INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH AND INNOVATIVE STUDIES
IJSRIS journal
ISSN: 2820-7157
Advancing Knowledge, Inspiring Innovation
www.ijsrisjournal.com
INDEXED JOURNAL
PEER REVIEWED Rigorous & Transparent
DOI: CROSSREF Member
OPEN ACCESS For Global Visibility
BI-MONTHLY Timely Publication
WIDE READERSHIP High Impact & Visibility
AUTHOR FRIENDLY Fast | Supportive | Reliable
RECEIVED 17 September
ACCEPTED 09 October
PUBLISHED 1 November 2026
September 2026
Volume 5
Number 6
Pages from 153 to 156

Didactic analysis of the effectiveness of innovative teaching methods in the acquisition of medical vocabulary at MALEMBA NKULU UNIVERSITY.

NGOY NSHIMBI Johnely[1], NGOY WA KALAMBA Héritier[2], NGOY MULUNDA Charly[3], NSENGA LUNDA Sardoux[4], BOFIO BINA Guillaume[5], KAFINGA LUZOLO Emery[6]

1 Assistant Professor at Malemba Nkulu University, Haut-Lomami, Democratic Republic of Congo, johnelyngoy@gmail.com.
2 First Assistant at Malemba Nkulu University, Haut-Lomami, Democratic Republic of the Congo
3 Assistant Professor I at the Malemba Nkulu Higher Institute of Education, Haut-Lomami, Democratic Republic of the Congo
4 First Assistant at the Malemba Nkulu Higher Institute of Education, Haut-Lomami, Democratic Republic of the Congo
5 Professor at the National Pedagogical University, Kinshasa, Democratic Republic of the Congo, P.O. Box 8815, Kinshasa XI.
6 Full Professor at the National Pedagogical University, Kinshasa, Democratic Republic of the Congo, P.O. Box 8815, Kinshasa XI.

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Crossref doi
PREFIX : 10.63883
IJSRIS JOURNAL
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ABSTRACT

This study presents a pedagogical analysis of innovative approaches to mastering medical language within the Faculty of Health Sciences at Malemba Nkulu University. Conducted with a representative sample of 180 students, the study combines a perceptual assessment with an objective skills test. While 75% of participants expressed a positive perception of the didactic innovations, summative assessments revealed objective underperformance, with 70% of students demonstrating a low or moderate level of knowledge.

The main obstacles identified include the morphological complexity of medical vocabulary (70%), cognitive overload from memorization (65%), and large class sizes (55%). Multivariate analysis shows that regular access to digital tools (ORaj = 3.42; p = 0.001), individual motivational engagement (ORaj = 2.89; p = 0.005), and the etymological breakdown of terms (ORaj = 2.15; p = 0.029) are the major determinants of terminology mastery. The study recommends a pedagogical realignment combining explicit instruction, interactive materials, and repeated formative assessments.

Keywords: medical pedagogy; specialized vocabulary; pedagogical innovations; digital resources; active learning; Malemba Nkulu University.

1. INTRODUCTION

The acquisition of medical terminology lies at the heart of academic and professional training in the health sciences. A precise command of anatomical, pathophysiological, and therapeutic vocabulary constitutes the essential foundation upon which clinical reasoning and interprofessional communication are built (Chabner, 2021). However, traditional teaching centered on lecture-based instruction and the passive memorization of dense glossaries—often encounters cognitive difficulties experienced by learners when faced with highly specialized language of Greco-Latin origin.

The pioneering meta-analysis by Freeman et al. (2014) demonstrated that active learning significantly improves student performance in science programs by reducing failure rates compared to traditional lecture-based instruction. In the specific field of medical education, the integration of innovative teaching approaches such as active morphological decomposition, role-playing, interactive formative quizzes, and the use of digital resources is attracting growing interest (Del Moral et al., 2024; Dunlosky et al., 2013).

In the specific context of the Faculty of Health Sciences at Malemba Nkulu University (Democratic Republic of the Congo), the actual effectiveness of these emerging methods requires rigorous investigation. This study aims to analyze the pedagogical impact of innovative approaches on students' effective mastery of medical terminology, while identifying the facilitating factors and pedagogical barriers encountered.

2. METHODS

2.1 Study Design and Setting

This is a cross-sectional observational study with descriptive and analytical objectives. The research was conducted within the Faculty of Health Sciences at Malemba Nkulu University, targeting students regularly enrolled in the first through third blocks of the Bachelor's degree program.

2.2 Sampling and Population Size

The study sample was calculated using Schwartz's probability formula: $n = (Z^2 \times p \times (1-p)) / d^2$. Using a 95% confidence level (Z = 1.96), an estimated proportion of p = 0.50, and an acceptable margin of error of d = 7.3%, the minimum required sample size was 180 participants. Students were recruited on the basis of voluntary inclusion and active participation in medical terminology courses.

