



### RESEARCH ARTICLE

## IMPACT OF INNOVATIVE TEACHING METHODS ON THE ACADEMIC PERFORMANCE OF NURSING AND OBSTETRICAL STUDENTS AT UNIVERSITY OF PARAKOU

ABRAHAM Florence<sup>1</sup>, AHONNON Adolphe<sup>2</sup> and ALLADAKAN Agbodjinou Germain<sup>3</sup>

1. Multidisciplinary Doctoral School "Physical Education, Sport, and Human Development" (EDP-EPS-DH), National Institute of Youth, Physical Education, and Sport, National Institute of Youth, Physical Education, and Sport, University of Abomey-Calavi, Benin.

2. Research and Expertise Laboratory "Sport, Education, and Social Interventions for Development" (LARESEID), Social Psychology and Group Facilitation Research Unit, National Institute of Youth, Physical Education, and Sport, University of Abomey-Calavi, Benin.

3. Laboratory of Anthropology and Sociology of Environmental, Educational, Rural, and Gender Dynamics, University of Abomey-Calavi.

### Manuscript Info

#### Manuscript History

Received: 14 July 2026

Final Accepted: 16 August 2026

Published: September 2026

#### Key words:-

Innovative teaching methods, ICT, academic performance, nursing and obstetric care.

### Abstract

The evolving needs of healthcare systems and the increasing number of students in health sciences schools necessitate a transformation of teaching practices. This study evaluates the impact of innovative teaching methods on the academic performance of nursing and midwifery students and analyzes the role of Information and Communication Technologies (ICTs) in their learning. A mixed-methods cross-sectional study was conducted at the Institute of Nursing and Midwifery Training (IFSIO) of the University of Parakou. Quantitative data include 53,068 exam grades covering four academic years (2021–2025) and questionnaires completed by 287 students. Multivariate analysis using linear regression with robust standard errors assessed the effect of innovative methods on grades. Thematic analyses complemented the qualitative data on ICT use. Innovative teaching methods are associated with an average increase of 0.49 points in grades ( $\beta = 0.488$ ; 95% CI [0.393-0.582];  $p < 0.001$ ). The effect varies across years, with a more pronounced impact in 2024-2025. Furthermore, 97.2% of students use ICT in their learning, primarily online courses (75.6%) and the internet (51.6%). The impact of ICT is perceived as positive by 90.9% of students for learning and by 90.2% for academic performance.

"© 2026 by the Author(s). Published by IJAR under CC BY 4.0. Unrestricted use allowed with credit to the author."

Qualitative analysis reveals that ICT facilitates comprehension, in-depth knowledge acquisition, and independent review. Innovative teaching methods significantly improve academic performance, and ICT plays a major

**Corresponding Author:-** ABRAHAM Florence

**Address:-** Multidisciplinary Doctoral School "Physical Education, Sport, and Human Development" (EDP-EPS-DH), National Institute of Youth, Physical Education, and Sport, National Institute of Youth, Physical Education, and Sport, University of Abomey-Calavi, Benin.

**E-mail :** florenceabraham14877@gmail.com

supporting role in learning. Their reasoned and guided integration constitutes a relevant lever for nursing and midwifery education.

### **Introduction:-**

Higher education in nursing and midwifery is undergoing significant evolution, marked by emerging questions regarding methods that facilitate the internalization of knowledge (Graham et al. 2020, p. 8413). This shift addresses the persistent theory-practice gap observed in the training of healthcare professionals. In recent years, health science schools have experienced a substantial surge in student numbers (Bope et al. 2023, p. 50). The Institute for Nursing and Midwifery Training (IFSIO) at the University of Parakou grew from 138 students at its inception to 1,106 students in the 2023–2024 academic year. This increase presents major challenges, particularly the difficulty of selecting appropriate teaching methods for practical and clinical learning (Agar &Knopfmacher 1995, p. 120).

