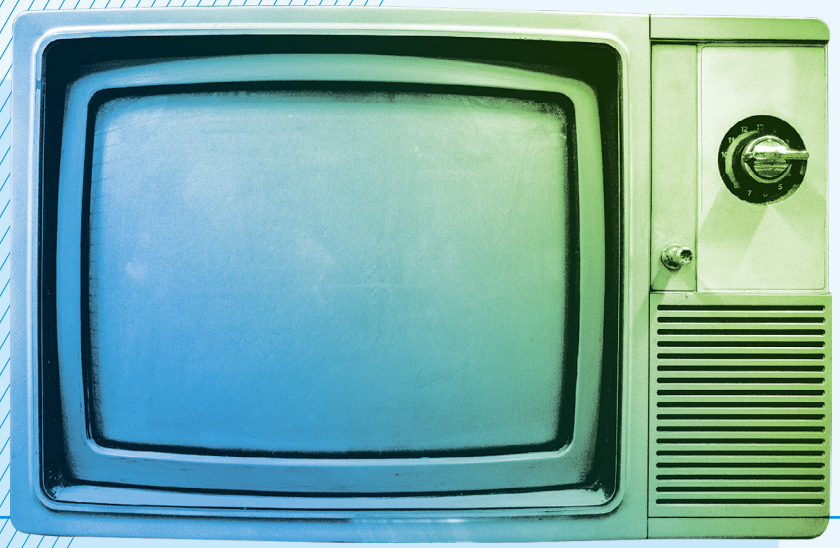
How to build better readers through a television program

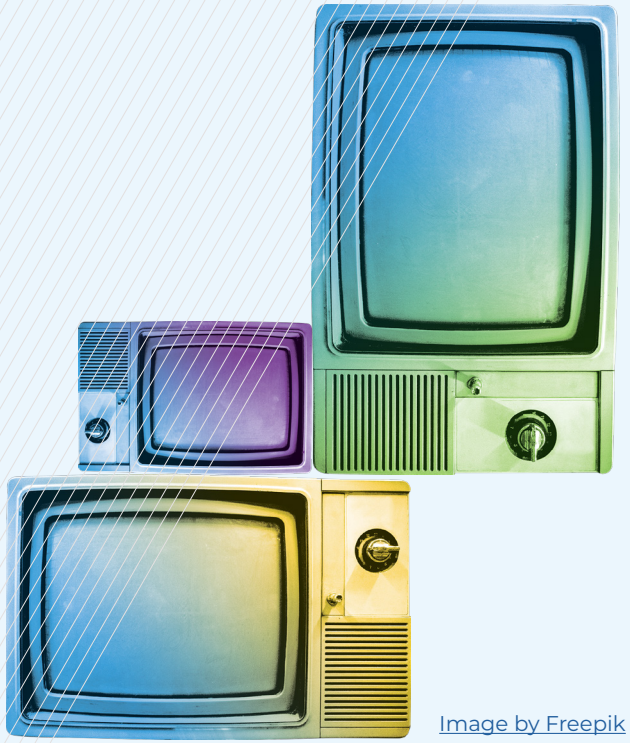


A playbook on leveraging research-practice partnerships in media-based literacy interventions

