

# Effective Integration of Digital Tools into the Teaching Practices of Public Primary School Teachers in the CISCO of Fianarantsoa, DREN Haute Matriatra, Madagascar

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**Abstract:** The integration of digital tools into pedagogy in Madagascar is an ongoing process, offering numerous opportunities to improve access to education and the quality of learning, while requiring particular attention to local issues and the capacities of the education system (Andriamihaja, 2020). However, the use of digital technologies in schools in Madagascar remains limited and fragile, primarily in public primary schools, due to infrastructural constraints, teachers' low digital skills, and a lack of appropriate digital resources (Rabenarivo et al., 2018). Indeed, the effectiveness of integrating digital technology into learning depends on a multitude of factors that go beyond simply providing equipment. Some public primary school teachers in the Fianarantsoa school district have tablets provided by the Ministry of National Education (MEN) to integrate digital technology into their teaching.

This article aims to analyze the conditions for integrating digital technology into learning within the CISCO public primary schools of Fianarantsoa, highlighting the specific obstacles encountered by teachers that hinder the effectiveness of this integration. The goal is to propose more operational recommendations regarding access to, use of, and pedagogical competence in digital technology within these schools. The research is based on a descriptive qualitative approach, using questionnaires and interviews conducted with teachers, students, and principals of the public primary schools. In addition, classroom observation provided concrete data on digital teaching practices in real-world contexts. The analysis of teaching practices was carried out using the TPaCK model by Koehler and Mishra (2009). This model guided the interpretation of the interactions between technological, pedagogical, and disciplinary knowledge, in order to assess how teachers integrate tablets into their practice. The results show that several factors can hinder the effectiveness of integrating digital tools into the teaching practices of primary school teachers.

To explain this observation, the discussion mentions certain structural and institutional factors that emerge, such as the availability of digital infrastructure and equipment, the design of the digital school program, and the competence of teachers.

**Keywords:** Digital Integration, Digital Tools, Tablet, Teaching Practice, Teacher, Public Primary School.

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## I. INTRODUCTION

Today, digital technologies are essential worldwide for working, learning, socializing, participating in societal debates, and accessing information and public services. Furthermore, Information and Communication Technologies (ICTs) play a crucial role in transforming education systems. According to UNESCO (2021), integrating digital technologies into education can improve access to education, the quality of learning, and teaching effectiveness. Moreover, according to Thierry Karsenti and Simon Collin (2013), the pedagogical integration of ICTs is defined as the planned and regular use of technologies by teachers to improve student learning. Indeed, many countries are integrating ICTs into their education systems.

Madagascar is committed to digitizing its education system to address the challenges of sustainable development and social inclusion. The Ministry of National Education (MEN) has launched several initiatives to integrate digital technology into teaching, such as distributing tablets and computers, creating dedicated resources, and training teachers. However, according to Rabenarivo et al. (2018), the use of digital technologies in schools in Madagascar remains limited and fragile, particularly in public primary schools, due to infrastructural constraints, teachers limited digital skills, and a lack of suitable digital resources. Although public primary school teachers in the Fianarantsoa CISCO district received tablets in 2024 to promote digital innovation, the use of these tools remains hampered by numerous technical and practical obstacles. These constraints limit the effective integration of digital tools into teaching practices. This is why we chose this topic. By focusing on Public Primary Schools (PPS) because they play the primary role of ensuring free, compulsory, and quality basic education for all children, without discrimination, this study began with a central research question: How can digital tools be effectively integrated into the teaching practices of public primary school teachers in the Fianarantsoa District Education Authority (CISCO)? To better answer this question, we will proceed directly to formulate hypotheses. Indeed, the effective integration of digital tools into teachers' pedagogical practices presents specific challenges, particularly related to infrastructure, digital equipment, the content of this equipment, teacher training, and the availability of appropriate teaching resources.

This research aims to analyze the conditions for integrating digital technology into teacher learning within the primary schools (EPP) of the Fianarantsoa district (CISCO). It highlights the specific obstacles encountered by teachers that hinder the effectiveness of this integration, in order to propose more operational recommendations concerning access to, use of, and pedagogical competence in digital technology within the schools, taking into account local realities and the specific needs of the district. This study employs a mixed-methods approach, combining quantitative and qualitative methods. It relies on the administration of questionnaires, conducting interviews, and direct observation.

