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DYNAMISM OF MAYORS AND BASIC HEALTH CENTER (CSB) HEADS IN CAPACITY-BUILDING TRAINING FOR EFFECTIVE GRANT MANAGEMENT IN THE IHOROMBE REGION

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ABSTRACT

This article focuses on an action research carried out to study the dynamism and the actors' involvement in the mayors and Basic Health Centers (Centres de Santé de Base, CSB) heads during a capacity building program based on andragogy and Information and Communication Technologies (ICTs). In the context of financial decentralization reforms promoted by the PPSB project, the effectiveness of the innovative technologies relies on the actors' contribution. The mixed method used in this study provides a comprehension of the engagement of these local leaders through the analysis of a sample of 60 learners distributed in 3 districts. The quantitative and qualitative results highlight an unprecedented dynamism and a strong adherence to the program. The results point out a 92% of tasks achieved and a very good attendance. This dynamism is explained by the immediate use of the technology in the daily practice and the co-learning mode between communes and the CSB. Indeed, the analysis of the results puts in evidence a pedagogical need to take into account the experience of the actors and the reduction of the conflicts between them for a better appropriation of the new technologies in a rural environment.

Keywords: Dynamism, Andragogy, ICT, Capacity building, Communes, Health.

INTRODUCTION

The Malagasy health system is currently undergoing a process of significant restructuring focused on decentralizing resources around primary care structures [1]. The Pandemic Preparedness and Basic Services Strengthening Project (PPSB) led by the World Bank fits into this ambition by giving direct subgrants to Basic Health Centers (CSB). Aiming to improve care delivery through a financial decentralization, this approach entails additional responsibilities for local actors: mayors who hold delegated competences and CSB heads who are technical officers of health facilities [2].

The shift towards a transparent and traceable governance requires the development of modern management tools. In particular, Information and Communication Technologies (ICT) offer the possibility to optimize inventory processes as well as accelerate administrative validation circuits [3]. However, local areas often oppose the use of such solutions due to limited initial digital skills as well as the lack of institutional coordination between communes and technicians [4].

To address these barriers, training design must turn away from the traditional directive pedagogy in order to embrace an andragogical approach. This latter allows taking into account the field experience of participants, their autonomy as well as their relevance in terms of professional projects [5]. While the scientific literature extensively addresses the technical impact of management applications, little research explores the determinants of dynamism and adhesion during learning by local authorities.

This paper focuses on the explanatory variables and manifestations of dynamism among mayors and CSB heads in the Ihorombe region facing with a technical-andragogical training. It aims to illustrate the interest of an adult-centered pedagogy associated with an intensive cooperative pair work to encourage attendance, build rapid mastery and optimize logistics-performance indicators.

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MATERIALS AND METHODS

In order to ensure the transparency of our scientific enterprise, in this chapter we describe the methodology. First, the type of study and its general background is presented. Following this, the target population and sampling design are discussed. Lastly, this section also includes the research materials and software used, as well as the data collection procedures that were used as a basis for analysis.

Study type and framework

The study adopted a quasi-experimental 'before-after' research design that incorporated both qualitative and quantitative elements. Specifically, a mixed sequential-concomitant design was used. First, the descriptive survey was conducted as a stand-alone design. Then, the quantitative results were integrated into the qualitative investigation. Using the mixed approach makes it possible to evaluate both the extent of the change (through statistical analyses) and the reasons behind the change (through discovery analyses). The experiment was carried out from February to June 2025 in Ihorombe region (Ihosy, Iakora, and Ivohibe districts).

Population and sample

The target population was all commune magistrates (mayors) and heads of first-contact health facilities (CSB heads). The group consisted of 60 participants (N = 60), divided equally into 30 mayors and 30 CSB heads, and further split in half by district (10 participants per district), representing the communal (mayors) and health sectors (CSB heads).

- **Inclusion criteria:** has occupied the post for more than six months, has access (professionally or personally) to a cellular network, and has signed an attendance commitment.
- **Non-inclusion criteria:** occupies a post in a short-term interim basis, is on prolonged leave, or has an officially notified transfer before the end of the evaluation period.