Busara

ubongo

Structure



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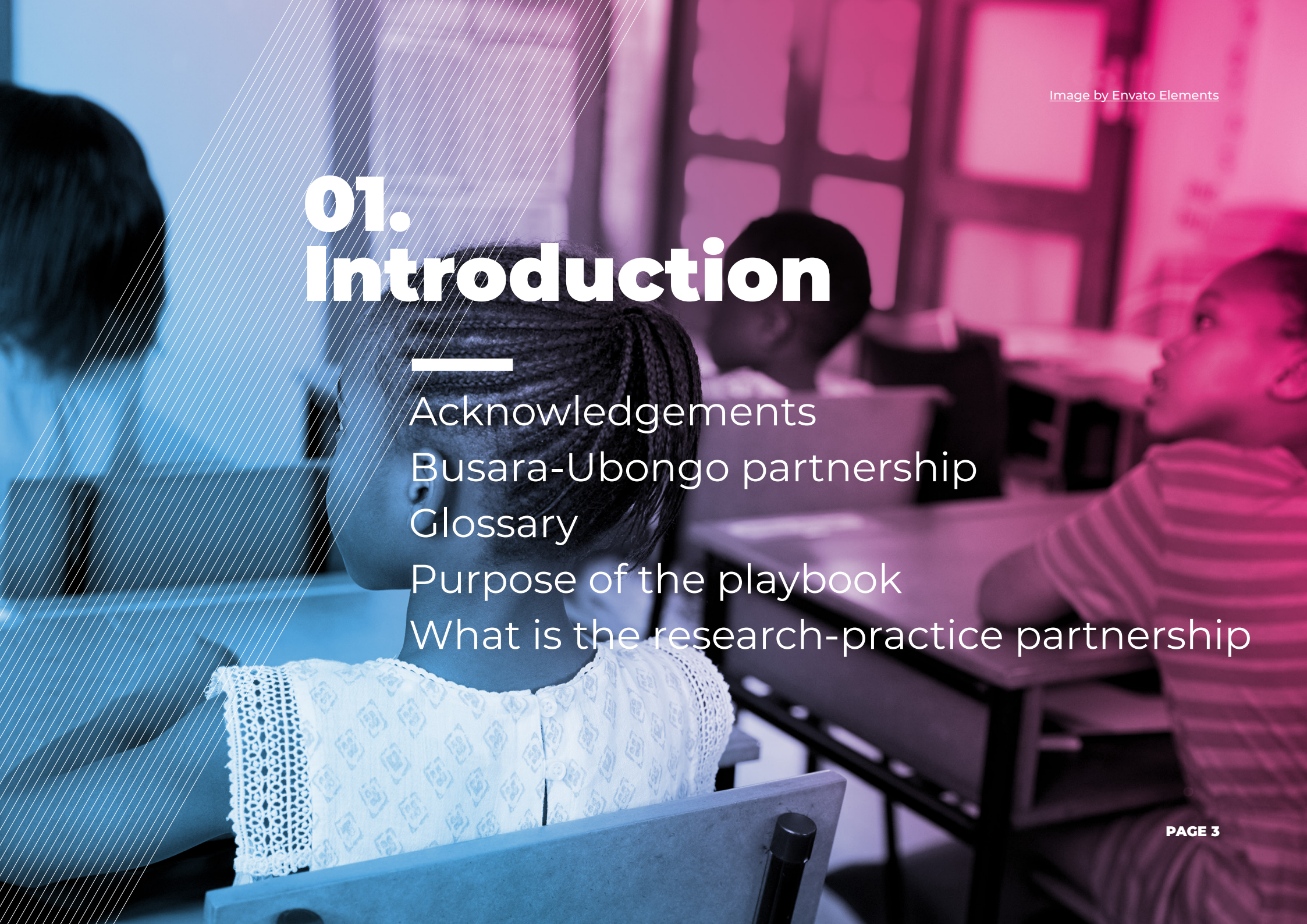

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01. Introduction

Acknowledgements

Funding: The funding for this study was provided by the LEGO Foundation. This report was made possible with support from Ubongo.

We extend our heartfelt gratitude to them for their collaboration and dedication to educational content that makes learning engaging and accessible for children.

We would like to thank Olympic School, Toi Primary School, Kinyanjui Primary School, and Makongeni Primary School for their support in conducting this research.

We also thank Ochi Boaz from Usawa Agenda, and Mercyline Nyagol and Margaret Oyie from Voluntari Academy who helped us with translating and contextualizing the literacy tool used for the study, Christine Okeyo for supporting the analysis, and Jasmin Baier and Dr. Nicolas L. Bottan for their constant guidance and support throughout each phase of the study.

Lastly, we are grateful to all the children and their caregivers who participated in the study, making it possible for us to do what we do.

The Ubongo-Busara partnership in a snapshot

The partnership between **Ubongo and Busara** exemplifies the power of collaboration between practitioners and researchers to achieve shared goals.

Having worked together for several years, both organizations have successfully aligned their unique strengths, creating a synergy that allows them to address each other's limitations while leveraging their respective expertise. This complementary approach has been fundamental in driving innovative research and impactful program structuring.

Ubongo developed the first season of Nuzo and Namia, which aired in 2023. During its airing, Busara conducted a large-scale randomized controlled trial in a naturalistic setting to evaluate the show's impact on literacy gains, socio-emotional learning (SEL), and changes in gender attitudes among children.

The research design was a collaborative effort; the objectives and measures of success were co-created, ensuring alignment between the program's goals and the research approach. Ubongo analyzed the show's content, categorizing it into specific skills that children were expected to learn from each episode. Busara then tailored research instruments to capture these skills accurately.