2.3 Measurement and Evaluation Tools

Data collection relied on a hybrid instrument comprising two main sections:

- A survey questionnaire measuring demographic variables, perceptions of innovative approaches, frequency of digital tool use, and perceived barriers.
- A standardized objective test consisting of 20 multiple-choice questions (scored out of 20 points) assessing terminological recognition, semantic understanding, and morphological analysis (roots, prefixes, and suffixes). Proficiency levels were stratified into four categories: Low (0–9), Medium (10–14), Good (15–17), and Very Good (18–20).

2.4 Data Processing and Analysis

Statistical analyses were performed using SPSS and Python (scikit-learn) software. Bivariate associations were evaluated using Pearson's chi-square test. A multivariate logistic regression model was constructed to estimate adjusted odds ratios (Adj OR) and their 95% confidence intervals (95% CI), with a significance threshold set at $p < 0.05$.

3. RESULTS

3.1 Sample Characteristics and Learning Profile

Table 1: Distribution of students by objective knowledge score (N = 180)

Master's Degree Category	Score Range (/20)	Number n (%)
Low level	0 to 9 points	54 (30.0%)
Moderate level	10 to 14 points	72 (40.0%)

Good level	15 to 17 points	36 (20.0%)
Very good level	18 to 20 points	18 (10.0%)

The study included 180 students, 40.0% of whom were in their first year (n=72), 35.0% in their second year (n=63), and 25.0% in their third year (n=45). While 75.0% of respondents rated the overall effectiveness of innovative teaching approaches as "good" or "very good," the objective assessment of skills reveals a substantial discrepancy: 30.0% of students scored low and 40.0% scored average, limiting the rate of satisfactory mastery (good or very good) to 30.0% of the total student body.

3.2 Analysis of Pedagogical Challenges

The predominant pedagogical barriers reported by learners include the structural complexity of terms (70.0%), difficulty in memorization (65.0%), large class sizes (55.0%), and limited access to instructional materials (45.0%).

3.3 Multivariate Modeling of Success Factors

Logistic regression analysis identifies three statistically significant independent predictors associated with achieving a good or very good level of terminological knowledge.

Table 2: Multivariate Analysis of Determinants of Terminological Performance

Influencing Factors	**Adjusted OR (Adj OR)**	**95% CI**	**p-value**
Frequent use of digital tools	3.42	[1.65 – 7.08]	0.001
High personal motivation	2.89	[1.37 – 6.09]	0.005
Morphological decomposition practice	2.15	[1.08 – 4.29]	0.029
Level of study: L3 vs. L1	2.10	[0.98 – 4.50]	0.057

4. DISCUSSION

Analysis of the results highlights a striking pedagogical paradox: while the vast majority of students (75%) express a very positive sense of efficacy regarding innovative teaching approaches, 70% of them fail to achieve a truly satisfactory level of knowledge on the objective test. This result confirms the observation made by Scott et al. (2024), who noted that the introduction of online pedagogical innovations increases student satisfaction and engagement without necessarily leading to an immediate improvement in scores on standardized exams.

The significant predictive effect of digital technology use (ORaj = 3.42; p = 0.001) is consistent with the work of Basuodan (2024), which demonstrates the benefits of hybrid learning in health sciences education. Furthermore, the superiority of active morphological decomposition (ORaj = 2.15; p = 0.029) corroborates the recommendations of Abdullah (2013) and Gaffas (2025), confirming that structured lexical learning based on prefixes, roots, and suffixes facilitate long-term memory retention.

Finally, the impact of personal motivation (ORaj = 2.89; p = 0.005) underscores the importance of combining innovative teaching methods with proactive student engagement to ensure the effective transfer of lexical skills in an academic setting.

5. CONCLUSION AND PERSPECTIVES

This study demonstrates that while innovative teaching approaches are met with enthusiastic support from students, their impact on the actual mastery of medical terminology requires more systematic implementation. The emphasis on morphological analysis and the integration of digital resources represent essential pedagogical tools at Malemba Nkulu University.

Pedagogical Recommendations: To optimize learning, it is recommended to institutionalize practical modules on medical morphology, expand access to digital platforms, and introduce regular formative assessments to reduce the cognitive load on learners.

ETHICAL AND REGULATORY STATEMENTS

- **Ethical Approval and Consent:** The study was approved by the Academic Committee of the Faculty of Health Sciences at Malemba Nkulu University. Information, voluntary, and written consent was obtained from each participant prior to data collection. The complete anonymity of the participants was ensured.
- **Conflicts of Interest:** The authors declare that there are no financial, institutional, or personal conflicts of

interest that could influence the conclusions of this study.

- **Funding Source:** This research was conducted using the authors' own funds without any external public or private funding.
- **Data access:** The anonymized dataset is available upon reasoned request to the corresponding author.

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