In order to address this issue, we will first examine the methodology, then the results, before finally discussing and making recommendations.

## II. MATERIALS AND METHODS

### A. *Presentation of the Study Area:*

This analysis helps to better understand the local context in which this study takes place, particularly regarding the integration of digital technologies into the teaching practices of public primary school teachers.

### ➤ *Geographical Location:*

The Fianarantsoa CISCO is located in the heart of the central highlands of Madagascar, in the Haute Matsiatra Region. It is situated within the Urban Commune of Fianarantsoa. It primarily encompasses the urban area of the city of Fianarantsoa as well as surrounding areas.

### ➤ *Organization of the Local Education System:*

The CISCO is one of the CISCOs that make up the DREN Haute Matsiatra. It is subdivided into several ZAPs. Each ZAP is headed by a ZAP Chief who acts as a liaison between the CISCO and the local schools. It encompasses a high concentration of primary schools, General Education Colleges (CEG), and high schools, with a mix of public and private institutions.

### ➤ *Pedagogical Dynamics and Challenges:*

It has a high concentration of teachers (civil servants and FRAM contract teachers). As an urban and peri-urban area, it is often chosen for the pilot phases of national projects, such as the introduction of new tools or the experimentation of innovative teaching methods.

### B. *Methodological Approach:*

This research adopts a qualitative approach, complemented by quantitative elements, to gain a deeper understanding of tablet use, perceptions, and the challenges associated with integrating digital tools into public primary education in the Fianarantsoa CISCO (School District). The objective is to obtain rich and detailed data on digital teaching practices and the digital skills experienced by the teachers involved, while also providing a statistical overview of observed trends. It should be noted that the use of these tablets remains at the experimental stage. Direct classroom observations will also be conducted with selected teachers, particularly the 27 teachers in T2 classes, to identify the problems they encounter using digital equipment, primarily tablets, to observe digital technology in practice, and to supplement the data. This observation will also allow for an analysis of the actual use of tablets and the interactions between teachers and students. The study involved 27 teachers who participated in a professional development program focused on integrating technology into their teaching practices. Therefore, we conducted semi-structured interviews with teachers using tablets in the 16 primary schools (EPP) of the Fianarantsoa CISCO (District Education Office), Haute Matsiatra Regional Directorate of National Education (DREN). These interviews allowed us to understand tablet use, teachers' experiences and perceptions regarding the integration of digital technology into their teaching, and also to identify the problems they encountered. The sampling method was purposive, targeting teachers using tablets in their teaching during the experimental phase. Specifically, a sample of 27 (twenty-seven) teachers in the second year of primary school

(T2), who will receive tablets in 2024, was selected from 16 (sixteen) public primary schools in the Fianarantsoa CISCO to ensure a diversity of contexts.

Several questions and surveys were posed to teachers in primary schools. Documents were also received from the Regional Directorate of National Education (DREN) of Haute Matsiatra and the Fianarantsoa District Education Office (CISCO) with the aim of collecting quantitative data on access to infrastructure and digital equipment in primary schools, on teachers' digital skills, and on the obstacles to the effective integration of digital tools into teachers' pedagogical practices. The tools used in this study were: an interview guide developed according to our research objectives, a structured questionnaire with closed and open-ended questions posed to the target population to obtain the necessary data, and an observation grid for classroom sessions. However, this methodology has some limitations, such as the fact that non-probability sampling may limit the generalizability of the results to the entire population. Furthermore, the reliance on self-reporting in the questionnaires and interviews may introduce social desirability bias. In summary, the combined use of three methods (questionnaire, interview, and observation) allows for a more complete understanding of teachers' pedagogical practices and the conditions that promote the effective integration of digital tools in public primary schools in the CISCO of Fianarantsoa.

### III. PRESENTATION OF THE RESULTS

Analysis of the conditions for integrating digital tools into the teaching practices of public primary school teachers in the CISCO of Fianarantsoa.

