

## DIGITALIZATION AND EDUCATION: AN ANALYSIS OF PRACTICES AND CHALLENGES IN THE CISCO OF TOLIARA I, MADAGASCAR

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### ABSTRACT

*This study investigates the prospects and challenges of educational digitalization in the CISCO of Toliara I, Madagascar, where digital reforms remain largely at the planning stage. Using a qualitative approach, the study gathers insights from teachers, students, parents, and administrators to examine how digital tools are envisioned, the expectations attached to them, and the factors that hinder their adoption. Current practices in attendance monitoring, examination registration, recordkeeping, and school-family communication are still paper-based, fragmented, and often ineffective in addressing chronic absenteeism, high dropout rates, or irregular examination participation. Participants emphasize the potential value of digital identification cards, centralized servers, automated alerts to parents, and digital student profiles as mechanisms to enhance accountability, transparency, and the overall quality of education. Anticipated outcomes include stronger parental involvement, reduced absenteeism, more reliable regulation of examinations, and better support for remedial initiatives such as Back to School for Learning and Teaching at the Right Level. However, the study also highlights major obstacles, including inadequate infrastructure, unstable electricity and internet access, limited technical capacity, and weak institutional coordination. By capturing both the realities of the existing system and the aspirations for digital reform, the study sheds light on the conditions necessary for digitalization to become a transformative force for educational governance in Madagascar.*

**Keywords:** Digitalization, Education, Challenges, Toliara

### INTRODUCTION

Education has long been regarded as the foundation of individual empowerment and collective progress (Alvarez & Payn, 2021). It equips learners with the skills, knowledge, and values necessary to navigate contemporary societies and to contribute meaningfully to national development (Alonso-Ferreiro et al., 2020). In the twenty-first century, the integration of digital technologies into education has gained unprecedented relevance (Aesaert et al., 2014). Across the globe, governments, institutions, and international organizations increasingly view digitalization not simply as a tool for modernizing administrative tasks, but as a transformative force capable of reshaping pedagogy, governance, and equity in learning (Emynorane et al., 2025; Maksum et al., 2025). For countries facing systemic educational challenges, digitalization offers a pathway to strengthen accountability, reduce inefficiencies, and expand access to quality education.

Madagascar presents a compelling case for exploring these transformations. As one of the world's largest island nations, it grapples with geographical, infrastructural, and socio-economic barriers that limit educational opportunities for many communities. National statistics reveal persistent issues such as high dropout rates, teacher absenteeism, and unequal distribution of resources between urban and rural areas (INSTAT, 2022). These challenges undermine the credibility and effectiveness of

the education system, leaving many learners without the necessary preparation for further study or entry into the labor market. Within this context, the CISCO (Circonscription Scolaire) of Toliara I, situated in the Atsimo-Andrefana region, embodies both the struggles and the opportunities inherent in reforming education through digital tools.

The global discourse on digital education has been shaped by a growing body of study. Scholars such as Selwyn (2016) and Warschauer (2004) have argued that digital technologies do not simply supplement existing practices but trigger new ways of organizing learning, redefining the roles of teachers and learners, and reconfiguring governance mechanisms. Recent empirical studies confirm this trend, showing that digital interventions can enhance transparency, improve parental engagement, and support differentiated pedagogy, particularly in low-resource contexts (Tondeur et al., 2017; Gunnars, 2021; Correa & Esquivias, 2025). Experiences in African countries such as Rwanda and Kenya highlight both the promise and limitations of nationwide digital reforms, which often succeed in expanding access but remain fragile in the absence of sustainable infrastructure and teacher training (Choi, 2016; Tadlaoui-Brahmi et al., 2022). Madagascar, despite its potential, remains underexplored in this regard, and few studies have examined how digital initiatives function in local contexts characterized by limited resources.