At the same time, the integration of Information and Communication Technologies (ICT) has radically transformed the educational landscape by creating new learning opportunities (Karsenti& Charlin 2008, p. 71). The COVID-19 pandemic accelerated this transformation, with over 89% of higher education institutions worldwide implementing remote learning (Krugman et al. 2022, p. 2). According to Rechidi et al. (2020), this crisis drove the pedagogical integration of ICT, confirming its many advantages. Previous studies have shown that innovative methods such as the flipped classroom improve academic results by 10–15% (Youhasan et al. 2021, 50) and that active learning significantly reduces academic failure (Freeman et al. 2014, p. 8414). However, few studies have jointly evaluated the impact of pedagogical innovations on academic performance and the role of ICT within the specific context of nursing and midwifery training programs in West Africa.

This study aims to address this gap by: (1) analyzing the effect of innovative pedagogical methods on student grades at the IFSIO (Nursing and Midwifery Training Institute) of the University of Parakou over four academic years; and (2) describing students' use of and perceptions regarding ICT in their learning. Our analysis draws on three main learning theories. Vygotsky's (1978) social constructivism emphasizes the importance of social interactions in knowledge construction, justifying the effectiveness of collaborative methods and ICT-mediated exchanges. Kolb's (2014) experiential learning theory posits that learning occurs through a cycle of concrete experience, reflection, conceptualization, and experimentation, thereby underpinning the relevance of active learning methods and interactive digital resources. Bandura's (2013, p. 149) social learning theory highlights observation and modeling—key principles in learning through simulation and instructional videos.

### **Methodology:-**

#### **Study type and population:-**

This was a mixed-methods (quantitative and qualitative) cross-sectional study with both analytical and descriptive aims, conducted at the IFSIO (Institute of Nursing and Obstetric Training) of the University of Parakou.

#### **Population and sampling:-**

##### **The study population comprised:-**

- students enrolled between the 2021–2022 and 2024–2025 academic years for the analysis of grades (53,068 observations, 3,622 students);
- a sample of 287 current students for the questionnaire survey (determined using Schwartz's formula:  $N = (1.96^2 \times 0.15 \times 0.85) / 0.05^2 = 196$ , adjusted to 213 to account for potential non-response) Simple random sampling was used for current students.

#### **Data collection:-**

Performance data: Documentary review of academic results over four years (2021–2025). ICT data: A digital, self-administered questionnaire via KoboToolbox, comprising closed and open-ended questions regarding ICT usage and perceptions.

#### **Variables studied:-**

Primary dependent variable: Grade obtained per subject (0–20).

#### **Independent variables:-**

- type of pedagogical method (innovative vs. traditional);
- program of study (nursing vs. midwifery);

- level of study (L1, L2, L3);
- academic year (2021–2022 to 2024–2025);
- use and perception of ICT

#### Data analysis:-

Quantitative analyses: Data were analyzed using Stata version 12. A multivariate linear regression with robust standard errors clustered by student ID was used to assess the effect of innovative methods. Qualitative variables were described using frequencies and percentages. The significance threshold was set at 5% ( $p < 0.05$ ). Qualitative analyses: Open-ended responses underwent thematic analysis using RQDA software.

#### Ethical considerations:-

Authorization to conduct the survey was obtained from the competent authorities. Free and informed consent was obtained from participants, and data confidentiality was guaranteed.

#### Results:-

##### Sociodemographic characteristics of respondents:-

**Table 1 : Sociodemographic characteristics of respondents (n=287)**

| Characteristic             | Effective | (%)  |
|----------------------------|-----------|------|
| <b>Age (years)</b>         |           |      |
| <20                        | 5         | 1,7  |
| 20-24                      | 246       | 85,7 |
| 25-30                      | 32        | 11,2 |
| >30                        | 4         | 1,4  |
| <b>Sex</b>                 |           |      |
| Male                       | 70        | 24,4 |
| Female                     | 217       | 75,6 |
| <b>Academic background</b> |           |      |
| Nurse                      | 120       | 41,8 |
| Midwife                    | 167       | 58,2 |

The sample of 287 students had a mean age of  $22.5 \pm 3.0$  years. The population was predominantly female (75.6%), with 58.2% enrolled in the midwifery program and 41.8% in nursing.

