Tewodros Aragie Kebede and Åge Arild Tiltnes

Evaluating E-labs in Niger

Learning Outcomes and Implications

Faforeport 2024:18

Photo: Tewodros Aragie Kebede

Evaluating E-labs in Niger. Learning Outcomes and Implications

This report presents the findings from an evaluation of the impact of electronic learning laboratories (E-labs) on literacy and numeracy in Niger. Commissioned by the Adventist Development and Relief Agency (ADRA), it compares five schools with E-labs to five without in the Balléyara district. E-labs, equipped with digital tools and educational materials, aim to enhance learning. The evaluation used literacy and numeracy tests, household surveys, and interviews. The findings highlight both the potential benefits and the areas needing improvement for E-labs to maximize their educational impact.

The French version of the report can be found here:

Faforeport 2024:18
ISBN 978-82-324-0726-2
ISSN 2387-6859
ID-nr.: 20885

Executive summary

This report summary presents findings from examination of the impact of electronic learning laboratories (E-labs) on education in Niger, focusing on their effects on literacy and numeracy outcomes. The evaluation, commissioned by the Adventist Development and Relief Agency (ADRA), aims to evaluate the effectiveness of E-labs it has introduced in five schools in the Balléyara district in the Tillabéri region of Niger.

The introduction of E-labs, a classroom equipped with digital tools, learning applications, personal computers, books, games, puzzles, and colored posters with items like letters and shapes represents an effort to enhance learning environments. This initiative seeks to increase literacy and numeracy skills among children, incorporating technology as a supplement to traditional teaching methods.

The evaluation methodology comprises literacy and numeracy tests, a household survey, and qualitative interviews.

The findings reveal a nuanced picture of E-labs' effectiveness. While E-lab schools show slightly improved literacy performance compared to non-E-lab schools, the overall reading scores remain low. This underscores the importance of prioritizing foundational literacy skills. In contrast, no significant differences were observed in numeracy outcomes between students from E-lab and non-E-lab schools.

The evaluation identifies several factors influencing learning outcomes, including child-specific characteristics, household attributes, and the school environment. Key determinants of improved performance include supportive family background, economic resources, and the presence of experienced teachers. However, challenges such as limited student access to E-labs and lack of inclusive resources for children living with disabilities highlight areas for improvement.

The broader effects of E-labs on the educational ecosystem are notable, leading to increased student engagement and interest in learning. To fully unlock the E-lab’s potential, several areas could be addressed, such as teacher training on the use of E-labs and adopting a more inclusive approach.

Based on the findings of the evaluation, our recommendations include prioritizing literacy over numeracy, increasing the time students spend in the E-labs, providing teacher training, enhancing inclusivity, and addressing underlying factors such as food security and school infrastructure to create a more equitable and effective educational environment.

Table of Contents

List of Tables

List of Figures

Acronyms

ADRA	Adventist Development and Relief Agency
CONFEMEN	Conférence des ministres de l'Éducation des États et Gouvernements de la francophonie
CP	Second grade in the Nigerien school system
EGMA	Early Grade Mathematics Assessment
EGRA	Early Grade Reading Assessment
E-labs	Electronic learning laboratories
PASEC	Programme d'analyse des systèmes éducatifs de la CONFEMEN, a large-scale assessment in the French-speaking countries of Africa
SEAQE	Strengthening Equity, Access, and Quality in Education
TOFI	Together for Inclusion

Preface

This report is the result of a successful collaboration between various parties. In 2021, the Adventist Development and Relief Agency (ADRA) commissioned Fafo to conduct an evaluation of an element in its 'Strengthening Equity, Access, and Quality in Education' (SEAQE Sahel) program, funded by Norad. In Niger, ADRA introduced electronic laboratories (E-labs) in five primary schools to provide students with access to tablets and interactive learning stations, enriching their reading and numeracy skills. ADRA tasked us with assessing the impact of these E-labs. To do so, we tested the performance of children in schools with and without E-labs twice: first in 2022 and then in 2023 to examine progress. Additionally, the evaluation included qualitative interviews with school directors and teachers, and a questionnaire survey of parents and caregivers.

To carry out the evaluation, we teamed up with Professor Goza Aicha Nana from L'École Normale Supérieure (ENS) at the University of Abdou Moumouni in Niamey. Professor Aicha significantly contributed to the study design, including adapting the Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA) tests to the Nigerien context. She oversaw the recruitment of pedagogic advisors and survey staff. The pedagogic advisors conducted the EGRA and EGMA tests, while field assistants diligently carried out the household survey. The evaluation was further supported by local education district officials who facilitated access to the schools, and the Ministry of Education, which provided the necessary permissions. We appreciate their efforts and support. We are also grateful to the school directors for their cooperation in test administration through logistical support and access, and to Dr. Moussa Issa Evaristho from ENS and Education Inspector Almou Abdoulaye for seamlessly coordinating the field activities.

We also extend our sincere gratitude to the staff at ADRA's Niger office for their invaluable support in facilitating the study activities, with special thanks to Alphonse Sassou and Guingarey Oumarou. The collaboration with ADRA Norway has been constructive. We would like to thank Birgit Philipsen, Elidon Bardhi, Anine Lauterer, and Øystein Kolstad for the productive meetings and discussions about the evaluation and its findings. We appreciate the support received during the analysis, which has contributed significantly to this report.

Moussa Yacouba Abdoul Aziz played an instrumental role as an interpreter and research assistant during fieldwork, providing essential translation services, including translating the report into French. We are immensely grateful for his contributions and collaboration.

At Fafo, several team members contributed to this project. Tewodros Aragie Kebede managed the project and was involved in all stages, from inception to reporting, including spending several weeks in the field. Jing Liu prepared the data entry program for the survey, managed the tabulation report, and assisted with multivariate statistical analysis. Åge A. Tiltnes assisted with data analysis and co-authored the various reports

with Kebede. We also acknowledge Anne Kielland, who served as the project's quality assurer and provided valuable input on a draft of this report.

Finally, we extend our gratitude to the local communities for their warm reception. We particularly thank the children who participated in the tests, as well as the parents, caregivers, and educators who patiently and honestly responded to our questions, providing the essential data for this report.

The analysis and conclusions of this report, including any errors, are solely our responsibility.

Oslo, May 2024

Tewodros Aragie Kebede and Åge Arild Tiltnes

1 Introduction

Educational technologies, defined as the design, use, and management of processes and technologies that support teaching and learning (Januszewski & Molenda, 2008), have emerged as having transformative potential in accelerating access to and improving the quality of education (Balkin & Sonnevend, 2016). This potential has become particularly pronounced in the wake of the Coronavirus pandemic, which exacerbated an existing global learning crisis (World Bank, 2018). As COVID-19-related school closures threatened educational continuity worldwide, many countries turned to digital tools and remote learning strategies as a lifeline (UNESCO, 2020).

The Global Education Monitoring Report 2023 entitled 'Technology in education: A tool on whose terms?' scrutinized the role of technology in education, probing its capacity to address fundamental educational challenges (UNESCO 2023). It shows that the efficacy of digital technology in education varies significantly across different socio-economic landscapes and countries. The report suggests that while technology holds promise, its benefits are often overestimated, particularly regarding cost and accessibility for disadvantaged groups. It calls for regulatory frameworks that foreground educational needs and promote an evidence-based approach to technology integration. Highlighting technology as a complement to traditional teaching methods rather than as a replacement, the report advocates for a balanced, equitable, and sustainable approach to incorporating technology in education.

In Niger, the Adventist Development and Relief Agency (ADRA) has introduced electronic learning laboratories (E-labs), an initiative that blends technological innovation with educational aspirations. The E-lab is a classroom equipped with tablet devices loaded with literacy and numeracy applications developed by Leap Learning (Leap Learning, n.d.). In addition to the tablets, the E-lab has a personal computer, books, games, puzzles, colored posters with items like letters and shapes, paper money, and other hands-on learning materials. Designed to accommodate up to 30 students at a time, the labs target all children in selected primary schools and aim to enhance literacy and numeracy skills. The E-lab initiative is a component of ADRA's Norad-funded education program known as *Strengthening Equity, Access and Quality in Education* (SEAQE) in Sahel, which operated in Niger from September 2017 to March 2024 (ADRA, n.d.-1).

This report is commissioned by ADRA and presents the findings of an evaluation of the impacts of E-labs on learning outcomes in primary schools and their influence on teaching and learning processes. The evaluation addressed the following questions:

- What are the effects of the E-labs on literacy?
- What are the effects of the E-labs on numeracy?
- How do tablets and digital tools modify the learning process and outcomes for learners?
- Does the integration of E-labs alter the teaching styles of educators outside these technologically enriched environments?

Chapter 2 provides a brief background about Niger, presents the structure of the education system and outlines the country's educational challenges. Chapter 3 describes the methodology and approach used to evaluate learning outcomes and to assess the effectiveness of the E-lab intervention. Chapter 4 provides an overview of the schools selected for the evaluation and the socioeconomic background of the students' families.

Chapter 5 presents the analysis of the effects and impacts of E-labs on learning outcomes. It also examines the impact of other determinants pertaining to the child, the family, and the schools. Chapter 6 explores the broader effects of E-labs on education in Niger, raising issues like their popularity, teacher training, inclusivity, and content diversity. Chapter 7 concludes and presents recommendations emerging from the evaluation.

2 Education in Niger

Niger, a landlocked West African nation, faces development challenges despite its valuable resources, including uranium. The country's vast expanse is dominated by the Sahara Desert, resulting in an arid climate with extreme temperature fluctuations. This geographical context, coupled with its location within the Sahel, poses difficulties for agriculture, water availability, and drought resilience. This struggle is particularly acute in rural areas, where most Nigeriens reside. Access to basic services such as education and healthcare remains limited in these regions. Poverty is a pressing issue in Niger, with over 40 percent of its 26 million population living below the national poverty line.

The political landscape in Niger is marked by instability, as evidenced by the 2023 military coup. The nation strives to establish stable democratic governance and faces challenges like corruption and limited state capacity to effectively address social and economic issues. Security concerns add another layer of complexity. Armed groups and regional instability in the Sahel pose threats, leading to violence and insecurity, particularly in border areas. The education system is one casualty of this insecurity, with schools in affected regions like Tillabéri being forced to close.