#### A. Analysis of the Actual Use of Tablets in the Teaching Practices of Public Primary School Teachers in the CISCO of Fianarantsoa:

##### ➤ Frequency and Methods of Use:

In 2024, the pilot phase of tablet distribution by the Ministry of National Education (MEN) involved 27 teachers (grade T2) from 16 public primary schools in the Fianarantsoa district. This initiative primarily aims to promote self-directed learning among the beneficiaries within the framework of the national strategy for the digital transformation of primary education. Regarding the inadequacy of the curricula and programs, surveys of teachers revealed that only two subjects are integrated into these tablets: Malagasy language and arithmetic. Consequently, there is an incomplete integration of the official T2 curriculum into the digital resources of these tablets. More specifically, there is a lack of complete digitization of the national curricula on the provided materials.

Regarding usage, teachers used these tablets daily, but exclusively during sessions dedicated to these two subjects, which significantly limited the implementation of integrated digital pedagogy. Indeed, the use of digital teaching tools was infrequent. However, all educational content, such as lessons, exercises, assessments, and lesson plans, was available on the tablets. Consequently, teachers no longer used textbooks in their teaching practice for these subjects, but simply followed the content provided on the tablets. They also did not prepare

their lessons at home, relying entirely on the content already integrated into the tablet.

##### ➤ The Pedagogical Integration of Tablets:

Within the context of digital classroom activities, tablets are strictly reserved for teachers in T2 classes in the selected EPPs (Public Primary Schools). It was observed that only one tablet is allocated to each teacher, its use being thus reserved exclusively for them. Despite pre-loaded content, including textbooks from the official curriculum, students have no direct access to these devices. They cannot manipulate them or truly appropriate their use, which significantly limits the development of active learning. This finding highlights a major structural limitation in the integration of digital technology in the classroom. Indeed, allocating only one tablet to a teacher, to the exclusion of students, reveals several realities, such as a teacher-centered pedagogy, digital exclusion of students, insufficient material resources, and a hindrance to active learning. In short, the integration of digital technology remains superficial, confined to the role of the teacher, without truly transforming teaching practices or directly benefiting students.

Regarding pedagogical support, a single tutor is responsible for assisting all teachers in learning how to use these tools. Nevertheless, the majority of them manage to use them independently, thanks to the prior training they received. This result indicates that while the initial training has had a positive impact on teacher autonomy, the pedagogical support remains insufficient to guarantee complete, sustainable, and high-quality digital integration. Furthermore, it should also be noted that the T5 level teachers had already used these tablets in 2020; however, they are now out of service due to technical malfunctions. This indicates that the sustainability of the digital system is seriously compromised by the lack of an adequate maintenance plan and the fragility of the equipment, thus threatening educational outcomes and the continuity of the project.

##### ➤ Problems Encountered by Teachers Using These Tablets:

The first pedagogical problem lies in the fact that, for Malagasy subjects, the proposed program is not adapted to the T2 level, particularly reading. The availability of content on the tablets assumes that students are already fluent readers, whereas the official curriculum, presented in textbooks, does not address this skill; they are, in fact, in the learning phase. All teachers using these tablets unanimously identify this discrepancy as a major problem for learning. Furthermore, for arithmetic, the path to achieving the objective is very different from the approach used in textbooks. Moreover, the time children can typically maintain their concentration remains particularly limited. In addition, before each use of the tablets, in schools lacking electricity, the teacher must recharge the devices at home or elsewhere without power. Hence, the safety of these tablets is called into question. Thus, when the battery of this tablet is low, its teaching function is suspended.

Finally, regarding the opinions of the students in class T2, they also expressed a strong sense of curiosity and a keen desire to interact with these tablets. However, frequent handling by many hands risks quickly damaging these devices. Furthermore, group projection is not feasible without a

projector. The teacher cannot project all the educational activities due to a lack of equipment.

**B. Obstacles to the Effective Integration of Digital Tools into the Teaching Practices of Public Primary School Teachers in the CISCO of Fianarantsoa:**

Digital inclusion is subject to three essential factors: access, effective use of services and possession of digital skills.

➤ **Structural Factors:**

In Madagascar, and more specifically in the Fianarantsoa CISCO (a highland region with significant rural/urban disparities), these obstacles are often the primary impediment to any digital initiative. Structural factors refer to all the constraints related to basic infrastructure and access to the technical equipment essential for using Information and Communication Technologies for Education (ICTE).