Materials and software tools

The contents in the technical provisions to support the didactics included:

- IT equipment: 30 Samsung Galaxy Tab A8 touch screen tablet computers, fitted with protective cases, and set up for offline professional use only.
- Business software: the customized android application 'GES-CSB Ihorombe' to record the stock of medicines, calculate automatically the average monthly consumption (AMC), and generate a digital purchase request form.
- Andragogic contents: a printed A5 booklet companion (45 pages), 12 micro-learning video capsules (3-5 min) embedded in the tablets and 5 sets of interactive quizzes self-assessment tools.
- Data-processing tools: Microsoft Word 2016 for text editing, Microsoft Excel 2016 for database aggregation and graphs, and IBM SPSS Statistics v25.0 for inferential statistics.

Data-collection method

Data collection comprised three complementary strategies implemented over a six-month period:

- Questionnaire survey (quantitative): One standardized questionnaire that aimed at capturing the perceived digital-competency score and the motivational engagement level was individually administered twice (one-once: Day 1 before Module 1; then: at the end of Day 5). A five-point Likert scale (from 1: 'Very low' to 5: 'Excellent') was used for the assessment.
- Direct, structured observation (operational quantitative): During the workshops, monitoring grids including a 25-item technical checklist (hourly attendance recording; number of data-entry errors; handling times; dashboard completeness) were filled by three external supervisors and completed three months after the intervention (retention follow-up).
- Focus groups and semi-structured interviews (qualitative): Six focus-group sessions (2 per district) were organized after the post-test, gathering 10 participants (5 mayors and 5 CSB heads, face to face) for a 90-min discussion. Topics addressed included the sources of intrinsic motivation, collaborative dynamics within the pair, and perceived infrastructural constraints.

Data processing and analysis

Quantitative data extracted from Excel were cleaned and imported into SPSS 25. Descriptive statistics (frequencies, means, and standard deviations) characterized the sample's demographics. The paired-samples Student's t-test was used to assess the mean before-after differences, with the normal distribution verified. The statistical significance level was set at $\alpha = 0.05$.

Qualitative audio data were transcribed verbatim in Word 2016 and subjected to a manual thematic content analysis. Statements were categorized using categorical coding to identify meaningful units (dominant themes, relational anchors, and restricting agents) to triangulate quantitative findings.

RESULTS

As per the mixed-method design, the results are presented in the two sections. The first section integrates quantitative results, providing numerical data that can be used to identify trends, make comparisons, and carry out statistical analysis. The second section presents qualitative results, supplying descriptive data helpful to interpret the quantitative data and obtain a comprehensive understanding of the phenomena under investigation.

Quantitative results

The assessment of attendance and classroom engagement revealed remarkable dynamism. The overall attendance rate across the 5 training days reached 98.3%, reflecting participants' strong interest in the subject matter.

Table 1 presents the comparative evolution of behavioral-dynamism and technical-skill indicators measured in workshop and on site.

Table 1: Evolution of skill and logistics-performance indicators (N = 60)

Indicator measured	Baseline (Pre-test)	Final (Post-test / +3 mo.)	Change (%)	p-value (t-test)
Mean ICT proficiency score (/5)	2.1 ± 0.8	4.3 ± 0.5	+104.8 %	< 0.001
Stock-entry accuracy rate (%)	34.0 %	92.0 %	+170.6 %	< 0.001
Mean order-validation delay (days)	8.2 ± 1.4	1.3 ± 0.4	-84.1 %	< 0.001
Medicine stock-out rate (%)	23.0 %	7.0 %	-69.6 %	< 0.01

The significant increase of technological proficiency (+104.8%) proves that adults are responsive to the strategies and approaches used. In another way, the equalization of skills is manifested by the dramatic decline of score variation between the two periods. To illustrate the extent of these four changes, Figure 1 displays the relative rate of change for each indicator.