#### Academic performance and the impact of innovative methods:-

##### Overall description:-

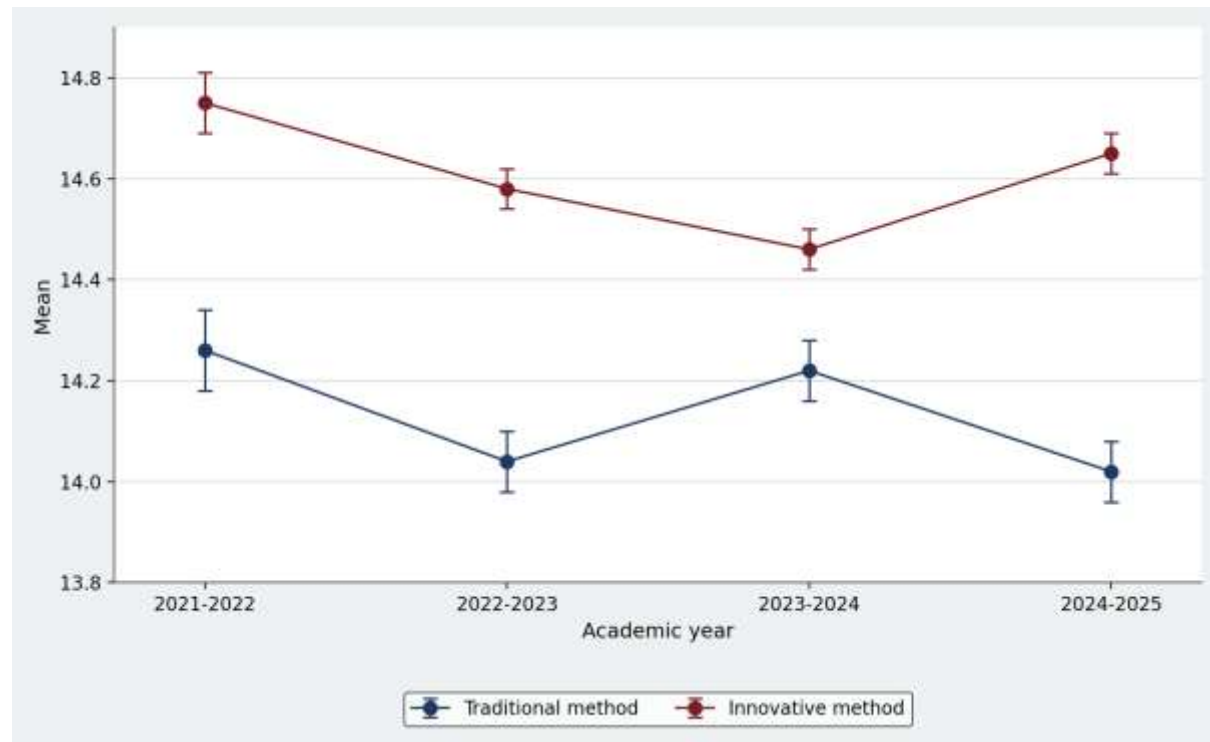
The students' overall raw mean score for the entire period was  $14.4 \pm 2.0$ , with grades ranging from 0 to 20. Performance improved with the level of study:  $14.2 \pm 2.3$  in L1,  $14.4 \pm 1.6$  in L2, and  $14.9 \pm 1.6$  in L3. In both programs, courses using innovative methods yielded higher mean scores than those using traditional methods.

##### Effect of innovative methods (linear regression):-

**Table 2: Linear regression of the effect of innovative methods**

| Variable                                        | Coefficient $\beta$ | SE           | p                | IC95%                |
|-------------------------------------------------|---------------------|--------------|------------------|----------------------|
| <b>Innovative method (ref = trad.)</b>          | <b>0,488</b>        | <b>0,048</b> | <b>&lt;0,001</b> | <b>[0,393-0,582]</b> |
| <b>Midwifery training program (ref = nurse)</b> | 0,092               | 0,018        | <0,001           | [0,056-0,127]        |
| <b>Level L2 (ref = L1)</b>                      | 0,141               | 0,020        | <0,001           | [0,103-0,180]        |
| <b>Level L3 (ref = L1)</b>                      | 0,862               | 0,024        | <0,001           | [0,816-0,909]        |

After adjusting for field of study, academic level, and academic year, courses employing innovative methods were associated with an average grade increase of 0.49 points ( $\beta = 0.488$ ; 95% CI [0.393–0.582];  $p < 0.001$ ).