• **Access to the Infrastructure:**

First, access to infrastructure: The Fianarantsoa District Education Office (CISCO) is located in the urban commune of Fianarantsoa and comprises 34 primary schools (EPP). These schools have both new and old school buildings to support students and facilitate educational activities. Some buildings are connected to the electrical grid, while others are either not connected or lack electricity. There is unequal access even within the CISCO itself.

Table 1: Access to Electricity in Public Primary Schools of the CISCO of Fianarantsoa.

EPP	NUMBER	PERCENTAGE
ELECTRIFIED	15	44%
NON-ELECTRIFIED	19	56%
TOTAL	34	100%

Source: FPE/DREN HM

This table highlights the electrification situation of public primary schools (EPP) within the Fianarantsoa district. Out of a total of 34 schools, only 15, or 44%, have access to the JIRAMA electricity grid. Conversely, 19 schools, representing 56%, are not electrified. This distribution reveals a significant lack of access to electricity, with more than half of the EPPs (56%) deprived of this essential resource, particularly those located far from a JIRAMA power source.

This situation can negatively impact the quality of teaching, particularly by limiting the use of educational technologies, lighting in classrooms, or the preservation of certain teaching equipment requiring a power supply.

Table 2: Distribution of Selected EPPs According to their Access to Electricity

EPP SELECTED	NUMBER	PERCENTAGE
ELECTRIFIED	8	50%
NON-ELECTRIFIED	8	50%
TOTAL	16	100%

Source: FPE/DREN HM

The table shows the distribution of the 16 schools using tablets, categorized by their access to electricity, within the Fianarantsoa CISCO (Intercommunal School District). The results reveal a perfectly balanced distribution: 8 electrified schools (50%) compared to 8 non-electrified schools (also 50%). This apparent balance, while seemingly random, reflects an alarming reality: one in two schools operates without electricity, depriving hundreds of students of optimal learning conditions and hindering the integration of modern educational tools within these institutions.

Furthermore, regarding the lack of connectivity infrastructure, digital integration requires access to online resources. However, schools equipped with these tablets currently lack connectivity. Moreover, these tablets do not have any free internet access. Indeed, no research has been conducted, despite the need expressed by teachers. Concerning the inadequacy and obsolescence of equipment, all primary schools in this district lack computers, interactive whiteboards, projectors, or digital kits. The few equipment donations that are received are often concentrated on junior high schools and high schools.

➤ **Access to Equipment :**

In the context of access to digital technology for educational purposes, according to Table 3, it was observed that 47% of the public primary schools in the CISCO of Fianarantsoa are equipped with tablets.

More specifically, out of a total of 34 public primary schools (EPP), only 16 have the basic conditions necessary to integrate digital technology into their teaching practices. This finding reveals that more than half of the schools (53%) still lack tablets and the adequate infrastructure to ensure internet connectivity. While this level of equipment might be seen as an encouraging sign, it highlights a persistent digital divide, hindering the modernization of educational practices. Consequently, internet access for teaching is limited, if not nonexistent.

Table 3: Distribution of EPP According to Tablet Availability.

EPP	NUMBER	PERCENTAGE
Equipped with tablets	16	47%
Not equipped with tablets	18	53%
TOTAL	34	100%

Source: CISCO of Fianarantsoa

Table 4: Distribution of Teachers According to the Availability of Digital Tablets:

TEACHERS	NUMBER	PERCENTAGE
Teachers will benefit from the tablets	27	8%
Teachers who do not have tablets	313	92%
Total	340	100%

Source: CISCO of Fianarantsoa

Table 4 shows that twenty-seven primary school teachers in the T2 class out of 340 teachers in the Fianarantsoa CISCO received tablets from the Ministry of National Education in 2024 to integrate digital pedagogy into their teaching. This means that some teachers are actually using tablets in their lessons. However, only 8% of teachers have access to digital tools to improve the quality of teaching. Meanwhile, 92% of public primary school teachers do not have tablets to practice digital pedagogy. The use of these resources is exclusively limited to the T2 class. It was also observed that no free internet access was provided for these tablets.

➤ *Institutional Factors:*

Institutional factors refer to all the constraints related to educational policies and training systems.

