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Didactic design of the general nursing techniques course for first-year students et the higher institute of medical techniques LUMBASHI

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ABSTRACT

Didactization in higher education in health sciences is a central requirement within the framework of pedagogical reforms across Sub-Saharan Africa. In the Democratic Republic of the Congo (DRC), the implementation of the Bachelor's-Master's-Doctorate (LMD) framework mandates a shift from traditional lecture-based methods toward an Integrated Competency-Based Approach (CBA). This study investigates the didactization process of the General Care Techniques course taught to first-year Bachelor's (BAC 1) nursing students at the Higher Institute of Medical Techniques of Lubumbashi (ISTM/Lubumbashi). Using an explanatory sequential mixed-methods design, the study combined a quantitative survey of 218 BAC 1 students with in-depth semi-structured interviews of 14 clinical instructors and faculty members. Findings show that 64.2% of students encounter significant challenges in translating theoretical knowledge into practice and in technical execution during clinical practice.

Didactic analysis indicates a structural disconnect between academic knowledge, teachable knowledge, and acquired competencies, exacerbated by equipment shortages in simulation laboratories and summative evaluations focused on rote memorization. To address these gaps, this article proposes a revised didactization framework based on four pillars: situational competency matrix engineering, clinical simulation workshops, reflective portfolio guidance, and Objective Structured Clinical Examinations (OSCE).

Key words: Didactization, General Care Techniques, BAC 1, ISTM Lubumbashi, Didactic Transposition, Competency-Based Approach, Clinical Simulation, OSCE.

1. INTRODUCTION

1.1. Context and Research Problem

The evolution of healthcare systems and the increasing complexity of patient care require a profound transformation of the methods used in the initial training of healthcare professionals. At the heart of this dynamic, nursing education demands the integration of theoretical anatomo-physiological knowledge with rigorous mastery of practical skills (Tardif, 2006; Perrenoud, 2012). Nursing pedagogy defined as the science that studies the transposition, mediation, and appropriation of the scientific and practical knowledge specific to the nursing profession plays a decisive role in this regard (Astolfi, 2018).

In the Democratic Republic of Congo, the higher medical education system has committed to the widespread adoption of the Bachelor's-Master's-Doctorate system (MINESU, 2021). This reform advocates a shift from a transmissive and compartmentalized pedagogy to a Competency-Based Approach (CBA). The Higher Institute of Medical Techniques in Lubumbashi (ISTM/Lubumbashi) is a major academic institution in this transformation process. However, the practical implementation of this pedagogical approach raises numerous didactic questions, particularly in courses with a strong practical component.

The General Nursing Techniques course in the first year of the associate degree program (BAC 1) forms the foundation of professional training. It is through this course that students are introduced to the principles of hygiene and asepsis, the assessment of vital signs, bed-making, dressing changes, injections, and medication administration (Brousseau, 1998; De Ketele, 2010). However, clinical evaluations reveal a gap in instruction: success on written theoretical exams is frequently accompanied by difficulties in execution and application during hospital internships. This discrepancy illustrates what Chevallard (1991) defines as a flaw in the transfer of learning.

1.2. Theoretical Framework and Key Concepts

Didactization refers to the set of theoretical and methodological processes through which scholarly knowledge is transformed and organized to become an effective subject of teaching and learning (Vergnaud, 1990; Pastré, 2011). In the field of nursing, didactizing a care technique involves not only describing a procedural step-by-step guide but also creating learning conditions that facilitate the integration of the underlying clinical reasoning.

According to Brousseau (1998), the theory of didactic situations posits that knowledge acquisition occurs through the learner's interaction with an environment structured by the instructor. Furthermore, professional pedagogy (Pastré, 2011) emphasizes action schemas and pragmatic concepts, demonstrating that technical competence is inseparable from conceptualization in action.

Drawing on Chevallard's model (1991), the chain of didactic transposition in this course can be analyzed as follows:

> *Academic Knowledge (Medical and Nursing Sciences) → External Transposition → Knowledge to Be Taught (ISTM Syllabus) → Internal Transposition → Knowledge Taught (Lectures and Lab Sessions) → Knowledge Learned (Clinical Practice).*

When practical sessions are hampered by material or methodological constraints, the chain is broken, leading to a weakening of the acquired competencies (Kafinga, 2020; Ilunga, 2022).

1.3. Research Questions and Hypotheses

The central research question of this study is formulated as follows: How can the teaching of the General Nursing Techniques course in the first year of the Bachelor's program at the Higher Institute of Medical Techniques in Lumbashi be optimized to ensure an effective transfer of theoretical knowledge to clinical practice?

The sub-research questions are:

- What are the current teaching and assessment methods used in the General Nursing Techniques course at ISTM/Lubumbashi?

- What are the main obstacles encountered by first-year students when learning technical procedures?
- What instructional design based on simulation and constructive alignment can improve the effectiveness of this teaching?