The education sector of Niger is regulated by the Loi d'Orientation du Système Educatif Nigérien of 1998 (LOSEN). Four types of schools are formally recognized: so-called traditional schools based on the French school model, private schools, community schools, and religious education institutions labelled Franco-Arab schools. Private schools follow the national curriculum, and the Franco-Arab schools are under the public system.[1] Community schools are often initiated by NGOs and run in rural or nomadic areas.

The Niger education model comprises three years of pre-primary education, although barely 8 per cent of children enroll nationally (UNICEF, n.d.). Basic education begins at the age of seven and continues for a duration of 10 years, assuming the intended progression is followed – which is not always the case. The structure of basic education consists of six years of primary education (*cycle de base 1*) followed by four years of lower secondary school (*cycle de base 2*). After completing these initial stages, students proceed to upper secondary education, which spans three years.

Although Niger gained independence from France in 1960, French remains the official language and plays a central role as the primary language of instruction from primary school through higher education. Teachers frequently employ a combination of mother tongues and French in their teaching practices. However, this Francophone system coexists with efforts to incorporate mother tongue languages into the educational framework, especially in the early years of schooling.

Niger faces significant challenges in ensuring that all children receive quality education. Despite primary education being compulsory by law, a substantial number of children

[1] Although the state of Niger is secular, the education law is not, something which opened for the public management of the Franco-Arab schools (Kielland, 2016).

are entirely excluded or drop out before completing it. About 45 percent of all children of primary school age are not in school, with stark rural-urban variation: 51 percent in rural areas and 11 percent in urban areas.[2]

One in four children are not enrolled in the first year of primary school, and this figure increases to four in ten by the final year, highlighting a concerning dropout rate (INS, 2021). Repetition, particularly in the sixth and final year of primary school, further exacerbates the issue (UNICEF, 2023a). These low completion rates can be attributed to several factors, including inadequate teacher quality and limited educational resources.

Despite improvement between large scale assessments (PASEC) in 2014 and 2019, students' learning remains low.[3] In 2019, only 30 percent of all students in year 6 were deemed to have 'sufficient' readings skills, and 22.5 percent had 'sufficient' skills in mathematics (UNICEF, 2023b:19). School performance and enrollment is generally poorer in rural than in urban areas, and the lowest enrollment rates are found in regions affected by insecurity.

The Nigerien education system involves two categories of teachers: contract teachers (known as "*contractuels*") and permanent teachers (known as "*titulaires*"). Contract teachers are recruited, deployed, and paid by the regional education departments. They constitute most of the teaching staff in Niger. Permanent teachers hold a permanent public sector contract and are managed at the national level with a relatively greater job stability.

Teacher quality is a critical bottleneck in Niger's education system. A report by UNICEF's 'Data Must Speak' initiative revealed that only about one-half of the teachers are proficient in reading and writing. While over 60 percent have some form of teacher training certificate, a significant portion (nearly 30 percent) only hold lower secondary school qualifications, raising concerns about their preparedness to effectively guide students (UNICEF, 2023b).

Limited access to essential educational resources hinders learning outcomes. Large class sizes, averaging 44 students per teacher, make it challenging for educators to provide individualized attention (UNICEF, 2023b). UNICEF's research established a clear link between access to textbooks and student promotion rates. However, the national average paints a concerning picture, with three students sharing a single textbook in both French and mathematics creating a learning environment where students struggle to keep up with the curriculum.

[2] The World Inequality Database on Education, hosted by UNESCO (2019 figure): https://www.education-inequalities.org/countries/niger.

[3] The Programme d'analyse des systèmes éducatifs de la CONFEMEN (PASEC) is a large-scale assessment in the French-speaking countries of Africa. The third round of PASEC assessments is scheduled for April-May 2024 (CONFEMEN, n.d.).

3 Methodology

> Education doesn't only occur at school; learning must also take place at home. Without this component, learning will not be effective. This situation is like placing a pot on three stones for stability; removing one stone will cause the pot to fall. The trio of the student, the teacher, and the parent is essential. The teacher must always be available at school, providing high-quality instruction and serving as a role model for the child. The child, in turn, is expected to attend school regularly and engage actively with their studies both at school and at home, including completing homework. The parent's role involves monitoring the child's school attendance and homework, ensuring the child prioritizes educational activities while enrolled in school, and assessing the child's academic performance. If any of the three parties fails to fulfill their responsibilities, it will negatively impact the child's educational outcomes. It is crucial for the teacher, the child, and the parent to collaborate closely to guarantee the child's success and well-being.
>
> School director, Balléyara

3.1 Conceptual framework

The social ecological model suggests that a child's educational achievements and learning outcomes are influenced by a dynamic interplay between three key stakeholders: the child, their parents/caregivers, and the school system (Bronfenbrenner, 1977). This theory emphasizes that learning outcomes emerge from the intricate interactions within this triad, situated within a broader social and environmental context.

The child is at the core of the learning process. Their cognitive abilities, motivation, learning style, and prior experiences play a fundamental role in shaping learning outcomes. Intrinsic factors, including curiosity, perseverance, and self-regulation, influence the child's engagement with the educational process and their ability to absorb knowledge and skills.

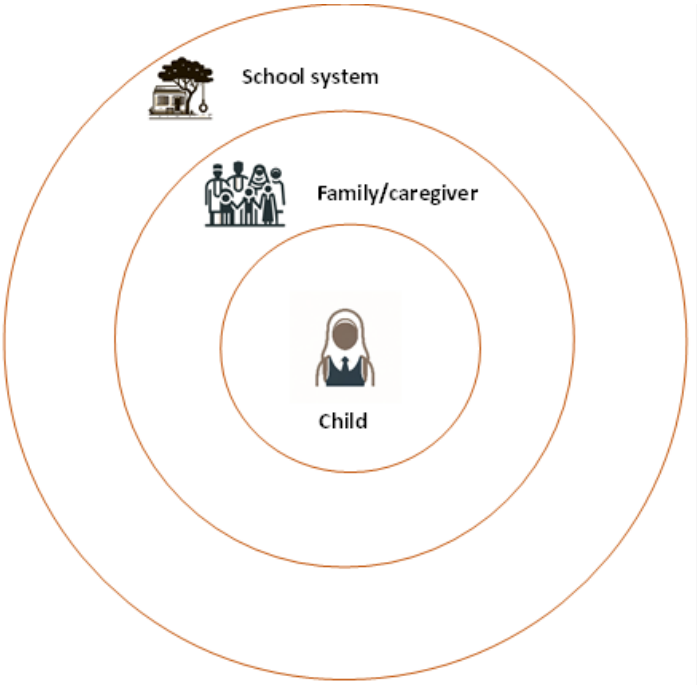
Parents and caregivers provide critical support for a child's educational journey. The role of parents and caregivers becomes even more crucial in contexts of poverty and food insecurity, as they ensure that children have access to sufficient and nutritious food, stable living conditions, and emotional support. Their involvement is essential for positive learning outcomes.

The school system encompasses the educational institutions, teachers, curriculum, and policies that shape a child's formal learning experience. The quality of teaching, availability of resources, class size, and the overall learning environment within the school can greatly influence a child's academic progress. School policies and practices, such as inclusive education, personalized learning approaches, and extracurricular activities, impact the child's holistic development and learning outcomes.

The social and cultural context in which a child grows and learns also plays a significant role. Factors such as socioeconomic status, food security, community support, and cultural beliefs can impact the opportunities and challenges that a child faces in their educational journey. Public policies, including access to quality education, social safety nets, food security programs, and support for marginalized communities, can either promote or hinder positive learning outcomes.

The intricate interplay between the child, parents/caregivers, and the school system within a broader societal context is depicted in Figure 1. It highlights that learning outcomes are not solely the result of one factor but are shaped by the interactions and relationships among these three crucial components. This evaluation utilizes this conceptual framework and aims to provide a nuanced understanding of the impact of E-labs and other factors on learning outcomes.

Figure 1 Social ecological model.



3.2 The E-lab

The E-lab is an integral part of the ADRA's SEAQE Sahel inclusive education program in Niger aimed at enhancing equity, access, and quality in the Sahel region. This program is designed to holistically support schools through infrastructure improvements, community capacity enhancement, and educational staff development.

ADRA introduced E-labs in five schools within the Balléyara school district, establishing one classroom in each school equipped with tablet devices preloaded with literacy and numeracy applications. Alongside the tablets, each E-lab features a personal computer, a collection of books, games, puzzles, colored posters with letters and shapes, paper money, and similar learning materials. ADRA has introduced personal computers and

books, expanding upon the tablet-centric concept developed by Leap Learning. These E-labs are designed to accommodate up to 30 students simultaneously.

The learning apps loaded on each Android tablet device are tailored to the local context and offered in French. The E-lab is organized into interactive workstations demarcated by color codes, each representing different levels of learning for language and mathematics. Students progress from one workstation to the next after demonstrating mastery of the current level. Thus, students in a class are assigned to workstations based on their performance levels.

Each E-lab has a designated teacher responsible for its organization, management, and utilization. This includes scheduling E-lab access for students based on their grade levels. Students are required to consistently attend the E-labs two hours per week. E-lab teachers collaborate with regular class teachers to coordinate students' access to the E-labs, using a schedule established at the beginning of the school semester. The academic year runs from mid-October to mid-June of the following year.

The E-lab teachers received specialized training and are typically chosen from among the permanent staff and appointed by the Balléyara school district authorities. Furthermore, several school directors have received training in the operation of E-labs. This strategy aims to ensure the presence of qualified personnel that manage the E-lab should the primary E-lab teacher be absent.

Photo: ADRA Picture Archive

3.3 Literacy and numeracy measurement

The learning outcomes are measured using standardized tools: the Early Grade Reading Assessment (EGRA) and the Early Grade Mathematics Assessment (EGMA). Both tests are used to measure the basic skills of children in the early stages of their education. The tools were originally developed by the Research Triangle Institute (RTI International) and have been widely used by governments, NGOs, and researchers in developing countries. Both EGRA and EGMA are designed to be adaptable to different languages and contexts and have been used in more than 50 languages worldwide.[4] The tools we used are modified to suit the Nigerien context.

EGRA focuses on five key components of early reading:

1. Phonemic awareness: the ability to recognize and manipulate individual sounds (phonemes) in spoken language.
2. Alphabetic knowledge: understanding the relationship between letters and sounds in a written language.
3. Fluency: the ability to read text accurately and quickly.
4. Vocabulary: the knowledge of words and their meanings.
5. Comprehension: the ability to understand and interpret the meaning of written text.