Study on educational governance further highlights the importance of tools that enable regulation and accountability. Drawing from sociological perspectives, particularly those of Durkheim (1922) and Bourdieu (1986), education is seen not only as a means of transmitting knowledge but as a structured social system requiring mechanisms of order, discipline, and fairness. The digital card system in Toliara I reflects these theoretical considerations by institutionalizing forms of monitoring that reduce opportunities for irregularities and strengthen the legitimacy of academic pathways. By offering real-time data on attendance and progression, digitalization introduces a form of transparency that has historically been difficult to achieve in under-resourced contexts. Studies have shown that such tools foster trust and legitimacy by making student trajectories more transparent and verifiable (Frau-Meigs et al., 2017; Hui et al., 2018; Choi & Cristol, 2021; Outhwaite et al., 2017).

Despite these promising avenues, the reality of education in Toliara I demonstrates that innovation often coexists with deep structural barriers. Teacher and student absenteeism remains widespread, compounded by poverty, poor infrastructure, and recurring natural crises such as cyclones and droughts. Dropout rates are alarmingly high, and large numbers of students attempt official examinations as independent candidates without following the standard curriculum sequence. These practices weaken the pedagogical integrity of diplomacy and contribute to systemic inefficiencies (Choi & Cristol, 2021). Traditional mechanisms of monitoring, reliance on paper-based documentation and irregular inspections, have proven insufficient in addressing these issues (Castells, 1996; Emejulu & McGregor, 2019; Garcez et al., 2022). The digital card system, therefore, emerges as a targeted attempt to close these gaps, ensuring that student trajectories are properly documented and that examination access is regulated in accordance with institutional norms.

International organizations have repeatedly stressed the necessity of digital transformation in education. UNESCO's Global Education Monitoring Report (2023) underscores digitalization as a prerequisite for efficiency, inclusiveness, and resilience in education systems. UNICEF (2022) highlights the role of digital tools in strengthening

parental involvement and mitigating dropout risks, while the World Bank (2021) emphasizes the importance of information and communication technologies for adaptive learning environments in Sub-Saharan Africa. Against this backdrop, the Toliara I initiative represents a locally adapted response to global calls for reform, reflecting both the universal aspirations of digital education and the unique realities of a Malagasy school district.

The experience of Toliara I illustrates how digitalization becomes meaningful when directly connected to daily educational realities. Through digital cards, parents receive immediate notifications about absences, teachers' presence is tracked with greater precision, and school leaders gain access to reliable data that informs their administrative decisions. These mechanisms reinforce trust between families and schools by promoting transparent communication and reducing doubts over grades or financial contributions (Shi et al., 2025). For learners, the existence of a digital record fosters accountability and discourages irregular progress through the system. Such outcomes resonate with international findings that emphasize the capacity of digital technologies to foster collaboration among stakeholders and create more transparent learning environments (Maksum et al., 2025; Gunnars, 2021). Yet, they also reveal the persistence of structural obstacles such as unreliable electricity, weak internet connectivity, and disparities between urban and rural schools that may reinforce inequalities if left unaddressed (UNESCO, 2023; Fernández-Montalvo et al., 2017).

Despite the encouraging results, the initiative also exposes critical questions that demand further scholarly investigation. The limited electricity supply in many schools, the uneven availability of internet connectivity, and the lack of contextualized digital content challenge the sustainability of the reform (Dooley et al., 2016; Carretero et al., 2017; Sokal et al., 2020). Moreover, disparities between urban and rural schools risk reinforcing inequalities rather than reducing them (Maksum et al., 2025). Digitalization holds the potential to democratize education, but if not carefully managed, it may instead exacerbate existing divides (Ahlquist, 2017; Shi et al., 2025). This tension reflects broader debates in the literature on the “digital divide,” where access to technology alone does not guarantee meaningful or equitable usage (Joo-Nagata et al., 2017; Kilic & Sancar-Tokmak, 2017; Garcez et al., 2022).