The hypotheses formulated are :

- **H1:** The current teaching method for the General Nursing Techniques course at ISTM/Lubumbashi relies primarily on traditional transmissive instruction, creating a disconnect between theory and clinical practice.
- **H2:** The under-equipment of the simulation lab and the large class sizes in the first-year cohorts constitute major pedagogical barriers to the acquisition of procedural self-efficacy.
- **H3:** A teaching model incorporating a situational matrix, peer simulation, and ECOS assessment promotes the structuring of skills and improves students' clinical performance.

2. MATERIALS AND METHODS

2.1. Study Setting and Research Protocol

The study was conducted at the Higher Institute of Medical Techniques of Lubumbashi (ISTM/Lubumbashi), a public institution of higher medical education located in the province of Haut-Katanga. A mixed-methods sequential explanatory design was applied (Creswell & Plano Clark, 2018), combining a quantitative survey of students with a qualitative study of faculty and clinical supervisors.

2.2. Sampling

The study population included students enrolled in the first year (BAC 1) of the Nursing program and the faculty members involved in the course. The sample size for the students was determined using Cochran's (1977) formula for a finite population (N = 512):

$$n = (Z^2\, p\, (1 - p) / e^2) / [1 + (Z^2\, p\, (1 - p) / (e^2\, N))]$$

With Z = 1.96 (95% confidence interval), p = 0.50, and e = 0.05, the calculated sample size was 218 students, selected through stratified random sampling. The qualitative phase included 14 participants (4 tenured faculty members, 5 lab assistants, and 5 field instructors) selected through purposive sampling (Paillé & Mucchielli, 2016).

2.3. Instruments and Data Collection

A structured questionnaire (38 items) assessing perceptions of didactic transposition and clinical self-efficacy (5-point Likert scale) was administered to the students. The internal consistency analysis revealed a Cronbach's alpha of 0.87 (Nunnally & Bernstein, 1994). Semi-structured interview guides were used for qualitative data collection.

2.4. Data Analysis

Quantitative data were analyzed using SPSS 27.0 and Python (Pandas, SciPy). Descriptive statistics and Pearson's chi-square (χ^2) test were applied (significance level $p < 0.05$). Qualitative data were analyzed using thematic content analysis (Bardin, 2013).

3. RESULTS

3.1. Current Teaching Methods

Analysis of teaching practices highlights the predominance of large-group lectures.

Table 1: Current teaching methods for the General Nursing Techniques course in the first year of the Bachelor's program at ISTM/Lubumbashi (N = 218).

Teaching Dimension	Dominant Method	Number of Students (n)	Percentage (%)
Format of the Theoretical Course	Lecture	176	80.7%
Frequency of Lab Sessions	Occasional (< 2 sessions per semester)	143	65.6%
Practical Session Group Size	Large class sizes (> 50 students)	189	86.7%
Laboratory demonstration	Passive observation by the teaching assistant	154	70.6%
Summative assessment	Written theory exam (MCQ/RCE)	198	90.8%

Table 1 highlights a clear predominance of traditional and transmissive teaching methods in the *General Nursing Techniques* course at ISTM/Lubumbashi:

- **Predominance of lectures (80.7%):** Virtually all theoretical instruction relies on ex cathedra lectures, which limits interactivity and students' active participation in the construction of their knowledge.
- **Low frequency of practical sessions (65.6%):** More than half of the students report having fewer than two practical sessions per semester, which is insufficient for mastering complex technical procedures.
- **Overcrowded practical sessions (86.7%):** The presence of more than 50 students per practical group significantly limits individual access to equipment and mannequins.
- **Passive observation-only sessions (70.6%):** Due to overcrowded classes, practical sessions mostly consist of a demonstration by the teaching assistant, which students observe from a distance.
- **Assessment Focused on Theoretical Recall (90.8%):** The final summative assessment prioritizes written exams (multiple-choice/open-ended questions), thereby promoting superficial learning based on memorization at the expense of evaluating actual procedural skills.

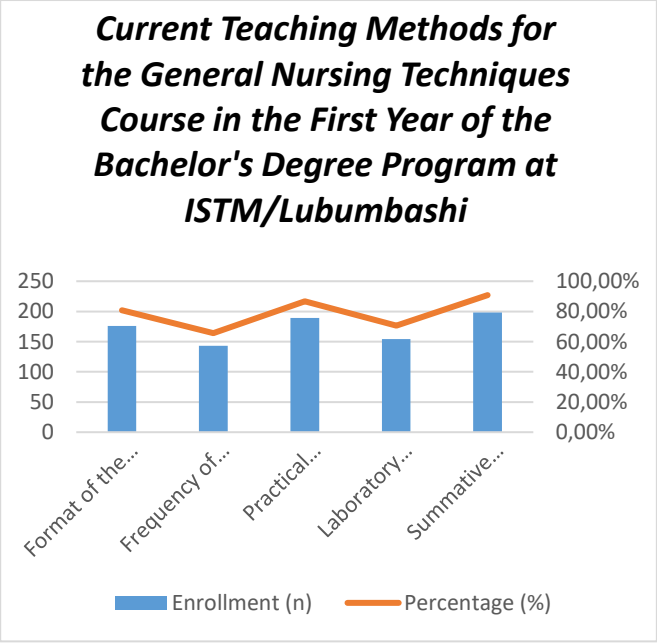


Figure 1: Current teaching methods for the general nursing techniques course

3.2. Students' Level of Clinical Self-Efficacy

Table 2: Assessment of first-year nursing students' level of self-efficacy regarding fundamental technical skills (N = 218).