The assessment typically consists of multiple tasks designed to measure each of these components. Examples of tasks include:

- Letter sound identification: students are asked to identify the sounds of individual letters.
- Non-word reading: students are asked to read a list of non-words (made-up words) to test their phonics skills.
- Oral reading fluency: students are asked to read a passage out loud while being timed to assess their reading speed and accuracy.
- Reading comprehension: students are asked to answer questions about a passage they have read to test their understanding of the text.

The EGMA focuses on the following components of early-grade mathematics skills:

1. Number identification: the ability to recognize and identify numbers and their symbols.
2. Counting: the ability to count and understand the concept of numbers as quantities.
3. Basic arithmetic operations: the ability to perform addition, subtraction, multiplication, and division.
4. Problem-solving: the ability to apply mathematical concepts and skills to solve problems in real-life situations.
5. Mathematics fluency: the ability to perform mathematical operations accurately and quickly.

[4] https://shared.rti.org/

The assessment consists of various tasks designed to measure each of these components, such as:

- Number identification: students are asked to identify and match numbers with their symbols.
- Counting: students are asked to count objects and write the correct number.
- Basic arithmetic operations: students are asked to solve simple arithmetic problems, such as addition and subtraction, with varying levels of difficulty.
- Problem-solving: students are asked to solve real-life mathematical problems using different strategies and techniques.
- Mathematics fluency: students are asked to solve a set of simple mathematical problems within a certain time limit to assess their speed and accuracy.

Both EGRA and EGMA are administered individually by a trained assessor who records each student's responses.

3.4 Data sources

EGRA and EGMA

For this evaluation, in addition to the five schools equipped with E-labs, we selected seven schools without an E-lab based on their proximity, ensuring all schools are within a 25-kilometer radius of Balléyara town. Five of these schools receive support provided by ADRA (e.g., books and infrastructure), while the remaining two do not receive any intervention from ADRA. This selection allows for a comparative analysis of numeracy and literacy outcomes between students attending schools equipped with E-labs and those without. Further comparison will also be made among the ten schools within the ADRA program with and without an E-lab. The schools are listed in Table 1.

In January 2022, we administered the EGRA and EGMA tests to 2nd and 4th Grade students across the 12 primary schools. This established a baseline for measuring changes in learning outcomes over time. Following a year of E-lab implementation, we conducted the same tests again in May 2023 for the same cohort of students, who by this time were expected to have advanced to Grades 3 and 5. Having both baseline and endline measurements enabled a comparative assessment of the impact of E-labs on learning outcomes. We employ a counterfactual statistical framework to assess the causal effect of E-labs on learning outcomes.

Table 1 Primary schools selected for the evaluation.

Schools with ADRA programs		Schools with no ADRA program
With E-lab	**Without E-lab**	**Without E-lab**
Agou Koira Tegui Balléyara Château Jidikamatt I Kabé Sandiré	Balléyara Centre Borgo Tabla Quartier Winditane Jidakamatt II	Borgo Gorou N'Dikitan

Household survey

As part of this evaluation and in alignment with the conceptual framework introduced earlier in this chapter, we conducted a survey involving the families of students who took the test in June 2023. The primary goal of this survey was to gather data providing a good understanding of the households in which these learners are raised (Sirin, 2005). The survey collected data using a structured questionnaire covering the following core themes:[5]

- Household size and structure: Understanding the composition of the family unit.
- Access to educational resources: Assessing the availability of resources that support learning.
- Overall living conditions: Examining the financial stability and resources within the family.
- Food security: Recognizing the impact of nutritional factors on a child's educational journey.
- Parental involvement in education: Acknowledging the role parents play in shaping their child's learning experience.

Qualitative interviews

In January 2022, we conducted five initial in-depth interviews, all of which proved valuable for shaping the design of subsequent qualitative interviews and informed the design of the household survey. We conducted interviews with 15 key informants.

In May and June 2023, we conducted qualitative interviews with key stakeholders, including teachers, E-lab teachers, school directors, district officials, pedagogical advisors, and local ADRA staff. These interviews delved into the nuanced impact of educational technologies, teaching practices, and importance of the overall school environment for learning outcomes.

3.5 Statistical methods

The following statistical methods are employed to analyze the test results and survey data:

- **Descriptive statistics** summarize and describe the basic features of the data. They include the calculation of means, medians, and percentages. Descriptive statistics provide an overview of data trends and patterns, such as average scores in literacy and numeracy assessments and general household characteristics.
- **Difference-in-Differences (DID) analysis** is used to assess the impact of E-labs on learning outcomes. It compares the changes in educational outcomes over time between two groups – those with access to E-labs (treatment group) and those without (control group). The DID analysis helps isolate the effect of E-labs from other factors that could influence learning outcomes.
- **Regression analysis** identifies the determinants of learning outcomes. It assesses the relationship between dependent variables (literacy and numeracy scores) and a

[5] The questionnaire used can be found here: https://www.fafo.no/en/projects/current-projects/evaluation-of-e-learning-laboratories-in-niger

set of independent variables (like gender, age, socio-economic status, and school environment factors). Regression models quantify the strength of these relationships and determine which factors are most predictive of educational success.

4 Schools and students

This chapter presents the profile of the schools and students covered in the evaluation, including findings from the survey administered to the parents and caregivers of the students assessed in 2023.

4.1 Schools under the evaluation

Education in Balléyara, like many rural areas in Niger, faces challenges such as limited infrastructure, scarce resources, and low enrollment rates. The educational opportunities are constrained by factors like distance to school, economic pressures on families to prioritize child labor over schooling, elevated school dropout rates particularly among girls, and a shortage of qualified teachers. The evaluation was carried out in 12 schools in Balléyara with a total of 6,291 students in 2023 (Table 2). The gender distribution is balanced in both schools with and without an E-lab.

Table 2 Number of students by gender and school. Source: school directors.

	Girls	Boys	Total	Percent girls
E-lab and program support				
Agou Koira Tegui	354	415	769	46
Balléyara Château	475	451	926	51
Jidakmatt I	428	383	811	53
Kabé	159	184	343	46
Sandiré	236	241	477	49
Total	**1,652**	**1,674**	**3,326**	**50**
No E-lab but program support				
Balléyara Centre	399	365	764	52
Borgo	185	260	445	42
Tabla Quartier	143	130	273	52
Jidakmatt II	463	365	828	56
Winditane	106	130	236	45
Total	**1,296**	**1,250**	**2,546**	**51**
No E-lab, no program support				
Borgo Gorou	62	89	151	41
N'Dikitan	131	137	268	49
Total	**193**	**226**	**419**	**46**
Grand total	**3,141**	**3,150**	**6,291**	**50**

In addition to permanent structures, all schools except Borgo and Sandiré set up temporary classrooms made from straw and wood (locally referred to as '*piotes*') at the beginning of the school year. These structures serve as a solution when the main classroom

buildings cannot accommodate all the students. During the rainy season, these temporary classrooms are disassembled, and the materials stored in the permanent structures. Schools equipped with an E-lab have a slightly higher share of temporary structures, as shown in Table 3. This can be attributed to high student numbers requiring the construction of temporary classrooms to accommodate all students. On the other hand, the SEAQE and "Together for Inclusion" (TOFI)[6] programs have invested in classrooms and infrastructure improvements across all schools covered by this evaluation other than Borgo Gorou and N'dikitan.

Table 3 Number of classrooms by type and school.

	Temporary structure	Permanent structure	Total	Percent permanent structures
E-lab and program support				
- Agou Koira Tegui	10	7	17	41
- Balléyara Château	16	9	25	36
- Jidakmatt I	8	9	17	53
- Kabé	3	7	10	70
- Sandiré	0	10	10	100
Total	**37**	**42**	**79**	**47**
No E-lab but program support				
- Balléyara Centre	8	13	21	62
- Borgo	0	8	8	100
- Jidakmatt II	10	7	17	41
- Tabla Quartier	5	3	8	38
- Winditane	1	5	6	83
Total	**24**	**36**	**60**	**40**
No E-lab, no program support				
- Borgo Gorou	2	2	4	50
- N'Dikitan	3	5	8	63
Total	**5**	**7**	**12**	**42**
Gand total	**66**	**85**	**151**	**44**

Notwithstanding certain variation across schools, both E-lab and non-E-lab schools primarily rely on contractual teachers. Just above one quarter of all teachers employed at the test schools have permanent contracts (Table 4). This high dependence on temporary staff affects the consistency and quality of teaching.

[6] The TOFI program — implemented by ADRA and other Norwegian development organizations — is a program that promotes inclusive education in several countries (Atlas Alliance, n.d.; ADRA, n.d.-2).

Table 4 Number of teachers by contract type and school.

	Contractual	Permanent	Total	Percent permanent teachers
E-lab and program support				
Agou Koira Tegui	15	5	20	25
Balléyara Château	18	8	26	31
Jidakmatt I	10	8	18	44
Kabé	7	2	9	22
Sandiré	9	1	10	10
Total	**59**	**24**	**83**	**29**
No E-lab but program support				
Balléyara Centre	16	7	23	30
Borgo	7	1	8	13
Tabla Quartier	7	1	8	13
Jidakmatt II	14	6	20	30
Winditane	6	1	7	14
Total	**50**	**16**	**66**	**24**
No E-lab, no program support				
Borgo Gorou	3	1	4	25
N'Dikitan	6	2	8	25
Total	**9**	**3**	**12**	**25**
Grand total	**118**	**43**	**161**	**27**

4.2 Students

As mentioned above, we administered the EGRA and EGMA tests in both 2022 and 2023 – the student count is summarized in Table 5. The objective was that the students tested in 2022 would repeat the test one year later. However, it was not feasible to re-test all children due to various reasons such as absence during the assessment, transfer to other schools, and some students dropping out of school altogether. To compensate for this, new students were included in the 2023 test, ensuring that the total number of students remained consistent. These new students were children who had transferred from other schools to the test schools as well as children who had repeated Grades 3 and 5.

Table 5 Number of students tested in 2022 and 2023. By type of test, type of school, and grade.

		EGRA		EGMA	
	Type of school	**Grade 2/3**	**Grade 4/5**	**Grade 2/3**	**Grade 4/5**
2022	With E-lab	504	366	475	384
	Without E-lab	329	404	312	407
	Total	833	770	787	791
2023	With E-lab	372	422	372	426
	Without E-lab	470	368	471	369
	Total	842	790	843	795

Grade 2/3 refers to students who attended Grade 2 in 2022 were expected to have advanced to Grade 3 in 2023. Likewise, Grade 4/5 refers to students who attended Grade 4 in 2022 were expected to have moved to Grade 5 a year later.

