

Enhancing the Conceptual Understanding of Students in Making Organic Fertilizer Through Teacher-Made Interactive e-Module

Christopher B. Saludez, PhD¹

1 – Talugtug Solsona National High School, Schools Division of Ilocos Norte

Publication Date: June 23, 2025

DOI: 10.5281/zenodo.15725667

Abstract

This study aimed to enhance the conceptual understanding of Grade 5 Mahogany pupils in making organic fertilizer using a teacher-made interactive e-Module. A quantitative approach was applied using a pretest-posttest design involving 22 pupils. The intervention included PowerPoint-based e-Modules with components such as interactive quizzes, activities, and assessments. Data analysis using mean,

percentage, and t-test (0.05 significance level, $df = 21$) revealed a significant increase in posttest scores (mean = 25.00) from the pretest mean (4.25). Results confirmed that the e-Module effectively improved conceptual understanding. It is recommended that more e-materials be developed and used to further enhance learning, especially in EPP.

Keywords: *e-Module, conceptual understanding, organic fertilizer, TLE, interactive learning, technology integration*

1. Introduction

In today's educational landscape, adapting to the learning needs of diverse students is increasingly important. The lack of engagement and mastery among high school students, particularly in Technology & Livelihood Education, is evident in low performance and poor participation. To address these issues, this study focuses on integrating a teacher-made interactive e-Module to enhance students' conceptual understanding in making organic fertilizer.

As noted by Cannarelli (2016), every learner has a unique learning style, and traditional methods often fail to reach all students effectively. In line with the Department of Education's push for ICT integration under the K to 12 Curriculum and the Enhanced Basic Education Act of 2013 (RA 10533), this study explores digital tools that can motivate and improve students' understanding.

Digital materials like e-Modules are believed to provide flexible, engaging, and individualized learning experiences (Ali, 2010; Sultan, 2011). The researcher observed low retention and poor attitudes toward class activities among students, prompting the creation of an interactive e-Module tailored to address

these challenges. This action research examines whether such an innovation can improve learning outcomes in TLE.

1.1 Research Objectives

1. To assess the students' level of understanding in making organic fertilizer before and after using the e-Module.
2. To determine the significance of the difference in understanding before and after the intervention.
3. To compute the percentage of students who improved in conceptual understanding.
4. To gather students' feedback after using the e-Module.

2. Methods

2.1 Research Design

This action research employed a **quantitative pretest-posttest design** using teacher-made assessment tools.

2.2 Participants

The participants were 22 TLE students of Talugtog National High School for SY 2023–2024. Random sampling was used.

2.3 Instruments

- A 25-item test created and validated by the school head
- An interactive PowerPoint-based e-Module covering the process of making organic fertilizer
- Feedback from students collected informally

2.4 Intervention Procedure

1. A **pretest** was administered to assess baseline understanding.
2. Students were grouped heterogeneously and used the e-Module for 5 days.
3. Activities included multimedia content, exercises, assessments, and links for further study.
4. A **posttest**, parallel to the pretest, was administered.
5. Feedback was gathered from students regarding their experience using the e-Module.

2.5 Data Analysis

- **Descriptive statistics:** Mean and percentage
- **Inferential statistics:** t-test for dependent samples ($\alpha = 0.05$, $df = 21$)
- Performance was interpreted using Medrano's (2016) scale:
 - 21–25: Outstanding
 - 16–20: Very Satisfactory

- 11–15: Satisfactory
- 6–10: Fair
- 0–5: Poor

3. Results

3.1 Pretest Results

- Mean score: **4.25**
- Description: **Poor**
- 60% of students scored 0–5
- 40% scored 6–10
- No student scored above 10

3.2 Posttest Results

- Mean score: **25.00**
- Description: **Outstanding**
- 100% of students scored **25** out of 25
- No variation in posttest scores (SD = 0)

3.3 T-Test Analysis

Metric	Pretest	Posttest
Mean	4.25	25.00
SD	2.70	0.00
Mean Difference	20.75	—
t-value	40.69	—
Critical t-value ($\alpha=.05$, $df=21$)	—	1.703

- Since $t(40.69) > t\text{-critical}(1.703)$, there is a **significant difference**.

3.4 Percentage of Improved Students

- **100%** of students improved from pretest to posttest.
- Performance shifted from 60% poor and 40% fair (pretest) to 100% outstanding (posttest).

3.5 Student Feedback

Positive responses included:

- “Nagmayat toy e-module tayo.”
- “Nakasursuro ak daras nu kasano ti agaramid ti ganagan.”

- “Naganas ti agklase nu kastoy nga adda e-module.”

4. Discussion

The results clearly indicate that the teacher-made interactive e-Module was highly effective in improving the conceptual understanding of students in making organic fertilizer. The significant improvement in scores and the uniform perfect posttest performance validate the effectiveness of the e-Module, consistent with the claims of Prensky (2010) and Sultan (2011) that technology-based tools can make learning more personalized and engaging.

Furthermore, the students' feedback suggests not only improved understanding but also increased motivation and enthusiasm for learning TLE topics. The use of digital tools such as PowerPoint presentations with built-in assessment activities appears to be a promising strategy for enhancing both learning outcomes and learner engagement.

5. Conclusion

The study concludes that the teacher-made interactive e-Module effectively enhanced the conceptual understanding of students in making organic fertilizer. From a poor pretest performance, all students achieved outstanding posttest scores. The statistical results confirm a significant difference in understanding after the intervention.

This suggests that interactive e-Modules can be used as effective instructional tools in TLE and other subjects, especially when aiming to address performance gaps and promote 21st-century skills.

References

- Ali, R. G. (2010). Effectiveness of Modular Teaching in Biology at Secondary Level. *Asian Social Science*, 6(6), 49–54.
- Brooks-Young, S. (2010). *Teaching With the Tools Kids Really Use*. Corwin.
- Cannarelli, G. (2016). *E-Learning: How Constructivist Learning Theory Guides Module Learning*. NY Polytechnic Institute.
- Holmes, B. (2009). *Communication Theory: Media, Technology and Society*. Sage Publications.
- Pascua, E. G. (2013). *Enhancing Skills in Problem Solving Through Cooperative Work*. Unpublished Research.
- Prensky, M. (2010). *Teaching Digital Natives: Partnering for Real Learning*. Sage India.
- Sultan, W. W. (2011). A Constructivist Approach for Digital Learning: Malaysian Schools Case Study. *Journal of Educational Technology and Society*.