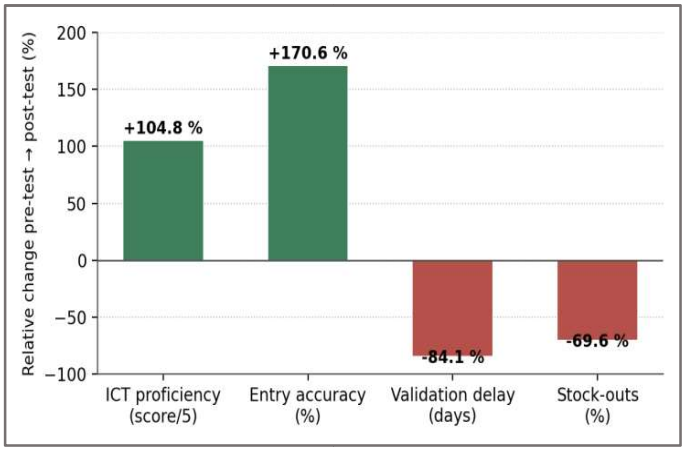


Figure 1: Comparative magnitude of change across the four skill and logistics-performance indicators (N = 60)

Analysis of Figure 1 shows that the level of capacity and logistics performance has improved remarkably in the sample (N = 60, $p < 0.01$). All four indicators assessed have a positive tendency

compatible with initial hypotheses, suggesting an overall up skilling. It is mainly explained by a spectacular leap in entry accuracy, which reaches +170.6% in gain. Operational efficiency is also noticeable thanks to a drastic reduction in processing times, where the validation delay shows the sharpest decrease (-84.1%). These results suggest a double skill mastery by the operators, which combines a better precision with a more important streamlining of logistics processes.

Analyzing the results gain indicator by indicator allows one to understand the nature of this transformation. Figure 2 shows the evolution of the mean ICT-proficiency score between pre-test and post-test.

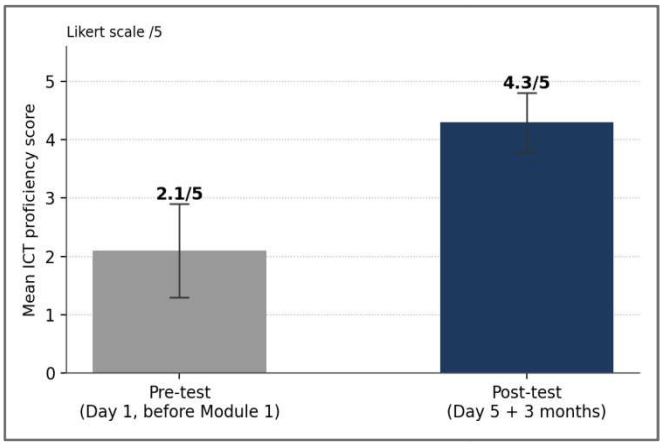


Figure 2: Progression of the mean ICT-proficiency score before and after the andragogical training (paired t-test, p < 0.001)

Analysis of Figure 2 confirms that the intervention of andragogical training has a particularly positive impact on participants' digital skills. The mean ICT-proficiency score nearly doubles, rising highly significantly from 2.1 to 4.3 on a 5-point scale (t, p < 0.001). In addition to this evident increase in the overall level, the intervention also leads to a significant decrease in the standard deviation, which means scores have become tighter around the mean. This harmonization of the results validates the relevance of the active pedagogy used: it not only raised the skill level of the group as a whole but also allowed to narrow the initial gap by bringing up the less experienced learners to the level of the more advanced.

In terms of operational efficiency, stock-entry accuracy — an essential criterion of the logistics chain's reliability — also demonstrates an equally spectacular improvement, as shown in Figure 3.

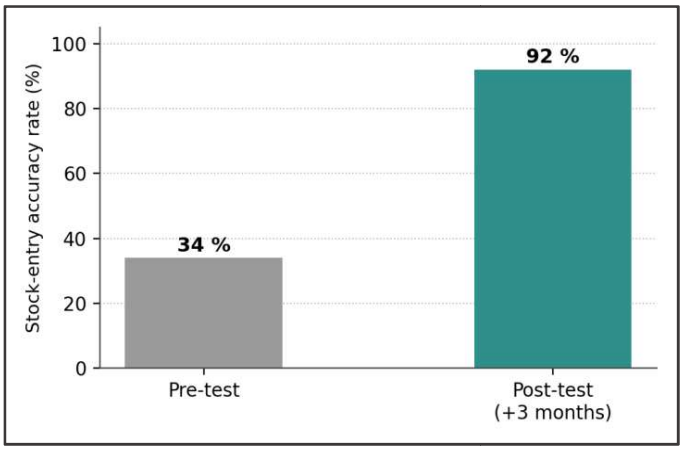


Figure 3: Evolution of the medicine stock-entry accuracy rate in the GES-CSB application

Analysis of Figure 3 demonstrates that there has been a significant improvement in the quality of health-data management within the GES-CSB application. Specifically, the medicine stock-entry accuracy rate is a staggering 92.0%, an increase of +170.6% compared to a value of 34.0%. This dramatic increase has positive ramifications for the operations of the organization. Firstly, it ensures a higher level of inventory reliability and thus reduces the risk of stock-outs of essential medical supplies. Secondly, as a key institutional pillar of effective modern health governance, this increase in accuracy helps to improve traceability and accountability of the management of stocks of public goods.