4.3 Socio-economic background[7]

As stated, we conducted a survey of the households of the children assessed by EGRA and EGMA in 2023. The surveyed households are large, consisting of 12 persons, on average. Nearly one half of all households are comprised of 11 persons or more.[8]

Most children live with their parents: 82 percent live with their mothers, and 75 percent with their fathers. In some cases, one or both parents are deceased (4 percent of mothers; 9 percent of fathers), but more often, parents who do not live with their children reside in a different household (13 percent of mothers; 16 percent of fathers).

Housing conditions

Six in ten households live in houses constructed from durable materials, while 15 percent of the surveyed households live in huts. Less than one fourth reside in houses of higher quality constructed from materials like concrete, bricks, or cement blocks. These houses have solid foundations and walls, providing greater durability.

Although the size of households is generally large, the houses contain only three rooms on average. Six in ten dwellings have merely one or two rooms.[9] Large households and a limited number of rooms contribute to crowding. Only 22 percent of all households have fewer than three persons per room, while 32 percent have six or more persons per room.

Electricity is available to six out of ten households. Among these, nine out of ten are connected to the grid, while one out of ten relies on a shared generator. Additionally, a few households utilize solar panels as their primary power source.

Livelihoods

In two-thirds of the surveyed households, there is only one person who is engaged in income-generating activities and contributing economically to the household. Twenty

[7] More details are found in a separate document at the project website: https://www.fafo.no/en/projects/current-projects/evaluation-of-e-learning-laboratories-in-niger

[8] The mean value is 11.6; the median value is 10.

[9] The mean value is 2.8; the median is 2.

percent of the households have two contributing members, and 15 percent have three or more contributing members.

Only one in ten households gets its main income from salaried work; just as many depend on daily labor; nearly four in ten rely on self-employment in agriculture; whilst one third of the households depend on non-agriculture self-employment. However, many households supplement their principal income with income from one or more additional sources. For example, about one half of the households report *any* self-employment income from agriculture or outside agriculture and one fourth of all the surveyed household report *any* income from daily labor. Altogether, 4 percent of the households rely on support from relatives, but more than twice as many report *any* such transfer income — from within Niger or abroad. A few households (3 percent) also receive aid from NGOs, but for them this is not considered their *main* source of income.

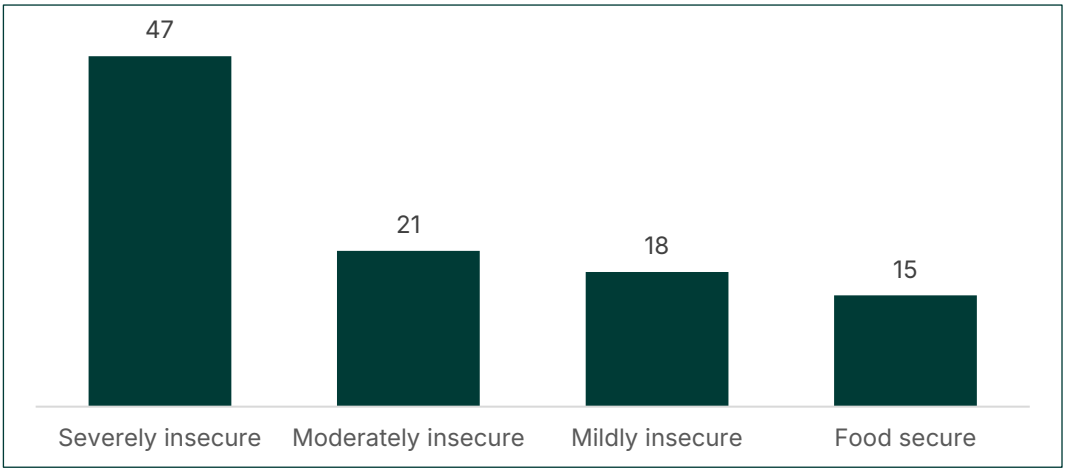
The surveyed households generally have low incomes as reflected in their household standards described earlier. While 94 percent own a mobile phone (not necessarily a smartphone), only 2 percent own a personal computer. One in four households have a TV, and a slightly higher share have at least one fan. Refrigerators are found in 15 percent of the surveyed houses, while one in ten households has a car. Twice as many own a motorbike, bicycle, or cart.

Due to low income, a high proportion of the surveyed households consume less food than they should. They are food insecure. For example, more than seven in ten state they are unable to eat healthy and nutritious food because of lacking income and other resources. Also, more than one half of the households admit having skipped meals and even having dropped eating for a full day for the same reason. As a result of such circumstances, 73 percent of the surveyed households worried about not having enough food to eat during the year preceding the survey.

We used the Food Insecurity Experience Scale (FIES), developed by the Food and Agriculture Organization (FAO), to investigate food security. This scale includes eight questions,[10] and we aggregated the results using a simple additive index. Considering the overall picture, nearly one half of all households fall into the category of severe food insecurity (Figure 2). In contrast, only 15 percent are considered food secure. These findings highlight the significant poverty faced by the surveyed households.

[10] Using a 12-month reference period and asking about any household member, this is a short version of the FIES questions: (1) Worry about not having enough food to eat? (2) Unable to eat healthy and nutritious food? (3) Ate only a few kinds of foods? (4) Had to skip a meal? (5) Ate less than you thought you should? (6) The household ran out of food? (7) Were hungry but did not eat? (8) Went without eating for a whole day? On the FIES, see FAO (n.d.) and Tufts University (n.d.).

Figure 2 Food insecurity. Percentage of households (n=1,490).



Another indicator of the widespread economic hardship among the people we have surveyed is the self-reported difficulty in paying the yearly fee of approximately 3 USD to the school management committee. These committees, known as '*comités de gestion des établissements scolaires*' in French, work to maintain and improve school infrastructure and provide teaching materials. Forty-nine percent report that covering the fee is somewhat difficult, and 14 percent find it very difficult.

4.4 Home learning environment[11]

Education in households and capacity to provide educational support

Having books and other learning materials at home is crucial for children's ability to learn. Access to electronic devices like smartphones, tablets, and PCs could serve as valuable tools. However, as we observed earlier, very few households own a computer and fewer than one in four students use an electronic device for learning purposes at home. While these resources are essential, perhaps even more central to a child's learning journey is the capacity and dedication of parents to their children's education.

Fathers tend to have somewhat better education than mothers, but the educational level of parents and caregivers is low overall. Only 20 percent of the fathers and 15 percent of the mothers have completed at least lower secondary schooling (Grade 10). Six in ten fathers and seven in ten mothers have not attended any education, and another 10 percent have been to school but without completing primary education (Grade 6). Amongst those who lack schooling altogether or did not complete primary school, only 7 percent of fathers and 2 percent of mothers are literate — they can read and write easily.

Half of the households have one or more persons aged 18 and above who have attained at least lower secondary school, and 18 percent have completed upper secondary or post-secondary education — compared to 6 percent of fathers and 3 percent of mothers, respectively.

[11] Additional details are found in a separate document at the project website: https://www.fafo.no/en/projects/current-projects/evaluation-of-e-learning-laboratories-in-niger

Children attending schools with an E-lab seem to have slightly better resources available at home than children attending non-E-lab schools, on average. For example, while 21 percent of the households of the former comprise at least one person who have completed upper secondary or have attained a post-secondary degree, only 12 percent of the latter have accomplished the same.

Many children — six in ten — receive regular help with their school homework, while 17 percent of the children never receive any support at home. The survey shows that siblings provide help with school assignments more often than parents. For one in six children, resourceful persons outside the household, such as neighbors and friends, provide the most valuable help.

According to the survey, nearly half of the children have homework as their principal activity after school. Others are engaged in household chores or play most of the time, and nearly one in ten children are mainly engaged in income-generating activities outside of school. Eighty-four percent of the respondents expressed that their children spend sufficient time on homework.

Eight in ten parents and caregivers say they follow up on and 'monitor' their children's homework daily or several times a week. However, only 37 percent state that they can assist with their children's homework. Nearly all those who cannot provide help attribute this limitation to a lack of education.

Fifty percent of the parents and caregivers are in touch with the child's teacher regularly or occasionally regarding the child's schooling.[12] Furthermore, three in four attend school events and activities regularly or occasionally. However, only 28 percent always pick up their child's result card after exams, while 26 percent rarely do so. Summarizing their own engagement in and commitment to the education of their children, 32 percent of the parents and caregivers report that they are very involved, and 57 percent state that they are somewhat involved.

School attendance and motivation

According to the household survey, most children (96 percent) go to school all five days of the school week. The rest attend 1-2 days per week (1.5 percent) or 3-4 days (2.5 percent). Nearly every-one spends full days at school when they attend. In a few cases, children return home for lunch without returning to school for the afternoon session. These findings on school attendance appear to contradict observations made by teachers and school directors who repeatedly brought up absenteeism as a challenge in the qualitative interviews. Parents and caregivers generally believe their children like reading (89 percent), learning new things (91 percent) and attending school (97 percent).

[12] Such contact may occur both at the initiative of the parents/caregivers and the teacher/school. However, it typically takes place after an invitation from the teacher, which the parents may choose to accept or not. Also, some of this contact may be informal. However, the survey did not collect information on these different modalities of communication and contact between parents/caregivers and teachers/schools.

Satisfaction with school performance

Asked to rate their child's overall school performance, nearly two thirds of the parents and caregivers consider it to be very good or good, while one in four thinks it is 'average'. Merely one in ten rates their child's achievement as poor. In line with this, seven in ten parents and caregivers are either very satisfied or satisfied with the results on the child's report cards, which is an indication of general satisfaction with the children's performance at school. Two in ten express their dissatisfaction. Eighty-eight percent believe that their child is performing at his or her full academic potential.

5 E-labs and learning outcomes

This chapter presents a detailed analysis of the EGRA and EGMA scores, examining the influence of E-labs on learning outcomes and identifying their determinants. Comparing the performance of students attending schools with E-labs and those attending schools without an E-lab, it first presents the scores as recorded in 2023. Next, the chapter contains a comparative analysis of the scores from 2022 and 2023. The third section examines the causal impact of E-labs on learning outcomes using a counterfactual statistical framework. This approach aims to isolate and attribute observable effects directly to the use of E-labs. The final section seeks to understand the determinants of educational outcomes based on the survey data. It considers variables related to the child, the family, and the school environment, including the presence of an E-lab.