Another area requiring exploration lies in the institutional dimension. For digital initiatives to take root, they must be supported by coherent policies, adequate training for teachers, and a shared vision across different levels of the education system (Tesolin et al., 2018). Without strong governance structures, projects risk being short-lived or confined to specific localities (Tadlaoui-Brahmi et al., 2022). The Toliara I case, led in part by local leadership and adapted to contextual realities, offers valuable insights into how digitalization can be piloted within resource-constrained environments. Yet its long-term viability depends on broader political will and integration into national education strategies.

This study explores digitalization in Toliara I by examining the broader dynamics that shape its potential adoption within the local education system. Attention is given to how planned innovations such as digital identification cards and centralized data systems are envisioned as tools to transform governance, strengthen accountability, and improve communication between schools and communities. In doing so, the study extends the global debate on digital education by emphasizing the structural and cultural conditions necessary for innovation to take root in resource-constrained environments. The case of Toliara I illustrates both the persistent challenges that

undermine educational quality in Madagascar, and the opportunities digitalization could provide if adequately supported, making it a significant reference point for academic reflection and policy dialogue.

## **RESEARCH METHODS**

### **Research Design**

The study uses a qualitative research design in order to capture the lived experiences, perceptions, and practices surrounding the digitalization initiative in the CISCO of Toliara I. This approach was chosen because it allows for an in-depth exploration of complex social processes and educational reforms that cannot be understood through quantitative indicators alone. Rather than focusing on numerical generalizations, the qualitative orientation prioritizes depth, context, and meaning, ensuring that the perspectives of different stakeholders are represented authentically.

### **Participants**

The participants in this study were selected through a purposive sampling strategy, designed to capture the diversity of perspectives among those most directly involved in or affected by the digitalization reform in the CISCO of Toliara I. In total, 140 informants took part in the study. These included 40 teachers drawn from both primary and secondary schools, who provided valuable insights into classroom implementation and institutional practices. Alongside them, 60 students from primary, junior secondary, and senior secondary levels were engaged to reflect on their everyday experiences as the principal users of digital cards. Parents were also represented in the sample; with 25 individuals whose children were enrolled in the district contributing perspectives on how the reform reshaped their engagement with schools and influenced their children's learning trajectories. Finally, 15 educational administrators, including inspectors, school directors, and CISCO staff, offered an institutional viewpoint on the design, oversight, and regulation of the initiative. The selection of these participants was not intended for statistical generalization, but rather to ensure that the findings drew on a rich tapestry of voices, each shedding light on the reform from a different angle.

### **Data Collection Techniques**

Data were collected through a combination of semi-structured interviews, focus group discussions, participant observation, and document analysis, ensuring a comprehensive understanding of the digitalization initiative. The interviews and group discussions gave participants the opportunity to articulate their experiences and perceptions in detail, while participant observation enabled the researchers to capture behaviors and interactions in real time within school settings. Document analysis, which included reports, policies, and school records, provided essential contextual grounding and institutional evidence. The integration of these methods allowed for a richer and more nuanced account of the phenomenon by drawing on multiple perspectives and types of data.

### **Data Analysis and Validation**

The analysis followed a thematic content approach that began with open coding of the raw data and progressed toward the identification of recurrent themes and relationships across stakeholder groups. This iterative process allowed patterns to

emerge inductively while remaining closely aligned with the research objectives. To enhance the trustworthiness of the findings, triangulation was employed by comparing evidence across teachers, students, parents, administrators, and official documents. Additionally, member checking was used to validate interpretations with participants, and thick descriptions were provided to capture the complexity of the context. These strategies together ensured that the findings authentically represented participants' voices and provided a credible account of how digitalization is shaping education in the CISO of Toliara I.