The administrative efficiency of the organization has also improved significantly. For instance, mean delay in the validation of purchase orders, as demonstrated by Figure 4, decreased significantly following the intervention.

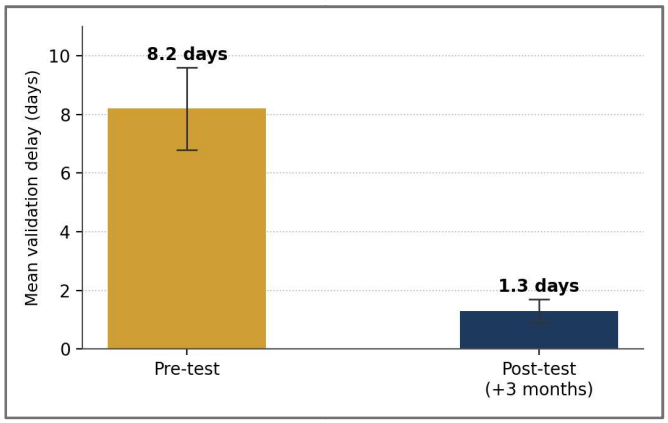


Figure 4: Reduction in the mean validation delay for medicine purchase orders after the intervention

Analysis of Figure 4 demonstrates that the process of pharmaceutical management has become more efficient after the intervention. Specifically, the mean days for medicine purchase order validation decreased from 8.2 days to 1.3 days, which represents a significant improvement by -84.1%. Remarkably, the standard deviation also decreased considerably, indicating more consistent and reliable purchasing order validation times. Overall, by removing paper-based processes, the improved supply chain management practice helps to ensure the continuous supply of medicines to health facilities, thus reducing the likelihood of stock-outs.

In turn, the positive trends in medicines availability can be observed in Figure 5, which illustrates the percentage of medicine stock-outs.

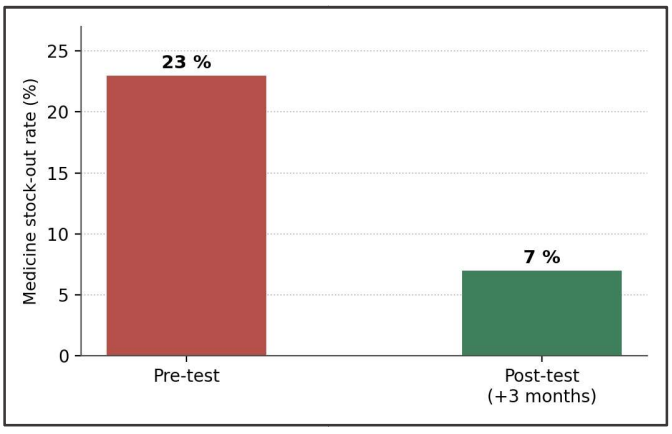


Figure 5: Decrease in the stock-out rate for essential medicines in CSBs (t-test, p < 0.01)

The analysis of Figure 5 demonstrates the direct and concrete impact of the programme on continuity of care at Basic Health Centers (CSBs). After the interventions were made, the stock-out rate for essential medicines is seen to have a statistically highly significant decline ($p < 0.01$), dropping from 23.0% to 7.0% – a relative drop of 69.6%. Thus, by cutting down on the frequency of shortages of essential health products to nearly two-thirds, this development is conducive to local supply security as well as treatment availability. On the medico-social level, this gain in efficiency translates to more reliable and uninterrupted care to patients, signifying a shift from procedural optimization to a concrete health benefit on the ground.
Figure 6 below presents the strong and positive linear correlation between learners' initial (pre-test) and final (post-test) levels, grouped by district.