5.1 Literacy and numeracy in 2023

This section summarizes the 2023 results of the literacy (EGRA) and numeracy (EGMA) tests for 3rd and 5th Grade students and provides comparative scores for students attending E-lab and non-E-lab schools. The findings include data for students who participated in the tests for the first time in 2023 as well as those who also took the tests in 2022. The results in the form of the mean and median of the total scores of the tests are shown in Figure 3.[13]

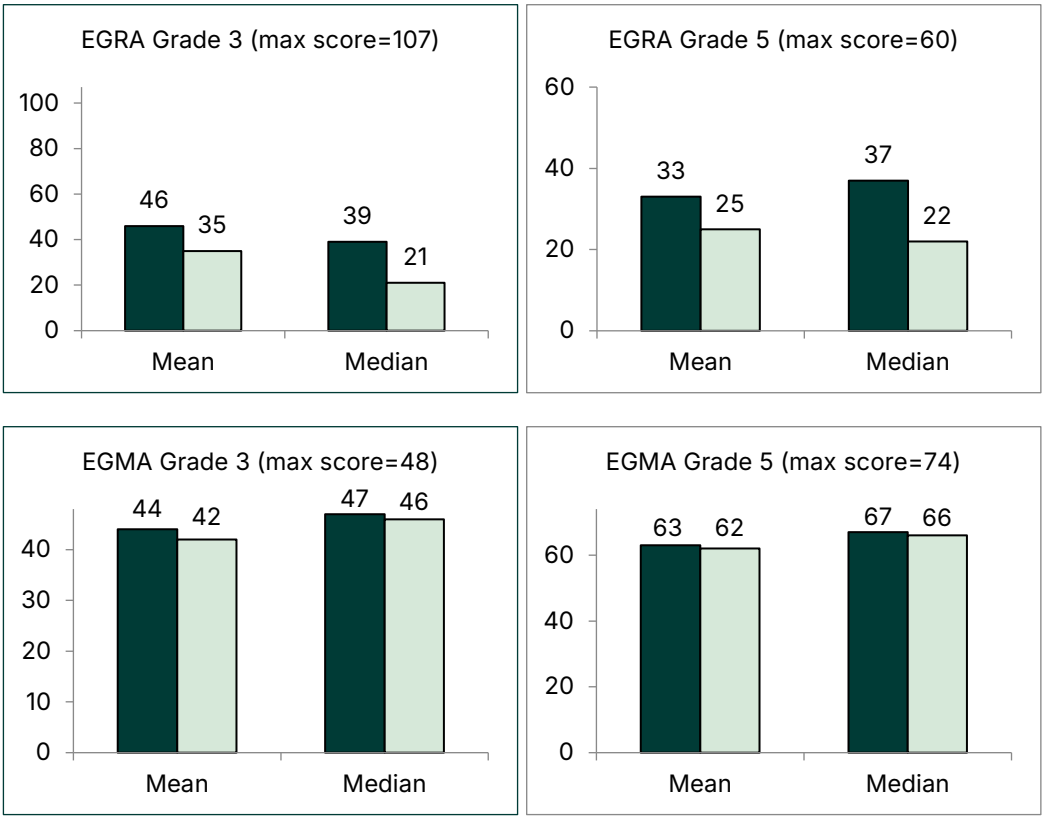
Both third graders and fifth graders attending the schools equipped with an E-lab outperformed students in schools without an E-lab. The result for comprehension was more encouraging for fifth graders than for third graders, as the fifth graders' scores are comparatively closer to the maximum.

The EGMA results for both grades are considerably better than those for EGRA in the sense that the scores tend to be much closer to the maximum. A second difference is that for EGMA, as opposed to EGRA, there is minimal difference between schools with and without an E-lab.

To sum up: these findings indicate that students in schools equipped with an E-lab consistently outperform their counterparts in literacy. However, the numeracy performance is not significantly different between students from the two types of schools.

[13] Detailed results for each test are found at the project web page: https://www.fafo.no/en/projects/current-projects/evaluation-of-e-learning-laboratories-in-niger

Figure 3 Mean and median total EGRA and EGMA scores in 2023 for schools with and without an E-lab. Dark green = with E-lab. Light green = without E-lab.



After completing the assessments, the pedagogic advisors responsible for administering the tests provided their insights on the outcomes. They considered the children's performance to be 'average,' finding their math skills 'acceptable' for their age, but their French below average. One advisor emphasized the fundamental importance of reading, noting that, "one cannot learn anything without knowing how to read." Another advisor highlighted the critical need for future focus on reading, stating, "particular emphasis must be placed [on reading] because reading is the key to learning."

5.2 Comparing EGRA and EGMA results for 2022 and 2023

This section introduces a new metric, the 'pass score,' alongside the mean and median scores. The 'pass score' is determined by setting a threshold at the midpoint of the maximum possible score. For 3rd Grade students, the mid-scores are 54 and 24 for EGRA and EGMA, respectively. For 5th Grade students, the corresponding mid-scores are 30 and 37. Students scoring above these thresholds are deemed to have achieved a passing score. This metric is relevant as it aligns with the schools' standard practice for assessing student promotion to the next grade level. For the sake of clarity, our discussion in this section will concentrate on the passing score.

Reading

The overall analysis reveals a positive trend from 2022 to 2023 in reading proficiency, highlighted by significant enhancements in median and mean scores, alongside an increased percentage of students passing the assessment (Table 6). For Grade 3, there

was a notable jump in the median score from 10 to 36 and in the mean score from 15 to 44, accompanied by a rise in the pass rate from 4 percent to 37 percent. Similarly, Grade 5 witnessed improvements, with the mean score doubling and the pass rate escalating from 22 to 50.

Students in schools equipped with an E-lab perform better in reading compared to their peers in schools lacking such a facility, as evidenced by consistently higher median and mean scores, along with improved pass percentages. Nevertheless, the annual progress in reading proficiency, as indicated by the pass percentage, is similar for both groups of students and is consistent across both grades.

The pass percentages vary significantly across schools, with some showing much weaker performance than others. For example, at Kabé, the pass rate for Grade 3 students increased marginally from 0 to 7 percent between the two assessments, while at Sandiré, it improved slightly from 15 to 17 percent. In Grade 5, N'Dikitan, Tabla Quartier, and Winditane recorded particularly low pass scores in 2022. Students at the first two schools showed substantial improvement after one year, but Winditane saw only a modest increase in its pass rate, from 0 to 15 percent, which is well below the average Grade 5 pass rate of 50 percent for all the 12 schools in 2023.

Despite significant improvement from 2022 to 2023, the overall reading performance remains low. In Grade 3, just above a third of all students reached the mid-score benchmark despite being at a higher grade than the tests were designed for. In Niger, where French is the official language of education but not the native language for most learners, students face the dual challenge of learning French as they start their formal education. Teachers utilize both their mother tongues and French to facilitate understanding, though all texts and written materials are provided in French. This dual focus means that literacy education in Niger is not merely about teaching students to read; it also involves them simultaneously learning a second language.

Table 6 Comparative EGRA scores for students evaluated both in 2022 and 2023. Median, mean, and the percentage passing mid-level scores for Grades 3 and 5. By gender, availability of E-lab, and school.

GRADE 3							
	2022			2023			
	Median	Mean	Passed %	Median	Mean	Passed %	Number of students
Total	10	15	4	36	44	37	536
Gender							
Male	10	15	5	34	41	33	248
Female	10	15	2	41	47	41	288
E-lab in school							
E-lab	10	16	5	41	46	39	332
No E-lab	9	14	2	33	41	35	204
Schools with E-lab & program support							
Agou Koira Tegui	16	17	2	68	64	56	62
Château	9	12	2	61	58	54	96
Jidakmatt I	10	14	2	41	48	44	61
Kabé	2	5	0	15	21	7	41
Sandiré	16	26	15	23	29	17	72
Schools without E-lab but program support							
Balléyara Centre	6	8	0	25	36	33	42
Borgo	11	13	0	21	30	23	26
Jidakmatt II	14	20	8	42	48	40	40
Tabla Quartier	5	8	0	29	41	36	22
Winditane	9	13	0	49	45	41	22
Schools without E-lab & program support							
Borgo Gorou	0	1	0	12	12	0	16
N'Dikitan	20	24	3	54	59	50	36
GRADE 5							
	2022			2023			
	Median	Mean	Passed %	Median	Mean	Passed %	Number of students
Total	7	16	22	30	30	50	509
Gender							
Male	6	15	23	30	28	48	212
Female	7	16	22	32	31	51	297
E-lab in school							
E-lab	12	19	27	38	33	56	209
No E-lab	4	13	19	26	27	45	300
Schools with E-lab & program support							
Agou Koira Tegui	2	9	12	8	17	24	25
Château	23	27	41	54	49	87	39
Jidakmatt I	5	13	13	26	29	46	67
Kabé	5	12	16	23	26	44	32
Sandiré	35	32	52	46	40	72	46
Schools without E-lab but program support							
Balléyara Centre	12	21	38	41	36	61	72
Borgo	1	8	12	5	17	32	57
Jidakmatt II	11	18	24	34	32	56	63
Tabla Quartier	2	9	4	20	26	33	27
Winditane	1	4	0	12	16	15	27
Schools without E-lab & program support							
Borgo Gorou	3	10	18	21	26	41	34
N'Dikitan	6	12	5	36	30	55	20

Mathematics

EGMA results also demonstrate considerable improvement in the overall performance from 2022 to 2023 (Table 7). For Grade 3 in 2022, the median score was 40, and the mean score was 38, with an 87 percent pass rate. A year later, the median had reached 47, the mean had climbed to 44, and the pass percentage had risen to 96. Likewise, Grade 5 students showed notable progress as the median score went from 57 to 66, the mean from 53 to 62, and the pass percentage improved from 84 to 94.

The gender differences are minimal. In 2023, for instance, 97 percent of Grade 3 female students achieved a passing score, versus 95 percent of their male counterparts. In Grade 5, the passing rates are 93 percent for girls and 95 percent for boys.

The availability of an E-lab is barely associated with improved EGMA outcomes, and only moderately so for Grade 5 students in 2022.

However, the pass rates vary across schools, especially the 2022 results. With a few exceptions, most schools demonstrate notable improvement from 2022 to 2023. For example, Kabé, with a pass rate of 56 percent for Grade 3 students in 2022, saw an increase to 89 percent in 2023. At three schools, all Grade 3 students tested passed the midpoint threshold.