Recognizing the limitations of the main RCT, such as its inability to explore nuanced aspects of learning within short-term or controlled environments, both organizations co-developed a complementary lab experiment.

Weekly discussions and Q&A sessions facilitated the alignment of objectives and methods.

Caregiver involvement, identified as a critical factor in children's learning, was integrated into the study through co-created interventions. Ubongo outlined the skills presented in each episode, while Busara scripted additional video segments to guide caregiver engagement. Ubongo's production team brought these scripts to life, which were then incorporated into the lab study for treatment groups involving caregivers.

Capacity-building activities were an integral part of this partnership. Busara created a dashboard to visualize weekly data on audience engagement with the episodes, empowering Ubongo to independently analyze and interpret findings. Training sessions introduced Ubongo's team to the dashboard, data collection tools like SurveyCTO, and the fundamentals of research instruments.

In a hands-on capacity-building session, both teams collaboratively deployed and refined observational tools and teaching assessments, ensuring shared understanding and consistent application.

The iterative nature of this partnership extended into the analysis phase. Ubongo provided valuable insights into what aspects of the show required focus for the upcoming season, such as engagement drop-offs, caregiver feedback, and participant interest levels. Busara analyzed the data with an emphasis not only on identifying findings but also on interpreting their implications for the show's content. Joint discussions of the findings led to actionable recommendations, such as adjusting specific episodes, enhancing elements with lower engagement scores, and refining sections where learning outcomes could be improved.

Ubongo's openness and trust in Busara's research expertise created a foundation of mutual respect. They acknowledged the limitations inherent in short-term lab experiments and encouraged bold yet evidence-driven conclusions. This culture of trust, combined with continuous feedback and innovation, exemplifies how research-practice partnerships can be a driving force for meaningful and scalable interventions.

Glossary

Attrition – When participants drop out of a study before it is completed, which can affect the results.

Cognitive Flexibility – The ability to switch between different ideas or ways of thinking, which helps with learning and problem-solving.

Endline – The final data collection point in a study, used to measure changes after the intervention.

Engagement Drop-off – The point in a program or video where viewers lose interest and stop paying attention.

Executive Function Skills – A set of mental skills that help with focus, memory, planning, and self-control. These skills are important for problem-solving and learning.

Intervention – The specific program, activity, or treatment being tested in a study to see if it makes a difference.

Lab-in-the-Field – A research approach that combines controlled experiments (like those in a lab) with real-world conditions to better understand behavior.

Naturalistic Setting – A research environment that closely resembles real-life conditions rather than a controlled lab setting.

Neurodivergence – A term that describes how some people's brains function and process information differently to what is considered "typical." This includes differences such as ADHD, Autism and Dyslexia, which can affect learning and behaviour in unique ways.

Placebo – A fake or inactive version of an intervention used in studies to compare results. This helps researchers see if the real intervention has an actual effect beyond just expectations.

Randomized Controlled Trial (RCT) – A research method where participants are randomly assigned to different groups (e.g., one that receives an intervention and one that does not) to measure the effect of the intervention in a fair and unbiased way.

SurveyCTO – A digital tool used to design and collect survey data in research studies.

Purpose of the playbook

This playbook is designed to serve as a comprehensive guide for EdTech stakeholders interested in leveraging research-practice partnerships to enhance literacy outcomes through media-based interventions.

By focusing on the collaboration between Busara and Ubongo, it highlights key insights, methodologies, and recommendations derived from the Nuzo and Namia program, an edutainment initiative aimed at improving children's reading skills.

Who can use it?

Policymakers
- To design and implement policies that support innovative literacy interventions in multilingual and low-resource contexts.
- To use evidence-based strategies for improving literacy outcomes.

EdTech Practitioners
- To understand how research insights can be embedded into educational programming.
- To learn about effective co-design processes that make interventions both engaging and pedagogically sound.

