for equality of variances was not significant, *F(1, 60) = 0.036, p = .850*, indicating that the assumption of homogeneity of variance was met. Using the equal variances assumed row, the analysis revealed a statistically significant difference in post-test scores between the two groups, *t(60) = -9.90, p < .001,* with a mean difference of *-8.12, 95% CI [-9.76, -6.47]*.

Table 4. Group Statistics

Group		N	Mean	SD	Std. Error Mean
Post-Test	Control	30	30.17	3.36	0.614
	Experimental	31	38.28	3.09	0.547

Table 5. Independent Samples T-Test for Post-Test Scores Analysis Results

		Levene's Test		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval Lower	95% Confidence Interval Upper
Post-Test	Equal variances assumed	0.036	0.850	-9.90	60	0.000	-8.12	0.820	-9.76	-6.47
	Equal variances not assumed			-9.87	58.69	0.000	-8.12	0.822	-9.76	-6.47

DISCUSSION

The results of the data analysis indicate that both the control and experimental groups improved significantly from pre-test to post-test; however, the improvement was substantially greater in the experimental group exposed to the SCCBLM. For the control group, the mean score increased from *M* = 17.43, *SD* = 4.20 to *M* = 30.17, *SD* = 3.36, with a significant paired-samples difference, *t*(29) = -20.62, *p* < .001. Likewise, the experimental group improved from *M* = 19.61, *SD* = 4.29 to *M* = 38.29, *SD* = 3.14, and this gain was also significant,

$t(30) = -20.13$, $p < .001$. These within-group improvements suggest that learning occurred under both instructional conditions. This pattern is understandable because TLE Cookery, as a competency-based subject, is intended to develop practical knowledge and procedural understanding through structured instruction and guided learning experiences [1]. Even conventional instruction can therefore produce learning gains when aligned with the curriculum competencies.

However, the independent-samples *t*-test showed that the post-test performance of the experimental group was significantly higher than that of the control group, $t(60) = -9.90$, $p < .001$, with the experimental group obtaining a mean of $M = 38.28$, $SD = 3.09$ compared with the control group's $M = 30.17$, $SD = 3.36$. This result suggests that although both groups benefited from instruction, the SCCBLM provided a stronger instructional advantage. This finding may be interpreted in light of studies showing that conventional modular materials often present difficulties for learners due to unclear instructions, dense textual presentation, weak scaffolding, and limited opportunities for immediate clarification [2–6]. In practical subjects such as TLE Cookery, these limitations can constrain comprehension because students are expected to understand sequences, procedures, tools, and task requirements that are better learned when clearly demonstrated and visually presented [1, 5].

The stronger performance of the experimental group also aligns with literature describing Generation Z learners as more responsive to visual, interactive, and multimodal instructional formats than to purely text-based materials [7, 8]. Since TLE Cookery requires students to identify tools, follow step-by-step procedures, and understand task performance in concrete ways, the use of simplified comic-based material likely supported learning by providing visual scaffolds that made the content easier to process [9, 10].

This interpretation is further supported by research indicating that comic-based and other multimodal materials improve learner attention, comprehension, and engagement by integrating concise text with sequential visuals and contextual cues [11-16]. Thus, the significantly higher post-test scores of the experimental group suggest that the simplified comic competency-based learning material was more effective than the conventional instructional material in supporting students' academic performance in Grade 7 TLE Cookery.

CONCLUSION

The findings of this study confirm that the use of a simplified comic competency-based learning material can significantly enhance the academic performance of Grade 7 students in TLE Cookery. While both the control and experimental groups showed significant improvement from pre-test to post-test, the experimental group obtained a significantly higher post-test mean, indicating that the comic-based material provided a stronger instructional advantage than the conventional material. This suggests that when TLE Cookery competencies are presented through simplified, visually sequenced, and learner-friendly formats, students are better able to understand, retain, and apply the required concepts and procedures.

More importantly, the results extend the growing body of knowledge on comic-based learning materials by validating their usefulness in a competency-based and performance-oriented subject such as TLE Cookery. Much of the existing literature has established that comics can improve learner engagement, comprehension, and attention in general academic contexts. The present study contributes further by showing that these benefits also apply to practical and procedural competencies involving kitchen tools, equipment maintenance, and measurements in cookery tasks. In this sense, the study not only supports previous claims regarding the instructional value of comics, but also expands them by demonstrating that comic-based materials can function as an effective pedagogical tool in skills-based secondary education. Hence, the study provides empirical support for the integration of comic-based instructional innovations in TLE, particularly in areas where learners benefit from visual scaffolding, sequential presentation, and simplified competency-focused instruction.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations are offered to further enhance the academic performance of students in TLE Cookery and related competency-based subjects.

For school administrators, it is recommended that they support the development, reproduction, and classroom use of visually enriched instructional materials, particularly comic-based and other multimodal resources, in performance-based subjects such as TLE. Since the study showed that students exposed to the SCCBLM achieved higher post-test performance than those taught through conventional materials, school leaders may institutionalize teacher-led material development initiatives, provide access to printing and reproduction resources, and include instructional material innovation in school improvement planning. Administrators may also organize capability-building activities that train teachers in the design and use of learner-responsive, visually scaffolded, and competency-aligned materials.

For TLE teachers, the findings suggest the need to move beyond heavily text-based modules and adopt more engaging and developmentally appropriate teaching materials that match the learning needs of present-day students. Teachers are encouraged to integrate simplified comic-based materials, step-by-step visual guides, and other multimodal supports into their lessons, especially when teaching procedural competencies such as the use of kitchen tools, maintenance practices, and measurements in cookery. They may also strengthen learning by pairing these materials with demonstrations, guided practice, and formative assessments to ensure that students not only understand the lesson visually but can also apply the competencies correctly.