- *Constraints Related to National Education Policy:*

To date, the Malagasy state, primarily the Ministry of National Education (MEN), has not defined, formalized, and implemented a sufficiently precise, coherent, and applicable national education policy to concretely guide the integration of digital tools in public primary schools, including those under the jurisdiction of the Fianarantsoa District School Board (CISCO). This stems from a lack of financial and material resources, as well as an absence of political will translated into concrete and structured actions within the primary education system. Ultimately, this statement reveals a fundamental flaw in the system: since the state itself has not defined its role in digital technology within public primary education, it is unrealistic to expect teachers, left to their own devices, to spontaneously fill this institutional void.

- *Constraints Related to Teachers' Digital Skills:*

As part of a digital skills assessment, questions were posed to teachers in the CISCO (Intercommunal School District). Of 340 public primary school teachers, 100 demonstrated proficiency in using digital tools, primarily tablets, including those who already had access to them. Furthermore, while tablet use is widespread among most teachers, skills related to the use of other equipment, such as interactive whiteboards and computers, remain insufficient. However, the effective integration of digital tools into teacher training requires ICT skills (Table 5).

Table 5: Distribution of EPP Teachers Regarding their Digital Training:

TEACHERS of the EPP	NUMBER	PERCENTAGE
Teachers who have received digital training	100	29, 41%
Teachers not trained in the use of digital tools	240	70,58%
TOTAL	340	100%

Source: Survey forms completed by teachers (2024)

Of the 27 teachers who received tablets and training in their use, only two encountered difficulties. These teachers

also stated that they had never received any computer training, except for the use of these tablets. Consequently, they were unfamiliar with operating a computer or a projector. This lack of training led the teachers to lack confidence in their ability to conduct educational activities using digital tools. Despite this, they also affirmed that using tablets offers numerous advantages, such as improved planning and organization. Furthermore, tablet use strengthens teachers' theoretical knowledge and develops their practical skills in digital technologies. However, students are not involved in this integration despite the availability of digital devices.

The insufficient number of tablets in each school prevents students from using them regularly. This limited interaction restricts the development of their digital knowledge and skills. Active tablet use fosters engagement and autonomy; without it, students risk being less motivated and less able to solve complex digital tasks, resulting in theoretical and fragmented learning. Furthermore, the lack of student involvement in tablet use highlights existing disparities among students.

#### IV. DISCUSSIONS

Regarding tablet use, according to Andriamparany and Ramarolahy (2021), the adoption of digital technologies, particularly tablets, offers opportunities to improve the quality of teaching, promote student inclusion, and strengthen young people's digital skills. In other words, the introduction of tablets in schools is a major lever for enriching the learning experience, facilitating access to diverse digital content, and developing students' digital skills from primary school onward. However, the results presented in tablet usage rates reveal inequalities in access to technology within the Fianarantsoa CISCO (School District), whether between schools, between teachers, or especially between students. This can have repercussions on the quality of teaching, teacher motivation, and students' learning opportunities. According to UNESCO (2023), this situation contradicts the Sustainable Development Goals, particularly SDG 4, which aims to "ensure inclusive and equitable quality education for all." Furthermore, the low frequency of daily tablet use reported in these results indicates a limited integration of digital innovations into learning. These findings highlight the restricted integration of digital educational technologies in the primary schools concerned. Moreover, limiting tablet use to Malagasy language and math lessons suggests that the digital tool is perceived and used as a one-off subject-specific aid, rather than a cross-curricular teaching tool. This indicates that use is restricted to pre-loaded content on the devices, reflecting a rather passive technological appropriation focused on the simple transmission of knowledge. Consequently, the lack of complete digitization of national curricula on the provided devices constitutes a major obstacle to daily use. Indeed, the mismatch between the content stored on the tablets and the requirements of the official school programs forces teachers to use multiple resources, making the digital tool optional, even cumbersome.

There are limits to the pedagogical potential of these devices.

Outside of these two disciplines, tablets remain unused, representing a considerable waste of educational potential. This time constraint reveals a narrow conception of digital integration, limited to replacing textbooks rather than transforming teaching practices. Regarding the provision of tablets in the selected primary schools, while the Ministry of National Education's (MEN) initiative demonstrates a desire for modernization, it faces major structural and pedagogical limitations.