Fundamental Technical Procedure	High Proficiency n (%)	Moderate Proficiency n (%)	Low Proficiency n (%)
1. Taking vital signs (blood pressure, pulse)	98 (45.0%)	76 (34.9%)	44 (20.1%)
2. Antiseptic hand washing	122 (56.0%)	64 (29.4%)	32 (14.6%)
3. Making an occupied bed	84 (38.5%)	92 (42.2%)	42 (19.3%)
4. Preparation of a sterile field	52 (23.9%)	81 (37.2%)	85 (38.9%)
5. Placement of a peripheral intravenous line	31 (14.2%)	65 (29.8%)	122 (56.0%)
6. IM/IV injection	45 (20.6%)	78 (35.8%)	95 (43.6%)
7. Bladder catheterization	18 (8.3%)	42 (19.3%)	158 (72.4%)
8. Aseptic dressing	61 (28.0%)	89 (40.8%)	68 (31.2%)
9. Dose and flow rate calculation	39 (17.9%)	58 (26.6%)	121 (55.5%)
10. Endotracheal suctioning	12 (5.5%)	33 (15.1%)	173 (79.4%)

The data reveal a significant proportion of students who rate their proficiency as low or nonexistent in complex procedures such as bladder catheterization (72.4%), endotracheal suctioning (79.4%), and dose calculation (55.5%).

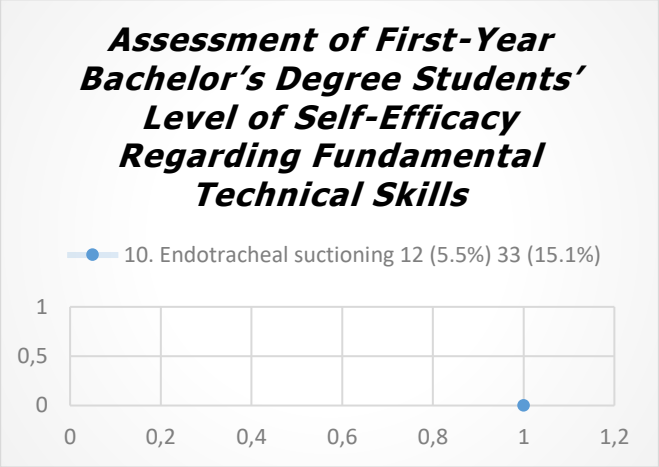


Figure 2: Assessment of first-year bachelor's degree students' level

3.3. Inferential Analysis

The cross-tabulation of hands-on practice time in the laboratory and overall clinical performance shows a statistically significant association ($\chi^2 = 68.42$, df = 1, $p < 0.001$). Students who accumulated at least 5 hours of hands-on practice demonstrated a significantly higher level of clinical performance (71.8% versus 15.7%).

4. DISCUSSION

4.1. Interpretation of Results

The results confirm Hypothesis H1 and are consistent with the analyses by Tardif (2006) and Perrenoud (2012) on the limitations of the "transmitter" model in nursing education. The predominance of ex cathedra lectures leads to theoretical memorization that is disconnected from the demands of the hospital setting in Lubumbashi. The observed disconnect in didactic transposition (Chevallard, 1991) can be explained by a lack of problem-based scenarios.

4.2. Proposal for a Revamped Didactic Model

To address this issue, we propose the DIS-SOINS model (Integrated System for Simulation and Scenario-Based Care), structured as follows:

- Situational Matrix: Reconfiguration of the curriculum around families of reference clinical situations.
- Simulation and peer tutoring: Organization of simulation workshops in which first-year students are supervised by third-year tutors.
- Reflective portfolio: Monitoring of learning through post-event reflective analysis (Gibbs, 1988).
- ECOS Assessment: Implementation of standardized practical assessment stations (De Ketele, 2010).

CONCLUSION AND RECOMMENDATIONS

This study highlights the need to reform the teaching approach for the General Nursing Techniques course in the first year of the Bachelor's program at ISTM/Lubumbashi. Implementing a competency-based approach requires moving away from traditional lecture-based methods in favor of clinical simulation and structured assessment.

Key Recommendations:

- At ISTM/Lubumbashi: Equip with the simulation laboratory and revise the course syllabus in accordance with the competency-based approach.
- To faculty: Adopt active learning methods and incorporate ECOS-based assessment.
- To MINESU: Develop a national guide on nursing pedagogy for the LMD reform.

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