**Temporal variation of the effect:-****Figure 1: Predictive values adjusted for academic year and subject type (95% CI)**

The effect of innovative methods varied by year, with a more pronounced impact in 2024–2025 (interaction  $\beta = 0.153$ ;  $p = 0.008$ ) and a weaker impact in 2023–2024 (interaction  $\beta = -0.249$ ;  $p < 0.001$ ).

**Use and perception of ICT:-****ICT used by students:-****Table 3: ICT commonly used by students**

| ICTs used                     | Effective | (%)  |
|-------------------------------|-----------|------|
| Digital course                | 217       | 75,6 |
| Internet (search engines, AI) | 148       | 51,6 |
| Social media                  | 90        | 31,4 |
| None                          | 8         | 2,8  |

The majority of students (97.2%) use ICT in their learning. Digital course materials are the primary resource (75.6%), followed by the Internet (search engines, AI) (51.6%) and social media (31.4%).

**Perception of the impact of ICT:-****Table 4: Perception of the impact of ICT**

| Perceived impact               | Effective | (%)  |
|--------------------------------|-----------|------|
| <b>On learning</b>             |           |      |
| Positive                       | 261       | 90,9 |
| Negative                       | 12        | 4,2  |
| None                           | 14        | 4,9  |
| <b>On academic performance</b> |           |      |
| Positive                       | 259       | 90,2 |
| Negative                       | 10        | 3,5  |
| None                           | 18        | 6,3  |

The majority of students surveyed perceive a favorable impact from the pedagogical models used. Regarding the impact on learning, 261 students—or 90.9%—consider the impact to be positive. Conversely, a small proportion views the impact as negative (4.2%), while 4.9% report perceiving no impact at all. Results regarding the impact on academic performance are similar; indeed, 90.2% of students report a positive impact of the pedagogical models on their academic results. Only 3.5% perceive a negative impact, and 6.3% believe there is no effect on their performance.

#### **Qualitative analysis of perceptions:-**

The thematic analysis of the interviews highlights several dimensions of the contribution made by information and communication technologies (ICT) to student learning.

#### **Facilitating understanding:-**

Students view ICT as a tool that fosters a better understanding of course content, particularly through visual and interactive materials. As one participant puts it: "It makes understanding easier, and we learn more" (E3). Another adds: "Explanations are more accessible" (E7), while one student highlights the value of multimedia resources: "Seeing images and videos helps to better understand certain movements or techniques" (E12).

#### **Deepening knowledge:-**

ICT also enables students to supplement classroom instruction by seeking out additional information. For instance, one student states: "Parts that weren't understood can easily be looked up on the internet" (E5). Others mention the contribution of specific platforms: "Google or YouTube provide more explanations, especially regarding practical aspects" (E9). The use of artificial intelligence is also mentioned: "AI clarifies things for me when I don't understand something" (E14). 2.4.3 Learner autonomy The feedback reveals that ICT enhances student autonomy in the learning process. Several participants feel they can make progress without constantly relying on the teacher: "it allows us to move forward without necessarily waiting for the instructor" (E2); "we manage to find answers to almost all our questions without the professors' help" (E11).

**Facilitating revision:-**ICT offers flexibility in revision, allowing students to access educational resources at any time. One participant notes the ability to "revise anywhere" (E6), while another specifies: "accessing lessons at any time without using notebooks" (E8). The economic aspect is also mentioned: "PDF lessons help save money" (E10).

**Collaborative learning:-**Peer interaction is facilitated by digital tools, fostering collaborative learning. In this regard, one student states: "if I don't understand a part, I message a classmate who can explain it better to me" (E4). Another adds: "in groups, we discuss things at length until we understand" (E13).

#### **Limitations of ICT use:-**

Despite their advantages, ICT tools have certain limitations, particularly regarding distraction and time management. Students acknowledge that "phones often distract us" (E1) and that "it makes us lose a bit of time" (E15). Furthermore, "having the connection on leads to messages that take us away from learning" (E16).