For Grade 5 students, the schools with the lowest pass rates in 2022 were Borgo Gorou (59 percent), Winditane (63 percent), and Tabla Quartier (67 percent). For all three schools, the pass rate had leaped about 30 percentage points one year later. At two schools, every Grade 5 student tested surpassed the midpoint threshold in 2023.

Table 7 Comparative EGMA scores for students evaluated in both 2022 and 2023. Median, mean, and the percentage passing mid-level scores for Grades 3 and 5. By gender, availability of E-lab, and school.

GRADE 3							
	2022			2023			
	Median	Mean	Passed %	Median	Mean	Passed %	Number of students
Total	40	38	87	47	44	96	513
Gender							
Male	40	38	86	47	44	95	229
Female	41	38	88	47	44	97	284
E-lab in school							
E-lab	40	38	88	47	44	97	316
No E-lab	40	37	86	47	44	94	197
Schools with E-lab & program support							
Agou Koira Tegui	44	41	95	47	46	100	60
Château	39	39	98	47	47	100	93
Jidakmatt I	46	42	92	46	45	97	61
Kabé	27	29	56	41	38	89	39
Sandiré	35	36	81	45	41	97	63
Schools without E-lab but program support							
Balléyara Centre	31	33	79	47	44	97	34
Borgo	35	34	81	46	41	92	26
Jidakmatt II	43	39	89	47	44	96	54
Tabla Quartier	34	34	86	47	43	91	22
Winditane	38	34	78	48	41	88	18
Schools without E-lab & program support							
Borgo Gorou	26	26	57	38	37	71	7
N'Dikitan	46	44	100	48	47	100	36
GRADE 5							
	2022			2023			
	Median	Mean	Passed %	Median	Mean	Passed %	Number of students
Total	57	53	84	66	62	94	524
Gender							
Male	58	55	87	68	64	95	222
Female	57	52	81	66	61	93	302
E-lab in school							
E-lab	61	57	89	68	63	94	221
No E-lab	55	51	80	66	62	94	303
Schools with E-lab & program support							
Agou Koira Tegui	60	54	88	65	57	88	25
Château	62	60	98	73	72	100	42
Jidakmatt I	54	52	83	60	58	92	65
Kabé	56	47	73	66	62	94	33
Sandiré	71	67	98	68	65	95	56
Schools without E-lab but program support							
Balléyara Centre	60	57	93	64	62	95	73
Borgo	50	46	71	68	60	86	59
Jidakmatt II	60	58	92	66	64	98	63
Tabla Quartier	49	46	67	67	65	96	27
Winditane	40	40	63	61	59	96	27
Schools without E-lab & program support							
Borgo Gorou	41	40	59	63	59	88	34
N'Dikitan	59	60	100	69	67	100	20

5.3 Impact of E-lab on learning outcomes

In this section, we investigate the effect of E-labs on learning outcomes through a counterfactual framework to isolate the causality directly attributable to the E-lab program. We apply difference-in-differences (DID) regression analysis to assess the changes in reading and mathematics scores between 2022 and 2023. First, we focus exclusively on students attending the ten schools supported by ADRA programs, comparing two distinct groups: students at schools equipped with an E-lab and those at schools without an E-lab. Next, similar regression analysis is done on all 12 schools.

Since the total possible scores for EGRA and EGMA differ between Grades 3 and 5, we have standardized the scores to a scale ranging from 0 to 100. The result is a composite score that integrates both grade levels. This standardization is achieved by multiplying the actual summarized EGRA and EGMA scores used in section 5.1 by a rescaling factor[14] for both EGRA and EGMA scores.

In the context of the counterfactual framework, we describe the E-lab program as a treatment or intervention. Students at schools equipped with an E-lab are designated as the treatment group, whereas students attending schools without an E-lab are identified as the control group. The data covered two time periods: pre-intervention (Time = 2022) and post-intervention (Time = 2023). The learning outcome variables are the rescaled EGRA and EGMA scores.

Impact of E-labs in ADRA-supported schools

The outcome of the DID regression analysis of literacy for schools receiving program support from ADRA paints a positive picture for E-labs, especially with respect to their impact in Grade 3 (Table 8). The regression shows statistically significant improvement from 2022 to 2023 for students in E-lab schools, who score about 5.7 points higher in literacy tests (EGRA) than their peers without E-lab access. This suggests that E-labs could be an effective tool to enhance the reading skills in young students. However, this result does not hold for Grade 5, where the lower positive score for E-lab schools is not statistically significant. This indicates that the favorable impact of E-labs on literacy might not be sustained as students progress to higher grades.

In numeracy (EGMA), the regression result indicates a *lower* score for students in schools with an E-lab, and this is particularly evident in Grade 5, where the students score approximately 6 points lower than those in schools without E-lab (Table 8). This statistically significant negative impact suggests that the gains from E-labs in mathematics are limited. In Grade 3, although the score is lower in E-lab schools, the difference is not statistically significant, indicating a less pronounced effect.

[14] The rescaling factors for EGRA scores are 100/107 for Grade 3 and 100/60 for Grade 5, reflecting the maximum EGRA scores of 107 and 60 for these grades, respectively. Similarly, the rescaling factors for EGMA are determined as 100/48 for Grade 3 and 100/74 for Grade 5, corresponding to the maximum EGMA scores of 48 and 74 for these two grades.

Table 8 The impact of E-lab on standardized total EGRA and EGMA scores in ten ADRA program schools. Difference-in-differences regression results by grades.

Outcome	Level	Coefficient	SE	t	p-value
EGRA	Grade 3	5.665	2.582	2.194	0.028
	Grade 5	2.618	2.402	1.090	0.276
EGMA	Grade 3	-2.696	1.631	-1.653	0.099
	Grade 5	-6.044	1.572	-3.845	0.000

Generalized impact of E-labs

A repetition of the DID regression analysis including the two non-E-lab schools without any program support from ADRA sheds light on the broader applicability of E-labs in primary schools in similar resource-constrained settings. It basically confirms the results and analysis presented in the previous section.

Literacy outcomes exhibit a favorable impact of E-labs, especially for the younger students (Table 9). Grade 3 shows a positive and statistically significant increase in literacy scores from 2022 relative to non-E-lab schools, with a coefficient of 5.578 and a p-value of 0.017. This suggests that E-labs have a positive effect on enhancing literacy skills among younger students, potentially serving as a supportive tool for reading development. On the other hand, the effect of E-labs for EGRA for Grade 5 is slightly positive but not significant (a coefficient of 1.413 and a p-value of 0.551).

In numeracy, the negative coefficient of -1.183 for Grade 3 students, although indicative of a lower performance by students in E-lab schools compared to those without E-labs, is not statistically significant (p-value of 0.423). However, the situation is markedly different for Grade 5, where the substantial negative coefficient of -6.968 is statistically significant (p-value < 0.001).

Table 9 The impact of E-lab on standardized total EGRA and EGMA scores in all 12 schools. Difference-in-differences regression results by grades.

Outcome	Level	Coefficient	SE	t	p-value
EGRA	Grade 3	5.578	2.335	2.388	0.017
	Grade 5	1.413	2.371	0.596	0.551
EGMA	Grade 3	-1.183	1.476	-0.801	0.423
	Grade 5	-6.968	1.513	-4.603	0.000

The above DID regression analyses suggest a complex relationship between the use of E-labs and academic performance. While E-labs may boost literacy for children in lower grades, their impact on numeracy is less favorable, particularly for older students in primary school. This discrepancy calls for a critical evaluation of how E-labs are implemented in the curriculum, suggesting that tailored adjustments might be needed to optimize their benefits across different subjects and age groups.

5.4 Determinants of learning outcomes

The analysis in the previous section isolated the causal impact of E-labs on reading and mathematics scores. To delve deeper into the factors affecting reading and mathematics proficiency, this section presents the results of multivariate regression analysis aiming to shed light on the underlying mechanisms at play. Based on existing research (Kielland et al., 2017), the analysis includes a wide range of variables surrounding child-specific characteristics, household attributes, and the school environment.

Table 10 summarizes the hypotheses explored in the regression analysis, along with the corresponding variables. We examine student characteristics like gender, age, grade level, and effort, alongside family background factors such as parental education, siblings' school attendance, family support, and economic standing, namely the possession of assets and food (in)security. The analysis also considers how the school environment, including teacher qualifications and number of permanent teachers, may affect academic performance. Like the approach in the DID regression analysis, we have combined the rescaled EGRA and EGMA scores for Grades 3 and 5 for this analysis. We have used the data for 2023.

Table 10 Hypotheses regarding determinants of learning outcomes and the variables used in the regression analysis.

Hypothesis	Variables
Boys have higher performance than girls	Gender of child
Learning performance increases by age	Age of child
Learning outcomes increase as the child progresses through grades	Grade level of child
Increased child effort increases outcome levels	Study after school; performing at full potential
Children from better educated households tend to have higher outcome levels	Household member completed lower or upper secondary school or higher
Having siblings currently attending school at a higher level increases the child's performance	Household member currently attending lower or upper secondary school
Support and monitoring by the family increase a child's learning performance	Monitoring of schoolwork
Poverty negatively impacts schooling. Children from poorer households tend to have lower learning performance	Number of assets
Food security is essential for a child's wellbeing. Food insecurity leads to a child's lower performance	Food insecurity index
Having qualified teachers, indicated by permanent contracts, increases learning outcomes of a child	Teachers with permanent contracts per 100 students
Availability of comprehensive learning materials, such as those available in the E-lab, increases learning outcomes	E-lab presence in school

Reading

The regression results for EGRA are shown in Table 11. The varying levels of statistical significance, denoted by asterisks, indicate the reliability of these associations. Variables with higher levels of significance (e.g., *** for p < .001) present stronger evidence of their effect on the scores.

Neither age nor gender showed a significant impact on reading scores, suggesting these factors alone may not directly affect reading proficiency. Engaging in after-school study and achieving full potential as perceived by the parents and caregivers were linked to higher EGRA scores.

On the household level, a positive connection emerged between the educational attainment of family members and EGRA scores, emphasizing the significance of a household's educational background. Economic status, as measured by the number of consumable assets, positively influenced EGRA scores. Moreover, higher food insecurity was linked to lower EGRA scores, emphasizing how fundamental needs impact educational achievements. Home study supervision did not exhibit a noticeable effect.

At the school level, the presence of E-labs and the number of teachers with permanent contracts were identified as key predictors. The number of teachers holding permanent contracts was positively correlated with reading scores. Similarly, the availability of E-labs within schools showed a positive association with EGRA scores.