For curriculum designers, the results indicate the value of embedding visual, simplified, and learner-friendly instructional features into competency-based materials for TLE. Curriculum developers may consider designing modules that are less text-heavy and more visually structured,

particularly for practical subjects where procedural understanding is essential. The integration of comic-based instructional materials may be explored not only in Cookery but also in other TLE areas such as Agri-Fishery Arts, Industrial Arts, and ICT, where competencies also require sequential understanding, applied performance, and concrete visualization.

Considering the limitations of the study, future researchers are encouraged to undertake similar investigations using larger samples and multiple schools to improve the generalizability of the findings. Since the present study was limited to two intact Grade 7 sections in one school, broader implementation across varied contexts may determine whether the effectiveness of the SCCBLM remains consistent. Future studies may also examine long-term retention of learning, practical skill performance, and student motivation to determine whether the effects of comic-based materials extend beyond immediate post-test gains. In addition, researchers may refine and expand the developed materials to include more competencies and test them using other research designs, such as mixed methods or longitudinal approaches, to capture both measurable learning gains and students' lived experiences with the intervention.

REFERENCES

[1] DepEd, "K-12 Basic Education Curriculum," Department of Educatopn, Manila, Philippines, 2016.

[2] J. D. Abrazado, S. O. Namoco and S. Dalonos, "A Transcendental Phenomenological Study on Special Education Teachers' Use of Distance Learning Modalities in Misamis Oriental, Philippines During Covid-19 Pandemic," *Science International Lahore,* vol. 33, no. 4, pp. 271-278, 2021.

[3] V. I. Diaz and S. O. Namoco, "SWOT Analysis of the Modular Distance Learning Approach During the Covid-19 Pandemic: TLE Junior High School Teachers' Perspectives," *Science International LAhore,* vol. 35, no. 2, pp. 143-146, 2023.

[4] J. M. Tanucan, b. A. Alejando and R. B. Corcino, "Towards an Enhanced Implementation of Printed Modular Distance Learning in the Philippines: A Meta-Synthesis," *International Journal of Learning, Teaching and Educational Research,* vol. 22, no. 3, pp. 341-358, 2023.

[5] M. I. Cap-atan and S. O. Namoco, "Untold Stories of TLE Students on Modular Distance Learning During the Pandemic: A Narrative Inquiry Study," *Science International Lahore,* vol. 36, no. 2, pp. 225-230, 2024.

[6] M. barbilla, B. L. Libo-on and M. C. Balasote, "Challenges Encountered by Teachers in the Implementation of Modular Distance Learning Modality," *International Multidisciplinary Journal of Research for Innovation, Sustainability, and excellence,* vol. 1, no. 6, pp. 1083-1090, 2024.

[7] S. Chardonnens, "Adapting educational practices for Generation Z: integrating metacognitive strategies and artificial intelligence," *Froentiers in Education,* vol. 10, 2025.

[8] Y. Shi, "Multimodal teaching in digital media arts education: insights and challenges from teachers' perspectives," *Cogent Educaton,* vol. 12, no. 1, 2025.

[9] E. Bobek and B. Tversky, "Creating visual explanations improves learning," *Cognitive Research: Principles and Implications,* vol. 1, no. 27, 2016.

[10] J. Tseng, "Using visual scaffolding to enhance the comprehensibility of English materials in science education: A genre-based approach," *Journal of English for Academic Purposes,* vol. 75, 2025.

[11] C. Brown, *The Benefits of Using Comics in the Classroom,* Portland State University, 2023.

[12] M. Şentürk and U. Şimşek, "Educational comics and educational cartoons as," *African Educational Research Journal,* vol. 9, no. 2, pp. 515-525, 2021.

[13] "Are Comic Books an Effective Way to Engage Nonmajors in Learning and Appreciating Science?," *CBE Life Sciences Education,* vol. 10, no. 3, pp. 309-317, 2011.

[14] Y. Topkaya, V. Batdi, D. Burak and A. Ozkaya, "The Effectiveness of Using Comics in Education: A Meta-analytic and Meta-thematic Analysis Study," *Journal of Ahmet Kelesuglo education Faculty,* vol. 5, no. 3, pp. 922-940, 2023.

[15] M. Barongoy, "Comic Strips as Instructional Materials in Teaching and Academic Achievement in Araling Panlipunan of Grade 7 Students," *Psychology and Education: A Multidisciplinary Journal,* vol. 48, no. 10, pp. 1642-1657, 2025.

[16] S. Samama, "Integrating Comics As An Instructional Tool In Teaching Translated Asian Literary Works: Its Influence On Students' Academic Learning In Filipino," *International Journal of Arts, Sciences and Education,* vol. 6, no. 8, pp. 66-75, 2025.

[17] J. Creswell, Research Design: Qualitative, Quantitative, Mixed Methods Approaches, Thousand Oaks, California : Sage Publications, 2009.

[18] "ADDIE Model," University of Washington Bothell, [Online]. Available: https://www.uwb.edu/it/addie.

[19] McGraw Hill Canada, "Richard Mayer's Cognitive Theory of Multimedia Learning," McGraw Hill Higher aEducation, April 16 2019. [Online]. Available: https://www.mheducation.ca/blog/richard-mayers-cognitive-theory-of-multimedia-learning.

[20] A. Field, Discovering Statistics Using SPSS, Thousand Oaks, California: Sage Publications, 2009.

[21] S. Tekin, "MALL with Young Learners: Methodological and Ethical Considerations in the Quasi-Experimental Research Design," *Journal of Learning and Teaching in Digital Age,* vol. 9, no. 1, pp. 115-122, 2024.