#### **Opinions on ICT integration in teaching:-**

**Table 5: Opinions on ICT integration in teaching**

| <b>Opinions and reasons</b>         | <b>Effective</b> | <b>(%)</b> |
|-------------------------------------|------------------|------------|
| <b>General notice</b>               |                  |            |
| <b>Favourable</b>                   | 245              | 85,4       |
| <b>Unfavorable</b>                  | 34               | 11,8       |
| <b>Indifferent</b>                  | 8                | 2,8        |
| <b>Main reasons cited</b>           |                  |            |
| <b>Facilitating research</b>        | 81               | 29,0       |
| <b>Improvement of understanding</b> | 75               | 26,9       |
| <b>Learner autonomy</b>             | 35               | 12,5       |
| <b>Time savings and efficiency</b>  | 26               | 9,3        |
| <b>Digital media</b>                | 19               | 6,8        |
| <b>Performance improvement</b>      | 17               | 6,1        |

The majority of students (85.4%) favor the increased integration of ICT into teaching. The main reasons cited are easier research (29.0%), improved understanding (26.9%), and learner autonomy (12.5%).

### **Discussion:-**

#### **Impact of innovative methods on academic performance:-**

Our study highlights an overall positive effect of innovative pedagogical methods on students' academic performance ( $\beta = +0.49$  points). Although moderate in magnitude, this effect is statistically significant and confirms trends observed in international literature. Youhasan et al. (2021, p. 50) showed that the flipped classroom approach improves academic results by 10–15% in nursing education, a figure roughly consistent with the effect observed in our context. Freeman et al. (2014, p. 8414) demonstrated that active learning methods significantly reduce academic failure compared to traditional lecturing. The more pronounced effect observed at the end of the period (2024–2025) suggests a gradual adoption of these innovations by teachers and a maturing of their implementation, aligning with observations by McKenna et al. (2018, p. 283) regarding the importance of the level of exposure and pedagogical coherence.

#### **Role of ICT in learning:-**

The widespread adoption of ICT by students (97.2%) and their highly positive perception of it (over 90% reporting a favorable impact) confirm its central role in contemporary learning. These results are comparable to those of Youhasan et al. (2021, p. 50), who showed that the use of digital resources significantly improves understanding and performance. The explanatory mechanisms identified in the qualitative analysis (improved access to information, diversified media, autonomy, and easier revision) align with the findings of Lewin et al. (2014, p. 164), who state that ICT fosters self-directed learning and better mastery of content, particularly in vocationally oriented programs. The risks of distraction and misuse highlighted by some students (5.7%) are also reported in the literature (Rosen et al. 2013, p. 2510), confirming that the effectiveness of ICT depends largely on pedagogical guidance and the learners' self-regulation skills.

#### **Complementarity between pedagogical innovations and ICT:-**

Our results suggest a complementarity between innovative teaching methods and the use of ICT. Innovative methods (simulation, problem-based learning, flipped classrooms) create a favourable pedagogical environment, while ICT provides the resources and access to information that support this framework. This synergy could explain the overall effect observed on performance.

#### **Pedagogical implications:-**

##### **Our results suggest several recommendations:-**

- strengthen the integration of innovative methods across the entire curriculum;
- ensure continuous teacher training in these methods and the pedagogical use of ICT;
- develop high-quality, accessible digital resources;
- support students in the reasoned and effective use of ICT;
- regularly evaluate the impact of the implemented measures

#### **Study limitations:-**

This study has several limitations: the cross-sectional design does not allow for the establishment of a formal causal relationship; the classification of methods as "innovative" relies on institutional criteria that may involve a degree of subjectivity; data regarding ICT usage are self-reported and may be subject to social desirability bias; and the study was conducted at a single institution, limiting the generalizability of the results.

### **Conclusion:-**

This study demonstrates that innovative pedagogical methods have a positive and significant impact on the academic performance of nursing and midwifery students at the University of Parakou (an effect of +0.49 points). Furthermore, ICT plays a major supportive role in learning, characterized by near-universal adoption and a highly positive perception among students. These findings advocate for the strengthening of pedagogical innovations and the strategic integration of ICT into the curriculum, while highlighting the need for appropriate institutional support and continuous evaluation of practices. Future research could explore the specific links between types of ICT tools and performance across disciplines, as well as the long-term impact on graduates' professional integration.