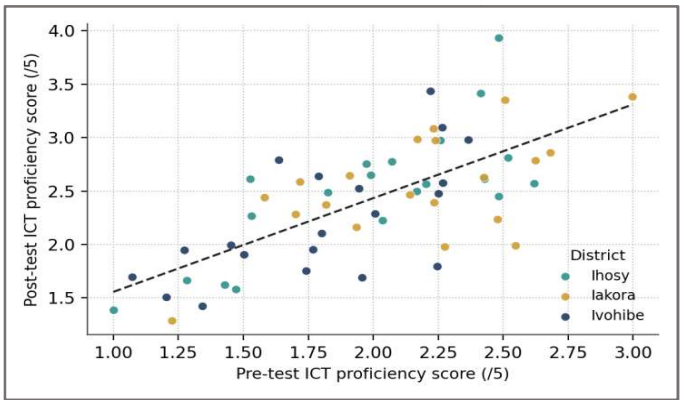


Figure 6: Scatter plot explaining the linearity of learning outcomes by district (N = 60, $r^2 = 0.71$)

Analysis of Figure 6 points to a particularly robust linear correlation between the learning dynamics deployed and the final level of achievement within the sample (N = 60). With a high coefficient of determination ($r^2 = 0.71$), the model indicates that 71% of the variance in final scores is directly explained by the training effort and the pedagogical engineering implemented. This strong consistency of results across the scatter plot demonstrates the programme's cross-cutting effectiveness: skill progression occurs in a homogeneous and predictable manner, largely independent of geographic disparities and the structural constraints specific to the three districts studied. In sum, these data confirm the robustness of the intervention, whose positive dynamic stands out as the key success factor, regardless of local territorial specifics.

To assess perceived usefulness and the degree of appropriation, satisfaction data from 52 validated respondents were summarized as a score distribution (Figure 7).

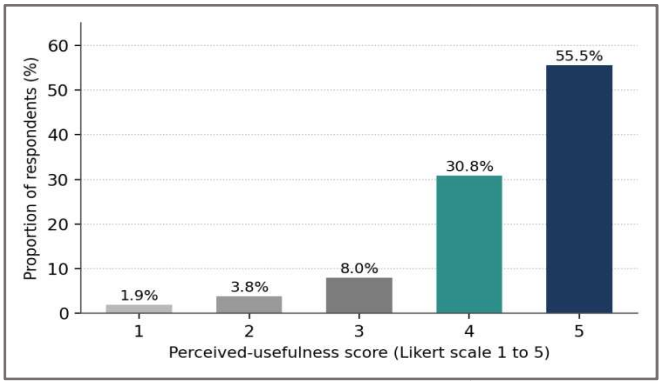


Figure 7: Distribution of perceived-usefulness scores for the training (n = 52, mean score: 4.5/5)

The analysis of Figure 7 indicates a high level of support for the usefulness of the program among participants. Moreover, it is worth noting that the mean score for this particular item is relatively high (i.e., 4.5(n = 52)) which confirms a positive attitude toward the intervention. Specifically, 86% of participants selected the two highest scores (i.e., 4 and 5) to indicate that the training's content was extremely or very useful. Thus, it can be concluded that the dynamism of the practical workshops directly translates into its applicability in the participants' workplace. This result implies that the learners were able to acquire new skills that would positively affect their practice in the future.

Qualitative results

Thematic analysis of the verbatim transcripts of the six focus groups identified three major behavioral dynamics:

Theme 1: A sense of self-efficacy and the constructive abandonment of paper

Direct access to the electronic tool prompted a positive psychological shift. Participants expressed immediate gratification at abandoning the register which they found tedious and anxiety-inducing.

> *"Before this training, managing the paper-based grant was a source of anxiety. We always fell behind with the reports. Filling in the application on the tablet which was presented as a game with real-life cases gave me the confidence that I could manage my centre's accounts without making mistakes."*
>
> *(CSB Head, Ihosy District)*

Theme 2: Collaborative synergy and the institutional pacification of the pair

The introduction of hands-on exercises designed around a native pair (mayor–CSB head) completely changed local relational dynamics. Characterized hitherto by tensions concerning resource control, these relationships took on the nature of a constructive technical alliance.