## **RESULTS AND DISCUSSION**

### **RESULTS**

The findings of this study reflect both the systemic challenges of Madagascar's education system and the aspirations for reform through digitalization, as articulated by teachers, students, parents, and administrators in the CISO of Toliara I. Across interviews and focus group discussions, participants consistently described how daily practices such as tracking attendance, managing examination registration, and monitoring student performance continue to rely on paper-based systems. Teachers highlighted the delays and inaccuracies caused by handwritten registers, while administrators noted how fragmented records undermined their ability to respond effectively to absenteeism, dropout, or irregular examination participation. Parents confirmed these observations, emphasizing their limited engagement with schools since communication depends largely on face-to-face meetings or paper notes, which are easily lost or overlooked.

The data reveal strong enthusiasm among local actors for adopting digital tools. Teachers and administrators envisioned digital identification cards to improve attendance monitoring, centralized servers for student tracking, and digital profiles for recording grades and attendance. Parents expressed support for automated SMS alerts, seeing them as a practical way to remain informed about their children's schooling. Students, in turn, expressed curiosity and excitement about digital cards and viewed them as symbols of modernization and fairness. These aspirations align with global recommendations that underscore the potential of digitalization to strengthen governance, enhance transparency, and support learners more effectively.

Participants, at the same time, repeatedly stressed the barriers that threatened implementation. Weak infrastructure, unreliable electricity, and poor internet coverage were identified as daily obstacles that make digitalization appear aspirational rather than immediately achievable. Teachers reported limited technical capacity and insufficient training, while administrators pointed to the absence of clear policies and localized digital content. Parents, particularly those from rural households, highlighted the challenge of low digital literacy and limited telephone access, which could prevent some families from benefiting from digital initiatives.

These lived experiences and aspirations are summarized in Table 1, which contrasts the current manual practices with the envisioned digital solutions, their anticipated benefits, and the key barriers identified during fieldwork. The table captures recurrent themes from the different groups of participants and illustrates how the move from manual to digital practices is understood locally as both a promising reform and a challenge constrained by context.

**Table 1: Current Situation and Planned Digitalization in CISCO Toliara I**

| Key Area                         | Current Situation                                                                 | Planned Features                                                                          | Anticipated Benefits                                                         | Main Barriers                                                                   |
|----------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| Teacher & student attendance     | Attendance recorded on paper registers; irregular reporting                       | Digital ID/attendance cards (or biometric); automated alerts to parents                   | Better traceability and accountability; earlier detection of chronic absence | Unreliable electricity and connectivity; training gaps                          |
| Dropout & retention              | Dropout identification is reactive and inconsistent; records fragmented           | Centralized student registry to flag at-risk learners and support reintegration           | Timely interventions; targeted outreach and reduced unnoticed dropouts       | Fragmented records; lack of unique student identifiers; low parental engagement |
| Examination registration         | Manual registration processes; irregular candidate patterns and weak verification | Server-based validation linking enrollment status to exam eligibility                     | Protects integrity of diplomas; reduces irregular candidates                 | Need for policy alignment at national level; technical integration required     |
| Academic records & monitoring    | Paper report cards and delayed aggregation; inconsistent data quality             | Digital student profiles with grades, attendance, and fee records                         | Data-driven planning; clearer learning trajectories and personalized support | Data privacy protocols missing; limited IT capacity among staff                 |
| School–family communication      | Communication face-to-face or paper notices; limited reach to remote families     | SMS alerts, parent portals, dashboards for real-time updates                              | Stronger parent–school partnership; quicker response to problems             | Low internet access in rural households; language and literacy issues           |
| Support for pedagogical programs | Programs (BTSL, TaRL) run manually                                                | Tools to identify target students for BTSL/TaRL and monitor progress                      | Faster targeting, improved remedial instruction                              | Lack of contextualized digital content; training needs for teachers             |
| Infrastructure & governance      | Many schools lack infrastructure, no electricity and no internet                  | Pilot rollouts, solar power options, local servers, capacity building, clear coordination | Scalable model if investments and governance are secured                     | Funding shortages; ongoing maintenance; donor dependency; weak coordination     |