Table 11 Results from regression analysis (Dependent variable: EGRA scores)

Dimensions	Explanatory variables	Coefficient	Std. Error	Sig.
	Intercept	13.917	11.576	0.230
Child level	Sex (Male=1)	-3.558*	2.031	0.080
	Age	0.708	0.912	0.437
	Grade level (Base=Grade 3)	-6.451	2.998	0.032
	Study after school (Base=yes)	5.067**	2.096	0.016
	Perform at full potential (Base=yes)	13.132***	3.233	0.000
Household level	Household member completed secondary school or higher (Base=yes)	8.790***	2.329	0.000
	Household member currently attending a secondary school (Base=yes)	3.873**	2.076	0.062
	Monitoring of schoolwork (Base=yes)	3.901	2.764	0.158
	Number of assets	1.917**	0.817	0.019
	Food insecurity index	-1.282**	0.392	0.001
School level	Teachers with permanent contracts per 100 students	10.457**	4.595	0.023
	E-lab presence in the school (Base=yes)	6.247***	2.122	0.003
Note. *p < .05. **p < .01. ***p < .001.				

Mathematics

The findings of the regression analysis to explore factors influencing EGMA scores — numeracy — are detailed in Table 12. The independent variables are the same as those used for EGRA in the previous section.

At the child level, being male has a positive but not statistically significant effect on EGMA scores. Likewise, child age shows no statistically significant impact on the scores. In contrast, higher grade levels are positively and significantly correlated with improved EGMA scores. Furthermore, performing to their full potential (as perceived by parents and caregivers) is correlated with significantly higher scores.

At the household level, a family member with at least a secondary school certificate was significantly and positively associated with EGMA scores, highlighting the potential impact of role models on children's motivation and the importance of in-house resources and capacity to follow up homework and support young children's learning.

Although food insecurity is negatively correlated with EGMA scores, this relationship is not statistically significant. This suggests that while food security may influence learning outcomes to some extent, it is likely that other factors have a more pronounced effect on numeracy.

Despite positive associations, neither of the two school-level variables have a statistically significant effect on EGMA scores. This may suggest that while the stability of teaching staff quality and the availability of E-labs contribute positively to mathematics proficiency, other variables, including supportive family dynamics and possibly unaccounted-for school-level influences, play significant roles as well.

Table 12 Results from regression analysis (Dependent variable: EGMA scores)

Dimensions	Explanatory variables	Coefficient	Std. Error	Sig.
	Intercept	75.030***	5.664	0.000
Child level	Sex (Male=1)	1.602	1.004	0.111
	Age	-0.033	0.446	0.941
	Grade level (Base=Grade 3)	6.910***	1.465	0.000
	Study after school (Base=yes)	1.685	1.040	0.105
	Perform at full potential (Base=yes)	5.655***	1.616	0.000
Household level	Household member completed secondary school or higher (Base=yes)	4.591***	1.156	0.000
	Household member currently attending a secondary school (Base=yes)	1.599	1.025	0.119
	Monitoring on study (Base=yes)	0.056	1.381	0.968
	Number of consumable assets	0.086	0.404	0.831
	Food insecurity index	-0.262	0.191	0.170
School level	Teachers with permanent contracts per 100 students	2.673	2.258	0.237
	E-lab presence in the school (Base=yes)	1.039	1.043	0.319
Note. *p < .05. **p < .01. ***p < .001.				

6 Broader effects of E-labs

This chapter addresses the wider effects of the E-labs on the educational ecosystem based on qualitative interviews with key informants, primarily interviews carried out in 2023.

6.1 Attitudes towards E-labs

The presence of tablets seems to markedly enhance student engagement and attendance. As re-counted by teachers and school directors, students often show a strong interest in lessons conducted in E-labs due to the interactive and visually stimulating nature of learning taking place there. In the words of an ordinary teacher:

> Actually, sometimes, when the students are making noise in the classroom, and I say, 'Hey, today we're not going to go into the E-lab', they will remain silent. They like to attend the E-lab.

An E-lab teacher expressed the opinion that the children prefer the E-lab over regular classes, and that the tablets perhaps are the major reason for that. Students seem more motivated to participate in classes that utilize modern tools. Tablets offer a dynamic and flexible learning medium, allowing students to explore and interact with content in ways that traditional textbooks cannot. For instance, the multimedia features, interactive apps, and educational games found in the tablets seem to make learning more engaging and enjoyable, potentially leading to improved comprehension and retention of material.

The popularity of the E-lab is also reflected in the perception of parents and caregivers, as shown by the survey data. Out of all parents and caregivers of children attending E-lab schools, 44 percent said the E-lab was very good, 47 percent said it was good, 7 percent answered 'average', while only 2 percent considered it poor. By contrast, only 28 percent said that the school's overall learning material was very good. An E-lab teacher stated that the local community had a very good impression of the E-lab and that its members were interested to learn about it to the extent that particularly parents sometimes came to visit and to see how their children were doing in the lab. Although we lack statistics to verify this, according to our interviews, schools with an E-lab attract new children, resulting in increased enrollment rates. Schools without an E-lab would like to get one. And one of the E-lab teachers claimed that school dropouts have regained interest in school and returned due to the E-lab.

6.2 E-lab integration and curriculum

School teachers and officials we interviewed confirm that there is alignment between the content available in E-labs and the official school curriculum, particularly in subjects like mathematics. The E-lab is not considered a separate entity within the school system, but rather an integrated tool that supports and enhances the existing curriculum. The technology enhances rather than disrupts the learning process. However, this also highlights the need for regular updates and maintenance of the E-lab content to ensure that it remains relevant and aligned with any changes and reforms in the curriculum.

Many informants highlighted that the effectiveness of E-labs hinges on the quality of training for their use. While E-lab teachers and some school directors have benefited from a five-day training course provided by ADRA, which appears to have been sufficient, there is expressed interest from the key informants that ordinary teachers should receive similar training. Enhanced training would likely lead to more efficient use of the E-labs during the limited time available to students. Currently, E-lab teachers support their colleagues, who gradually become more familiar with the technology. Despite this and despite the fact that some E-lab teachers have offered brief training sessions to their peers, informants consistently suggested that formal training for all teachers would be advantageous. Moreover, having multiple trained teachers would reduce the school's dependence on any single individual.

While the ordinary teachers are responsible for the content of the teaching in their classes, they rely on the E-lab teachers to make effective use of the labs. It appears that good collaboration in both planning and implementation is a prerequisite for success. One teacher explained the process as follows:

> Before coming to the E-lab, I explain to her [E-lab staff] the lesson I am going to teach in advance. If there are textbooks, or when the tablet devices are there, I ask — as I am new — [and] she will explain to me how I can deliver my lesson. [...] When we search on the tablets, we look for parts that are related to the lesson.

Access to a wide array of learning materials in the E-lab appears to assist teachers greatly, especially in presenting their lessons. An E-lab teacher noted: “I help them [the teachers] if they have difficulties. [...] I provide support.” An ordinary teacher explained how “the teacher of the E-lab room helps us do the activities.”

An E-lab teacher described her role as a supportive assistant to the ordinary teacher during sessions in the E-lab. This arrangement was beneficial as it enabled her to assist individual students at different workstations. It also allowed her to focus specifically on children facing learning challenges due to disabilities or behavioral issues, thereby enabling the ordinary teacher to devote more attention to the rest of the class.

One of the advantages of the E-lab is the diversity of learning material found there. A teacher suggested that the resources available in the E-labs ought to be accessible beyond the lab itself, for use in regular classroom settings. She introduced this critique with an illustration from mathematics:

> There are some materials that are in the E-lab which we do not have in the normal classes. For example, to solve small problems in mathematics, the E-lab has [fake] paper money, coins. [...] When there is a small math problem in the classroom, for example, Moussa buys a sheep at 75.250 francs and sells it at 95.775 francs. How much has he gained? You see, if it was in the E-lab, they would even touch the money; they have the money. But in the normal class, is it concrete? It’s not concrete. It's abstract because we don't have the paper money. Do you see? And you can’t borrow the paper money from the E-lab, you are not allowed to remove it. This is where the E-lab is

> blocking us. The [teaching] materials that are there, we only use them in the E-lab. [...] That's a big problem.

This critique points to a broader issue concerning the lack of adequate pedagogical materials in many Nigerien schools. For instance, a recent report highlights that, on average, every textbook in Niger is shared by three students (UNICEF, 2023).

The example provided above, with students using paper money when doing the calculations, illustrates how learning in the E-labs is more hands on. In the words of an E-lab teacher:

> Using paper money, the child learns practically how to do math. He gives you the result, and he asks questions. He asks himself questions.' [...] It's more practical here. But there in the normal class, sometimes, it's theory.

Evidently, our informants believe that practical, hands-on methods greatly benefit children's learning. A teacher stated how she has always created didactic materials for her classes on her own, and how the E-lab has further motivated her in this endeavor. This situation again highlights the scarcity of learning materials in Nigerien schools.

Our informants highlighted other differences between regular classes and E-lab classes. For ex-ample, a teacher explained how in the regular class, all students must do the same, whether they understand the task at hand or not:

> In the normal class, when we should read, reading is the only thing all the students do. Whether you know how to read or you can't read, you're going to have to read.

The informants elaborated on the unique experience in the E-lab, noting the variety of activities available to the children. They emphasized how, beyond engaging in tasks at various workstations or levels, the children are also granted a measure of autonomy, allowing them to choose what they want to do.

Informants described how the large class sizes in regular classrooms hinder teachers' ability to tailor teaching methods to accommodate students of varying performance levels. One informant noted, "We have too many students to meet the needs of individual students." In contrast, differentiation is more feasible in the E-lab as the workstations cater to different levels of learning and have a diversity of materials. Furthermore, the presence of two teachers in the classroom, as previously mentioned, facilitates more personalized attention.

Another advantage of the E-lab, according to one of the informants, is that it allows the students to help each other; it permits peer learning:

> If he [the student] has understood correctly, the teacher can also ask him to go around in the classroom to help his classmates, his peers. This is the advantage of the E-lab. While working in a group, the work will be well done as well, and the child can help his classmates. It is not like in the normal class where the child cannot move to help his classmates in need.

6.3 E-lab and inclusive learning

In our evaluation, around 28 children living with disabilities (CWD) took part in the language and mathematics assessments. We observed that none of the E-labs had materials specifically designed for children living with disabilities such as those living with severe sensory impairments.