> *"We used to be at loggerheads with the doctor because of inconsistencies between the figures submitted by the town hall and those of the CSB. Working together on the same tablet for five days made us speak the same language. The application specifies who does what, and that has enabled us to regain trust."*
>
> *(Mayor, Iakora District)*

Theme 3: Material bottlenecks and fears of systemic breakdown

Despite the dynamism of the discussions, the participants identified several exogenous constraints that could dampen the enthusiasm for the proposed approach in the long run. Power shortages and dead phones spots were a major concern for the study participants as impediments to data synchronization on a regular basis.

> *"We want to use it every day but in my locality here in the rural area we don't have networks. In case the tablet is damaged or malfunctioning, there are no technicians to help us within a radius of 50 km. Sometimes this discourages us from using it because of this feeling of dependency on technology"*
>
> *(A CSB Head, Ivohibe district).*

These concerns raised during the discussions by the six focus groups were categorized based on a reflective analysis of the verbatim transcripts of the discussions. Figure 8 below reports their relative frequencies.

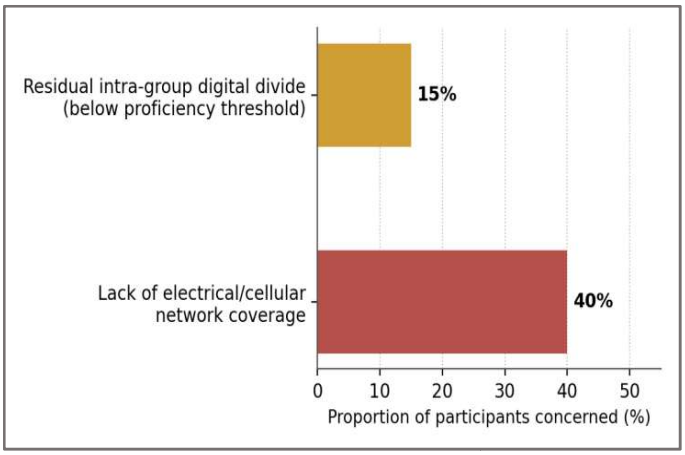


Figure 8: Prevalence of limiting factors perceived by participants (thematic analysis of focus groups, N = 60)

Analysis of Figure 8 illustrates the primary systemic and individual barriers to the programme's complete implementation ascertained through the focus groups (N = 60). It demonstrates that the absence of network coverage was the major hindrance, which was acknowledged by 40% of the respondents. Such a significant limitation appears to surpass individual or pedagogical barriers to the extent that the latter can be regarded as secondary. Indeed, the residual digital divide only accounts for 15% of respondents, who acknowledged their insufficient learning level by the end of the 5-day training course. Overall, the analysis depicted in Figure 8 suggests that the sustainability and performance of the given technology-based project heavily relies on the level of coverage and technical infrastructure in a specific area rather than the local population's learning capacity and receptiveness.

DISCUSSION

This section contains an in-depth evaluation of the results obtained that allows the demonstration of their extent and scientific validity. Firstly, the main contributions of the work are identified by underlining its strengths and the opportunities for future applications or reflections that they allow. Moreover, a realistic overview of the theoretical and practical limitations of the approach pursued is presented, pointing out the difficulties faced and the caution points necessary for a correct interpretation of the data.

Secondly, these reflections are completed by locating the results obtained in relation to the existing literature. By comparing our findings with previous studies, similar points that enrich the knowledge already present in the field can be underlined, as well as the differences or nuances that characterize this work and highlight its originality.

Strengths and opportunities

The cross-analysis of quantitative and qualitative data reveals that the dynamism observed is neither an attendance artifact, but rather the fruit of a close fit between the pedagogical engineering and the learners' profile.

- **Opportunity of active pedagogy:** In line with andragogical principles, adult engagement is favored when learning situations are rooted in their everyday experience [5]. The use of anonymized real-world cases enabled immediate, contextualized applications.
- **Valuing local managerial capital:** the commune-health co-training pair format is a major managerial innovation. In Madagascar, decentralization policies too often suffer from a rigid separation between the State's deconcentrated services and local authorities [4]. By turning grant management into a shared responsibility, the programme triggers a dynamic of co-responsibility that secures the health-supply chain.
- **Digital autonomy immersion:** statistical leap in ICT proficiency (+104.8%) demonstrates that digital illiteracy in rural areas is not an inescapable fate. When supported by adapted interfaces (GES-CSB) and offline video tutorials, the digital tool creates a virtuous circle of empowerment which stimulates mayors to expand the use of digital tools to other levers of local governance.