## **DISCUSSION**

### **Digitalization as a Response to Systemic Challenges**

Persistent challenges such as absenteeism, early dropout, irregular examination registration, and weak communication with families reflect structural weaknesses that have long undermined the Malagasy education system. In CISCO Toliara I, these issues are not isolated incidents but symptoms of deeper systemic fragilities, including underfunded infrastructure, limited oversight, and a lack of reliable data management. From the perspective of Durkheim's (1922) notion of education as a social institution requiring order and discipline, the absence of effective monitoring mechanisms erodes the regularity that schools are meant to instill. Bourdieu's (1986) concept of educational capital further highlights how irregularities in examinations and student progression

weaken the symbolic and social value of diplomacy, thereby diminishing their role in promoting equity and mobility. In this sense, systemic challenges in Toliara I are not merely logistical hurdles but also disrupt the very function of education as a vehicle for social reproduction and transformation.

Digitalization is imagined as a corrective mechanism capable of restoring discipline, accountability, and trust within this fragile system (Granić & Marangunić, 2019). By embedding attendance tracking, student progression, and exam registration within digital platforms, education authorities aim to institutionalize traceability and transparency, reducing the scope for irregular practices and fostering greater confidence among families (Hui et al., 2018). Theories of educational governance, particularly those emphasizing the role of technology in strengthening accountability (Warschauer, 2004; Selwyn, 2016), suggest that digital tools can create a new balance of power among stakeholders by making data more accessible and verifiable. For parents, the promise of automated alerts and real-time information represents not just a technical improvement but a redefinition of their role as active partners in schooling. For teachers and administrators, digitalization offers a framework where responsibilities are clearly documented, minimizing disputes and subjective interpretations. Although these changes remain aspirational in Toliara I, the discourse around them reveals how digitalization is understood as more than a technological reform: it is framed as a systemic intervention designed to reinforce the credibility of education and to re-establish its legitimacy in the eyes of the community.

### **The Gap Between Aspirations and Reality**

In the CISCO of Toliara I, digitalization remains more of a vision than a lived reality. Interviews and observations reveal that daily school management is still dependent on manual registers, fragmented records, and irregular communication channels. This situation creates a striking contrast between the enthusiasm for digital reform and the persistent reliance on traditional practices. UNICEF (2020) has emphasized that in contexts like Madagascar, the absence of reliable monitoring tools weakens the ability of schools to intervene early in cases of dropout or absenteeism. The aspiration for digitalization thus reflects a recognition of existing systemic shortcomings, yet the infrastructure and institutional conditions necessary for adoption remain largely absent (Emynorane et al., 2025). This gap highlights the paradox of many education reforms in low-income countries: innovation is envisioned as transformative, yet the baseline environment is structurally unprepared to absorb it.

Theories of ICT4D also describe this phenomenon as a “double divide” (Warschauer, 2004), where the challenge is not only access to technology but also the social and institutional capacity to use it effectively. In Toliara I, electricity shortages, weak internet connectivity, and limited technical training for teachers prevent digitalization from moving beyond discourse. Peñalva & Irazabal, (2017) and Tadlaoui-Brahmi et al., (2022) argues that reforms in fragile contexts often fail when implementation does not align with local capacity. This explains why stakeholders in Toliara I can articulate the potential of digital cards and servers with clarity, yet schools remain constrained by conditions that render such tools aspirational. Bridging this gap requires more than introducing devices; it demands coordinated investment, capacity-building, and systemic reforms that prepare the ground for digital innovations to take root.