The fact that the tablet is the only digital tool available and used in the EPP (Educational Project for Primary Education) reveals several important points. On the one hand, it shows that digital equipment remains limited, and on the other hand, the exclusive use of this tablet suggests that digital practices are focused on simple, mobile, and intuitive activities. Above all, the absence of a computer or video projector indicates that student involvement in the digitization process remains limited. Thus, the teachers' insufficient skills in using appropriate digital tools is a major challenge to this integration. As Koehler and Mishra (2009) emphasize, mastery of educational technologies is not acquired through one-off training but through continuous, integrated, and reflective practice. Finally, the complete lack of free internet access on the distributed tablets constitutes a structural limitation that reduces their pedagogical potential, and they operate in a closed, autonomous mode.

As demonstrated by Kozma (2011) and UNESCO (2022), internet access in an educational context provides access to updated and diverse teaching resources, facilitates professional collaboration among teachers, keeps content current, and opens learners up to the world. All of this constitutes a major obstacle to the effective integration of digital technology in learning. However, the results also show positive impacts on tablet use. Following the survey of teachers, it is noteworthy that these teachers no longer prepare their lessons in advance, relying entirely on the digital content provided. This raises questions about the quality and adaptation of teaching to the specific needs of students. Furthermore, the shift away from textbooks in favor of digital resources indicates a significant change in practices, but one that is not accompanied by a diversification of resources or ongoing professional development.

Regarding the perceived impact of tablet use on the quality of primary education, the teacher states that the introduction of tablets has, in some cases, facilitated access to educational content, particularly for subjects like Malagasy and Mathematics. Tablets have offered structured and ready-to-use resources, which can lighten the preparation workload for teachers. However, the strict use of the digital content available on tablets, without adaptation or enrichment, has led to a standardization of teaching, limiting the ability to differentiate instruction according to students' needs. Teachers' pedagogical dynamism is also weak in the use of tablets, which risks reducing flexibility and creativity in knowledge transmission. Furthermore, students struggle to master the use of tablets because they are not actively involved in their use. Thus, the case of the T5 teachers clearly illustrates the limitations of this approach: after initial use in 2020, the tablets broke down and were not replaced, revealing the fragility of the equipment and a lack of technical and institutional support. Centralizing

educational resources (lessons, exercises, lesson plans) on a single digital platform not only facilitates the organization of teachers' work but also provides rapid access to content. Furthermore, the exclusive use of tablets by teachers raises several pedagogical and technological challenges. However, this restriction limits the opportunity for learners to develop skills from a young age. Moreover, the lack of direct use by students can reduce the potential impact of technology on improving learning, particularly in terms of individualized learning paths and academic motivation. Although support is limited to a single tutor, the teachers have developed functional autonomy in using the tablets, demonstrating the effectiveness of initial and ongoing training in the successful integration of educational technologies. As Depover et al. (2007) emphasize the need for ongoing support to ensure the successful integration of ICT in education, the discrepancy between the content of digital resources and official textbook curricula raises a major issue regarding pedagogical coherence. As Hattie (2009) points out, the use of inappropriate content can not only hinder learning but also generate frustration and disengagement among students. This inconsistency can lead to cognitive overload for students and compromise learning effectiveness. Furthermore, the approach proposed for calculation deviates considerably from that of textbooks, thus lengthening the learning process. However, according to Chanquoy et al. (2007), the sustained attention span of primary school students varies between 10 and 15 minutes, necessitating short, fast-paced teaching sequences.