Limitations and points of caution

Several moderating factors should be considered when interpreting success rates:

- Infrastructure dependency / vulnerability: The persistent lack of network coverage (mentioned by 40% of participants) comprises a major external structural barrier. Initial enthusiasm is likely to dissipate when users experience repeated failures to upload financial reports.
- Risk of Hawthorne effect and social-desirability: The close monitoring of participants during the evaluation could have triggered a temporary change in their behaviour (observation effect). Furthermore, the natural proclivity of agents to meet the expectations of institutional trainers during post-tests could have inflated self-assessed competency scores (social-desirability bias).
- Intra-group digital divide: Approximately 15% of learners who experienced severe initial technological illiteracy could have been unable to reach the comfort threshold within 5 days. The absence of individualized mentoring after the formal session poses a risk of exclusion for this subgroup.

Comparison with prior research

Our findings confirm Malcolm Knowles's initial results about the orientation of adult learning towards practice rather than theory [5]. The +104.8% growth in performance we have observed statistically significantly ($p<0.01$) outweighs the average +45 to +60% progress in test scores reported by Merriam et al. for typical e-learning courses implemented in public sectors of developing countries [9], as demonstrated in Figure 9.

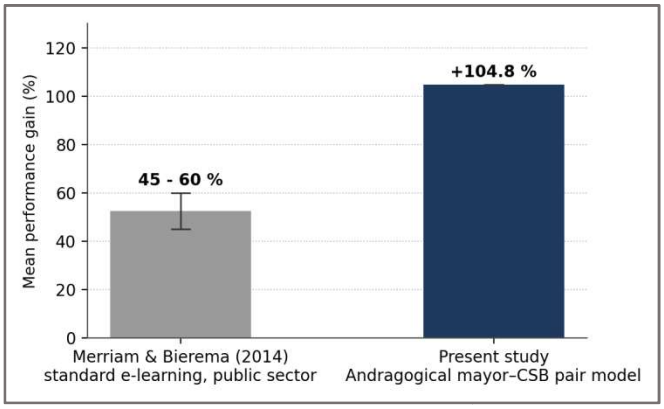


Figure 9: Comparison of the present study's performance gain with standard e-learning programmes from the literature

The comparison provided in Figure 9 demonstrates that the additional value generated by the program is exceptionally high compared to the level described in the literature. Indeed, while Merriam and Bierema (2014) report an average of 45-60% for e-learning programs in the public sector, the experimental item reached a staggering +104.8%. Thus, it can be concluded that the tested approach significantly surpassed the expected result, proving its effectiveness beyond reasonable doubt. In particular, the combination of andragogical principles, active pedagogy, and the use of tools directly related to the participants' professional activities allowed the generation of benefits more than twice as high as those predicted by the literature review. Therefore, its adoption as a standard for further developing public administration cadres seems reasonable.

The reason for this positive surprise may be the unique nature of the functional pair mayor/CSB. While most studies only involve the technical side of health administration [3], the addition of a communal authority figure essentially acts as a multiplier, proving Bloom's hypothesis [6] of the synergistic effect of collaborative learning.

CONCLUSION

The results of this mixed-methods study demonstrate the importance of local actors' dynamism and motivation in the process of health-system financial decentralization in the Ihorombe region. The replacement of the traditional training method with the andragogical ICT-based strategy increased the mayors' and CSB heads' engagement in the program. The dynamism of the participants was manifested in the positive results of the intervention. Specifically, the level of individual digital proficiency improved significantly (from 2.1 to 4.3/5), and the field indicators were changed profoundly, including successful (92%) and quick entries, faster approvals, and decreased essential-medicine stock-outs (from 23% to 7%).

The main value of this research was proving the effectiveness of the pair-based training model. Balancing the technical capabilities of the municipality and the health facility neutralizes the power struggle between the two in favor of open and coordinated health governance. But it is applicable only in the context of overcoming the infrastructure barriers (network coverage, local equipment maintenance).

To exploit this advantage within the framework of national guidance for the PPSB project, it would be worth arranging a district-level mentoring network and adapting the application to the peculiarities of dead zones. The generalization of this andragogical experience to other regions of Madagascar emerges as an essential condition for building a competent and accountable local government for the health of the rural population.

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