**References:-**

1. Agar, D. L. et Knopfmacher, N. (1995). The Learning and study strategies inventory: a south african application. *Higher Education*. Juillet 1995. Vol. 30, N° 1, Pp. 115-126. DOI 10.1007/BF01384056.
2. Bandura, A. (2013). The role of self-efficacy in goal-based motivation. *New Developments in Goal Setting And Task Performance*. 2013. Pp. 147-157.
3. Bope, M B., Ket, I. N., Buhika, B. M., Ntanga, M.N., Kashit, E. K., Ngoy, L. C., Wangakyumo, M. B., Mupenda, B. M., Bwadja, S. K. et Kasama, Trésor K. (2023). The challenge of massification in education and the application of active learning methods at Higher Institute of Medical Techniques in Lubumbashi. *Revue de l'Infirmier Congolais*. 22 Septembre 2023. Vol. 7, N° 1, Pp. 47-55.
4. Freeman, S., Eddy, S. L., Mcdonough, M., Smith, M. K., Okoroafor, N., Jordt, H. et W., M. P., (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences of the United States of America*. 10 Juin 2014. Vol. 111, N° 23, Pp. 8410-8415. DOI 10.1073/Pnas.1319030111.
5. Graham, J-M., W., C., Pachkowski, K. et Friesen, H., (2020). Educating the educators: determining the uniqueness of psychiatric nursing practice to inform psychiatric nurse education. *Issues In Mental Health Nursing*. 3 Mai 2020. Vol. 41, N° 5, Pp. 395-403. DOI 10.1080/01612840.2019.1678081.
6. Karsenti, T. et Charlin, B. (2008). Information and Communication Technologies (ICT) in medical education and practice: the major challenges. *Revue Internationale des Technologies en Pédagogie Universitaire*. 2008. Vol. 5, N° 2, Pp. 68-81.
7. Kolb, D. A. (2014). *Experiential learning: experience as the source of learning and development*. FT Press.
8. Krugman, D. W., Manoj, M., Nassereddine, G., Cipriano, G., Battelli, F., Pillay, K., Othman, R., Kim, K., Srivastava, S., Lopez-Carmen, V. A., Jensen, A. et Schor, M. (2022). Transforming global health education during the COVID-19 Era: perspectives from a transnational collective of global health students and recent graduates. *BMJ Global Health*. 1 Décembre 2022. Vol. 7, N° 12, Pp. E010698. DOI 10.1136/Bmjgh-2022-010698.
9. Lewin, L. O., Robert, N. J., Raczek, J., Carraccio, C. et Hicks, P. J. (2014). An online evidence based medicine exercise prompts reflection in third year medical students. *BMC Medical Education*. 9 Août 2014. Vol. 14, N° 1, Pp. 164. DOI 10.1186/1472-6920-14-164.
10. Mckenna, L., Copnell, B., Butler, A. E. et Lau, R., (2018). Learning style preferences of australian accelerated postgraduate pre-registration nursing students: a cross-sectional survey. *Nurse Education In Practice*. January 2018. Vol. 28, Pp. 280-284. DOI 10.1016/J.Nep.2017.10.011.
11. Rechidi, N., Bennani, H., Nafzaoui, M. A., Benazzou, L. et Hilmi, Y., (2020). Pedagogical integration of ICTs and the Covid-19 crisis: what are the main learnings? *International Researcher Journal* [Online]. 2020. Vol. 1, N° 2. pp.274 – 297 <https://doi.org/10.5281/zenodo.7578886>
12. Rosen, L. D., Whaling, K., Carrier, L. M., Cheever, N. A. et Rokkum, J., (2013). The media and technology usage and attitudes scale: an empirical investigation. *Computers in Human Behavior*. 2013. Vol. 29, N° 6, Pp. 2501-2511. DOI 10.1016/J.Chb.2013.06.006.
13. Vygotsky, L. S. et Cole, M. (1978). *Mind in society: development of higher psychological processes*. Harvard University Press.
14. Youhasan, P., Chen, Y., Lyndon, M. et Henning, M. A. (2021). Exploring the pedagogical design features of the flipped classroom in undergraduate nursing education: a systematic Review. *BMC Nursing*. 22 March 2021. Vol. 20, N° 1, Pp. 50. DOI 10.1186/S12912-021-00555-W.