Regarding the structural and institutional constraints hindering the effective integration of digital tools into the teaching practices of public primary school teachers in the Fianarantsoa CISCO (Intercommunal School District), Randriamarolaza et al. (2018) highlight the issue of electricity. First, they point to the electrification rate in Madagascar, which remains among the lowest in sub-Saharan Africa, with direct repercussions for the education sector. The most significant obstacle is the precariousness of access to energy. According to recent data (IMF/World Bank 2025), less than 1% of public primary schools in Madagascar have electricity. In the urban area of this CISCO, some schools still lack connections to the JIRAMA (Malian Electricity and Water Company) and operate without power. Furthermore, even areas with electricity often experience frequent outages due to load shedding. In the rural area of the Fianarantsoa CISCO (Intercommunal School District), a large number of public schools still lack access to electricity and do not even possess solar power equipment to enable the use of digital tools. Located within the urban commune of Fianarantsoa, the district is fortunate to have JIRAMA (the national electricity company) installed in all its schools and to have stable and unlimited connections, but it still faces major challenges regarding electricity. Some schools are connected to the electricity grid but lack access to free internet connectivity due to a lack of adequate digital equipment. There are also primary schools (EPP) that lack both electricity and internet access. However, according to Atchoarena and Gasperini (2003), the lack of electrification constitutes a major obstacle to the modernization of educational systems in rural areas, creating systemic inequalities between urban and peri-urban schools, since electricity is necessary to ensure the use of digital technology in schools. Thus, the operation of digital equipment and internet access require electricity. Indeed,

schools without access to electricity remain marginalized by this new technology, which limits or excludes them from the educational opportunities offered by digital tools and from equal opportunities for all students. Furthermore, the lack of electricity has a cascading effect on the quality of education; it also limits natural lighting in classrooms, which is particularly problematic for sessions at the end of the day or during the rainy season, according to Barreto & de Mendonça (2018). Despite this, the presence of electricity in a school is not a sufficient condition to guarantee the integration of digital technology into teaching practices. This also requires the availability of modern and appropriate digital equipment, such as tablets, computers, and digital kits.

Secondly, the lack of connectivity in this device prevents optimal use of tablets. They cannot access the internet or online platforms. Teachers cannot fully utilize digital resources (educational applications, videos, learning platforms, updates, content sharing). Consequently, digital use remains limited, less interactive, and less enriching for teaching. However, internet access is a crucial factor influencing the effective integration of digital technology in the classroom.

Third, the insufficient number of tablets presented in these results indicates a lack of technological resources, which hinders the effective integration of digital technology, including in the training of public primary school teachers within the Fianarantsoa CISCO (Intercommunal School District). Consequently, students lack access to digital tools at school, and their digital skills remain limited. However, Amadiou and Tricot (2014) emphasize that the pedagogical effectiveness of technology largely depends on the active engagement of learners in its use, which is lacking in the observed context. Thus, according to Piaget (1970) and Vygotsky (1978), learning is an active process in which students construct their knowledge through their interactions with the world and others. Furthermore, digital tools facilitate these interactions, allow for personalized learning, and promote collaborative work. Indeed, the use of a single tablet in teaching and learning does not guarantee the long-term effectiveness of digital pedagogy.

Fourth, the lack of a clear and operational national policy is the most decisive institutional factor hindering the integration of digital technology into the learning of public primary school teachers. Indeed, the absence of a well-defined strategic framework limits the direction of digital technology and the coordination of initiatives related to its use in education. Teachers may find themselves facing a lack of precise guidelines, adequate training, and institutional support to effectively integrate digital tools into their teaching practices. Consequently, the current problem is that teacher evaluation during this experimental phase is suspended.

Fifth, regarding teachers' digital skills, the finding that only 100 out of 340 teachers (29.4%) are proficient in using digital tools, particularly tablets, reveals a significant deficit in techno-pedagogical skills in this CISCO district studied. The concentration of teachers' skills on tablets, to the detriment of other tools such as computers, interactive whiteboards, or projectors, suggests training that is too specific and insufficiently transferable. According to Albion et al. (2015),

teachers' digital skills must be diverse and adaptable to respond to the constant technological evolution of the education sector. Our hypothesis is confirmed by our previous results, as the effective integration of digital tools into teachers' pedagogical practices poses specific challenges, particularly related to infrastructure, digital devices, the content of these devices, teacher training, and the availability of appropriate teaching resources.

## V. RECOMMENDATION

In light of the preceding observations, it is recommended to implement a comprehensive structural and institutional strategy aimed at strengthening the integration of digital tools in education. Providing electricity to all unelectrified schools is an absolute priority to ensure the operation of digital equipment. Furthermore, for schools located in remote areas where JIRAMA's electricity supply is difficult to install, the use of appropriate solar energy, specifically robust and reliable solar panels, could be an effective solution. Ensuring access to energy for schools through the implementation of mini-grids and off-grid power systems is crucial. It is also essential to provide technological equipment adapted to the climatic conditions of primary schools to allow students and teachers to fully benefit from these tools, especially computers with projectors.