An E-lab teacher expressed the need for resources, stating, "We want to get materials for those children with disabilities." An ordinary teacher also recognized that the E-labs currently have limited learning materials for children living with disabilities. She stated:

> When entering the E-lab, I have the same difficulties [as in the regular class]. I don't think that the E-lab provides them with support. [...] In the future, it would be good if we manage to train teachers to deal with the disability cases [children living with disabilities].

In addition to acknowledging the limitations of the E-labs, she emphasized the broader issue of insufficient competency in delivering inclusive education and the pressing need for additional training in this area. Reflecting on the inadequacies in teacher training, one teacher, who has resorted to using self-devised strategies, claimed to find it challenging to support the learning of students living with disabilities effectively:

> Now I have problems teaching them [new students with disabilities]. Because they are new, I have problems teaching them. I am not used to having these cases in my class.

These observations regarding E-labs' limitations underscore the need for making the labs more inclusive. Recent developments in research agendas (Banks et al., 2022; Liu et al., 2022) and global program interventions have begun addressing the challenges faced by children living with disabilities. A notable example is the ongoing TOFI program implemented by a collaboration of several Norwegian development organizations, including ADRA, which promotes inclusive education within schooling systems in several countries including Niger (Atlas Alliance, n.d.; ADRA, n.d.-2). For example, one of the schools covered in this evaluation (Bellayéra Centre primary school) is receiving support from the TOFI program, illustrating the attention paid towards developing more inclusive educational environments.

6.4 Challenges in E-lab implementation

There is broad agreement on the positive impact of E-labs, from igniting and sustaining interest in education among children and their parents and caregivers to improving the quality of teaching and learning. However, despite these benefits, the E-labs face limitations in offering resources for children with disabilities, as highlighted in the preceding section. Additional challenges and shortcomings were also identified during the assessment and highlighted by key informants.

One of the challenges pertains to implementation, specifically the limited time students spend in the E-lab, which if increased would presumably benefit their learning significantly. Students in the larger schools use the E-lab only once a week, with sessions ranging from 45 minutes to an hour. Others, particularly those in the smaller schools

have two or even three weekly visits. The tablets emerged as the most sought-after equipment in the E-lab. However, not all students can access them every week or for the full duration of each session due to the high student-to-tablet ratio. Often, they must take turns on the laptops or share a tablet among two or three students.

Ideally, each E-lab was equipped with 25 tablets. Nevertheless, practical issues such as charging difficulties, battery problems, or software malfunctions frequently resulted in a reduced number of tablets being available for use. Informants also made the point that not only the tablets, but more generally teaching aids end up worn out over time and need substitution. Furthermore, it was argued that the E-labs need an even larger variety of teaching materials, as some children get familiar with cards, money, etc.

Furthermore, it is important to note that ADRA introduced E-labs in three schools in the department of Dargol. However, these schools faced security threats, and the presence of E-labs was perceived as heightening the risk of attacks. Consequently, it was decided to relocate these E-labs to safer schools in the Tillaberi region. This scenario underscores the complexity and challenges of implementing digital learning initiatives in fragile settings, where security concerns can significantly obstruct educational advancements.

7 Conclusion and way forward

The evaluation of the impact of E-labs on the school performance of primary school children shows mixed results. To test their performance, Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA) were carried out in 2022 and 2023. In 2022, we implemented the two tests on Grade 2 and Grade 4 students, applying tests adapted to their grade level. The same (Grade 2 and Grade 4) tests were repeated in 2023, this time on Grade 3 and Grade 5 students, to examine developments.

The 2023 EGRA and EGMA results show that students in schools with an E-lab performed better in literacy compared to schools without an E-lab. This was especially true for third graders. However, despite the positive influence of E-labs on literacy, the overall reading scores were low, suggesting a need for improvement and the importance of prioritizing reading as a foundational skill. There was no significant difference in the numeracy performance between students from the two types of schools.

A comparative analysis of the EGRA and EGMA results for 2022 and 2023 demonstrates, as expected, a positive trend in both literacy and numeracy skill; one year later children have learned more. The EGRA results show significant improvement between the two years. The median and mean scores, along with the pass rates, have all increased substantially. While E-lab schools generally performed better than non-E-lab schools, the progress made was similar for both groups. There is, however, considerable variation in pass rates between schools, with some showing much weaker performance than others.

The EGMA results are positive, with a clear improvement in the overall performance from 2022 to 2023. Both Grade 3 and Grade 5 students achieved substantially higher median and mean scores, and the pass rates rose significantly. There were minimal gender differences, and access to an E-lab had little to no impact on math outcomes. While most schools demonstrated improvement, some still have many students not meeting the passing benchmark.

The causal impact of E-labs on reading outcomes remains inconclusive. While there was a small positive difference in score gains between students with and without E-labs, this difference was not statistically significant. The limited impact could be partly attributed to implementation challenges faced by E-labs, especially the restricted access time due to the large number of students in the E-lab schools. Additionally, the challenge of learning in French, a language not native to most students, may further complicate the effective utilization of E-labs.

We explored how a variety of child-specific characteristics, household attributes, and the school environment influenced learning outcomes. For reading, positive associations were identified with good after-school study habits, children being perceived as reaching their potential, high educational attainment within households, food security, greater economic resources, and the presence of experienced teachers. In the case of

mathematics, factors like higher grade levels, children performing at their full potential, and at least one family member having completed secondary education were positively associated with achievement.

Our findings indicate that offering training in the use of an E-lab to ordinary teachers would enhance the efficiency of its use. It would ensure an even better integration of the E-lab into the curriculum, and it is suggested that such training could improve the teaching methods applied in the ordinary classrooms. Furthermore, the inclusivity of E-labs for students with disabilities remains a concern. The design and resources available in the E-labs at the assessed schools did not cater to the needs of all children, especially those living with disabilities, calling for more adaptive and inclusive educational resources.

E-labs have had a broader effect on the educational ecosystem, influencing school culture and student engagement. The use of tablets and interactive tools in E-labs significantly increases student interest and attendance. However, to realize its full potential, there must be a balance between leveraging technological advancements and addressing socio-economic challenges that impact education in the Nigerien context. Approaches that encompass technological tools, quality teaching, community involvement, and support systems attuned to the socio-economic realities are essential for fostering learning outcomes among students in Niger. Striking a balance between technology-enhanced and traditional teaching methods is crucial for enhancing the overall educational experience, especially given the persistently low reading scores.

Based on the findings, the following recommendations are made:

- Prioritize efforts that enhance learning outcomes for children, especially in literacy.
- Enhance the integration of E-labs within the school system through increasing the duration of students' access to these facilities and providing regular teachers with training on E-lab utilization.
- Make E-labs more inclusive by providing resources that meet the varied learning needs of all students, including children living with disabilities.
- Address the range of factors influencing educational outcomes such as enhancing food security, improving school infrastructure, and increasing the availability of learning materials and qualified teachers.

Literature

ADRA (n.d.-1). Strengthening Equity, Access & Quality in Education — SEAQE. Final Report 2014-2019.

ADRA (n.d.-2). TOFI: Fokus på mental helse for barn og unge. https://www.adranorge.no/2021/01/tofi-fokus-pa-mental-helse-for-barn-og-unge/. Accessed 4 May 2024.

Atlas Alliance (n.d).Together for Inclusion. https://www.atlas-alliansen.no/en/together-for-inclusion. Accessed 4 May 2024.

Balkin, J. M., & Sonnevend, J. (2016). 'The Digital Transformation of Education'. In J. Sonnevend, C. Greenhow, & C. Agur (eds.): Education and Social Media: Toward a Digital Future, pp. 9–24. The MIT Press.

Banks L.M. et al. (2022). 'Childhood disability in rural Niger: a population-based assessment using the Key Informant Method'. BMC Pediatrics, 22:170.

Bronfenbrenner, U. (1977). 'Toward an experimental ecology of human development'. American Psychologist, 32(7): 513-531.

CONFEMEN (n.d.). Evaluation PASEC2024: Une vingtaine de pays engage. https://www.confemen.org/actualite/evaluation-pasec2024-une-vingtaine-de-pays-engages/. Accessed 4 May 2024.

FAO (n.d.). The Food Insecurity Experience Scale, https://www.fao.org/in-action/voices-of-the-hungry/fies/en/. Accessed 4 May 2024.

Institut National de la Statistique (INS) du Niger (2021). Annuaire Statistique du Niger 2020-2021 [Niger Statistical Yearbook 2020-2021].

Januszewski, A. & Molenda, M. (2008). Educational Technology: A Definition with Commentary, Routledge.

Kielland, A. (2016). Education in Niger. Fafo report 2016:12, Oslo: Fafo.

Kielland, A. et al. (2017). Hidden in the numbers: Barriers to girls' education in West Africa. Fafo Report 2017:39, Oslo: Fafo.

Leap Learning (n.d.). Learning Labs, https://leaplearning.no/the-learning-labs. Accessed 4 May 2024.

Liu, J. et al. (2022). Children with disabilities during Covid-19: Survey Data from rural Niger in 2019 and 2022. Fafo Report 2022:11. Oslo: Fafo.

Sirin, S. R. (2005). 'Socioeconomic Status and Academic Achievement: A Meta-Analytic Review of Research', Review of Educational Research, 75(3): 417–453.

Tufts University (n.d.). The Food Insecurity Experience Scale (FIES). https://inddex.nutrition.tufts.edu/data4diets/indicator/food-insecurity-experience-scale-fies. Accessed 4 May 2024.

UNESCO (2020). Distance learning strategies in response to COVID-19 school closures, UNESCO COVID-19 Education Response, Issue note no. 2.1.

UNESCO (2023). Technology in education: A tool on whose terms?, The Global Education Monitoring Report 2023.

UNICEF (2023a). Education | UNICEF Niger. https://www.unicef.org/niger/education, accessed 4 May 2024.

UNICEF (2023b). Data Must Speak: Unpacking Factors Influencing School Performance in Niger. UNICEF Innocenti — Global Office of Research and Foresight and Niger, Ministry of National Education. Florence (Italy).

UNICEF (n.d.). Children in Niger. https://www.unicef.org/niger/children-niger, accessed 21 May 2024.

World Bank (2018). World Development Report 2018: Learning to Realize Education's Promise. Washington, DC: World Bank.

Fafo
Institute for Labour and Social Research

Borggata 2B, Oslo
P.O. Box 2947 Tøyen, NO-0608 Oslo
Telephone: +47 22 08 86 00
E-mail: fafo@fafo.no

fafo.no