### **Anticipated Benefits and Stakeholder Expectations**

The study highlights strong expectations among stakeholders regarding the role of digitalization in reshaping educational experience. Parents believe that automated alerts and transparent recordkeeping will strengthen their involvement, reduce absenteeism, and restore confidence in the school system. Teachers view digital cards as tools that can provide accountability, structure attendance, and support remedial instruction. Administrators, on the other hand, expect centralized servers to bring orders for examination registration and ensure greater legitimacy of diplomacy. These perspectives align with findings from the World Bank cited by the UNICEF (2020), which have documented that digital interventions in Africa often serve as catalysts for reinforcing trust and accountability in educational systems. The anticipated benefits in Toliara I demonstrate that digitalization is framed not only as a technical solution but also as a social mechanism for rebuilding confidence between families, schools, and the state.

From a pedagogical standpoint, digitalization is also expected to support targeted interventions, particularly in programs such as Back to School for Learning (BTSL) and Teaching at the Right Level (TaRL). Gunnars (2021) has argued that technology, when combined with sound pedagogy, enables differentiated instruction that meets students at their level of readiness. Informants in Toliara I echo this vision by stressing the potential of digital tools to identify struggling learners and track their progress. Such expectations resonate with Selwyn's (2016) argument that digital education is not just about efficiency but about reconfiguring relationships between learners, teachers, and knowledge. Anticipated outcomes in Toliara I, therefore, extend beyond logistics to encompass deeper aspirations for quality, fairness, and inclusiveness in education.

### **Barriers to Implementation and Conditions for Success**

Despite the enthusiasm for digital reform, the study underscores significant barriers that limit the feasibility of digitalization in Toliara I. Infrastructural deficits remain the most pressing: many schools lack reliable electricity, adequate hardware, or stable internet connections. INSTAT (2022) reports that fewer than one-third of public schools in the Atsimo-Andrefana region have consistent access to electricity, which directly undermines the practicality of introducing digital systems. Socioeconomic inequalities further compound the challenge, as rural schools are disproportionately under-resourced compared to urban ones, a pattern UNICEF (2022) identifies as widening educational inequities. These obstacles illustrate that digitalization cannot be divorced from broader structural realities. Without foundational investments, digital reforms risk exacerbating the very inequalities they are intended to address (Tondeur et al., 2017).

Equally important are governance and institutional coordination. Outhwaite et al., (2017) states that digital interventions in education succeed only when supported by strong leadership, policy coherence, and sustained support. In Toliara I, fragmented coordination between the Ministry of Education, regional authorities, and local schools weakens the sustainability of pilot initiatives. Bourdieu's (1986) analysis of educational capital also reminds us of that technology alone cannot guarantee equity; its distribution and regulation within institutions determine whether it reinforces or reduces social inequalities. Success in Toliara I, therefore, depends on addressing both the infrastructure and institutional conditions of digitalization. This includes long-term

policy commitments, localized digital content, capacity development for teachers and administrators, and the active engagement of families and communities to ensure equitable access. Only under these conditions can digitalization evolve from an aspirational vision into a transformative reality.

## **CONCLUSION**

This study explored the lived experiences and perceptions of teachers, students, parents, and administrators regarding the digitalization initiative in the CISCO of Toliara I, aiming to understand how local actors envision reform and identify the challenges that frame its implementation. The findings reveal a strong aspiration across stakeholders to use digital tools to strengthen accountability, regulate examinations, improve attendance monitoring, and enhance communication between schools and families, with digital cards and centralized systems viewed as symbols of modernization and fairness. Alongside these aspirations, participants highlighted barriers including inadequate infrastructure, unreliable electricity, weak internet coverage, limited technical skills, and insufficient institutional coordination, which collectively constrain progress and raise concerns about sustainability. The study contributes to ongoing debates by showing how digitalization is perceived as both a necessity and a challenge in contexts marked by resource scarcity, providing insight into the prerequisites for reform. Moving forward, government and policymakers should prioritize investment in infrastructure, connectivity, teacher training, and localized digital content while reinforcing national coordination to support equitable reform. Future research is needed to assess the outcomes of pilot projects once operational, particularly their effects on governance, equity, and learning outcomes in Madagascar's diverse educational settings.

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