Local authorities, parents, partnerships with NGOs, and the Ministry of National Education (MEN) must all take responsibility for the major challenges related to digital technology. It is essential that they work together to achieve this goal. However, as the primary authority, the MEN plays a key role in implementing the integration of digital tools in all schools, particularly in providing the necessary technology. Ideally, it should also seek partnerships, as these can provide financial and material resources to support schools' digital integration needs. More specifically, it should initiate public-private partnerships (PPPs) with local telecommunications operators to obtain preferential rates for schools, and explore solar energy solutions for schools not connected to the electrical grid.

Raising awareness among parents who have the means to purchase tablets or computers is essential. It is crucial that digital resources be diverse, contextualized, and aligned with learning objectives to support differentiated instruction tailored to students' needs. Furthermore, a mechanism for technical monitoring and regular maintenance must be implemented to ensure the sustainability of digital tools and prevent their rapid obsolescence.

The integration of digital technology into all primary school classes is also necessary to ensure continuity of digital learning and "equal access to digital resources for all." Digital educational content must also be harmonized with the official curriculum, particularly for the final year of primary school (T2). This harmonization should involve close collaboration between digital resource developers, teachers, and educational authorities to ensure that the skills targeted by digital resources truly correspond to the students' actual level. Furthermore, a testing and adjustment phase in the field would be advisable before any widespread implementation to guarantee the

relevance and effectiveness of the tools used in the classroom. Equipping primary schools with digital equipment other than tablets is crucial, including computers and projectors. A system for monitoring digital practices should not be neglected in order to regularly assess the impact of digital tools on learning and adjust integration strategies. Teacher training in digital technology and digitalization is insufficient compared to modern equipment. It is better to strengthen their skills.

A support system, including educational advisors or digital technology specialists, is essential to assist teachers in planning, implementing, and evaluating their digital practices, as well as monitoring equipment. A system for the continuous evaluation of technology use in classrooms should be established to adjust actions based on observed needs. Above all, teachers should be encouraged and supported in creating digital educational resources tailored to the local context. This could be achieved through collaborative workshops or content-sharing platforms.

## VI. CONCLUSION

We can conclude that the use of digital technologies in public primary schools in the Fianarantsoa district remains limited and fragile due to structural and institutional constraints, such as infrastructural factors, insufficient digital equipment, inadequate teacher training, and a lack of appropriate teaching resources. The availability of tablets in some primary schools allows access to digital teaching practices but is not sufficient to ensure effective digital integration. Furthermore, it appears that tablet use presents an opportunity to improve the quality of education and promote digital inclusion. Following the survey and interviews, the teacher used the tablet only in mathematics and Malagasy language subjects. Moreover, the analysis of data from classroom observations revealed that teachers primarily draw upon their existing ICT knowledge. Indeed, the effectiveness of integrating digital tools into teachers' pedagogical practices is questionable. Since it depends on several conditions, such as computer equipment, connectivity, teacher skills, and the up-to-date maintenance of digital equipment, it now represents a major challenge for the modernization of public primary education in the CISCO Fianarantsoa.

This study, through an approach combining field surveys and qualitative analysis, shed light on the reality of digital device use, particularly tablets. It revealed, on the one hand, the growing interest of teachers in these technologies and, on the other hand, the obstacles hindering effective integration, such as insufficient equipment, a lack of verification of pre-loaded content for curriculum alignment, and inadequate institutional support. Furthermore, the results highlight the need for additional digital equipment and regular tablet maintenance. Aligning digital educational content with official school curricula is crucial.

Strategic support for teachers should not be neglected or eliminated. In particular, teacher training in ICT should be adapted to the current context, and relevant and accessible digital resources should be made available. For new technology to become a genuine driver of improvement in teaching and learning within primary education, this

integration must be part of a comprehensive, participatory, and coherent approach, centered on the real needs of those working in the field. In this context, what efforts should be undertaken to integrate digitalization into teaching?

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