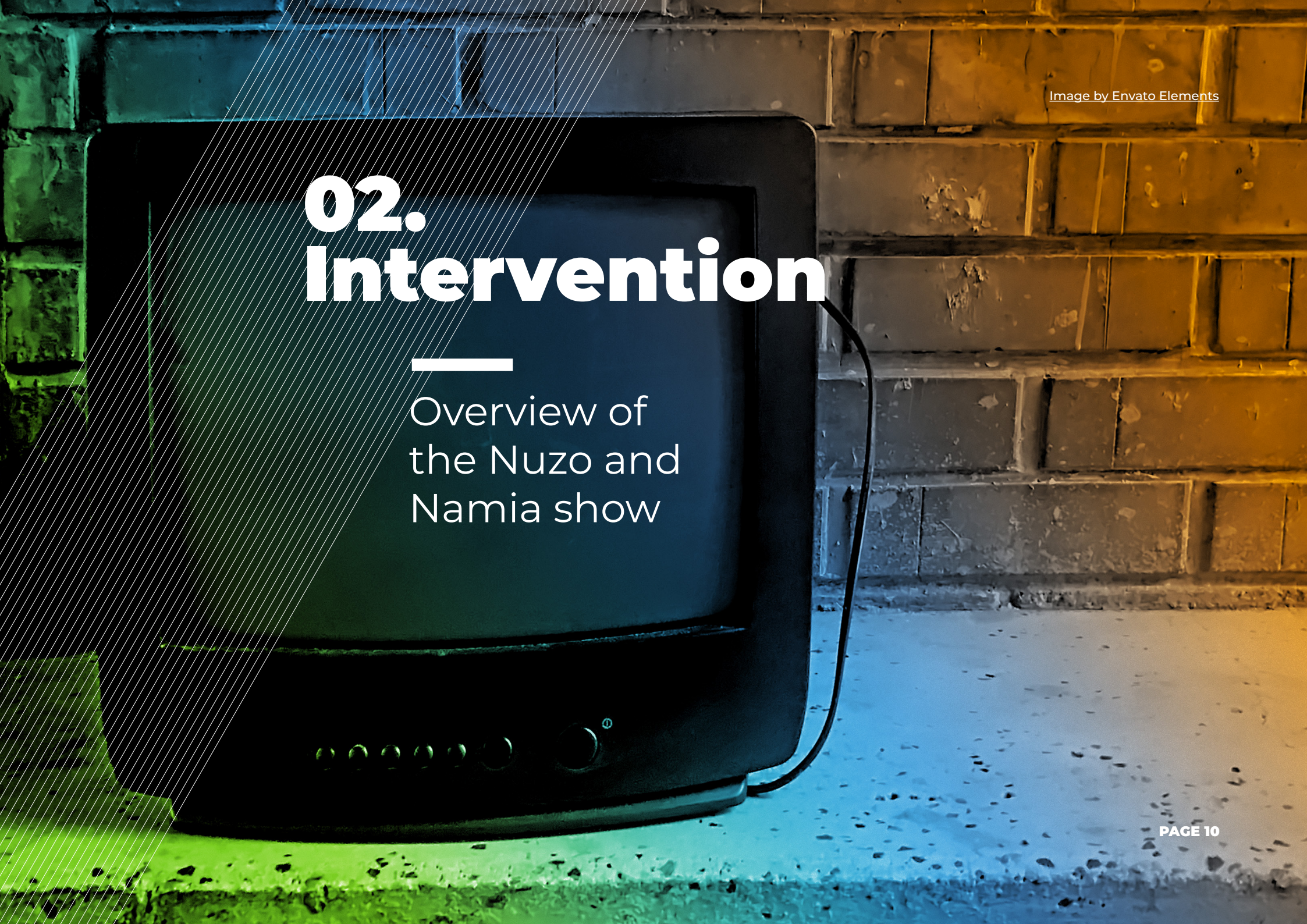
Researchers and Academics
To explore how experimental research can inform practical solutions in this context.

Funders and Development Partners
- To assess the value of supporting media-based interventions as part of their literacy and education portfolios.
- To understand the importance of integrating MEL (Monitoring, Evaluation, and Learning) frameworks for sustained impact.

What is a research-practice partnership?

A Research-Practice Partnership is a collaborative approach that bridges the gap between research and practice by fostering meaningful, sustained collaboration between researchers and practitioners.

The aim is to co-create solutions that are both actionable in real-world settings and informed by rigorous evidence.



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02. Intervention

Overview of the Nuzo and Namia show

The Nuzo and Namia show

The Nuzo and Namia show, developed by Ubongo, targets young children with the aim of improving their literacy, social-emotional learning, and gender attitudes. The plot revolves around 2 protagonists, Nuzo and Namia, as they travel to different African countries, meet with different characters and learn about different cultures.

By interacting with the protagonists, who appear just in time to help them solve a problem that they are facing, viewers see and hear the protagonists model key strategies in early reading comprehension, such as predicting, questioning, clarifying, and analyzing information.

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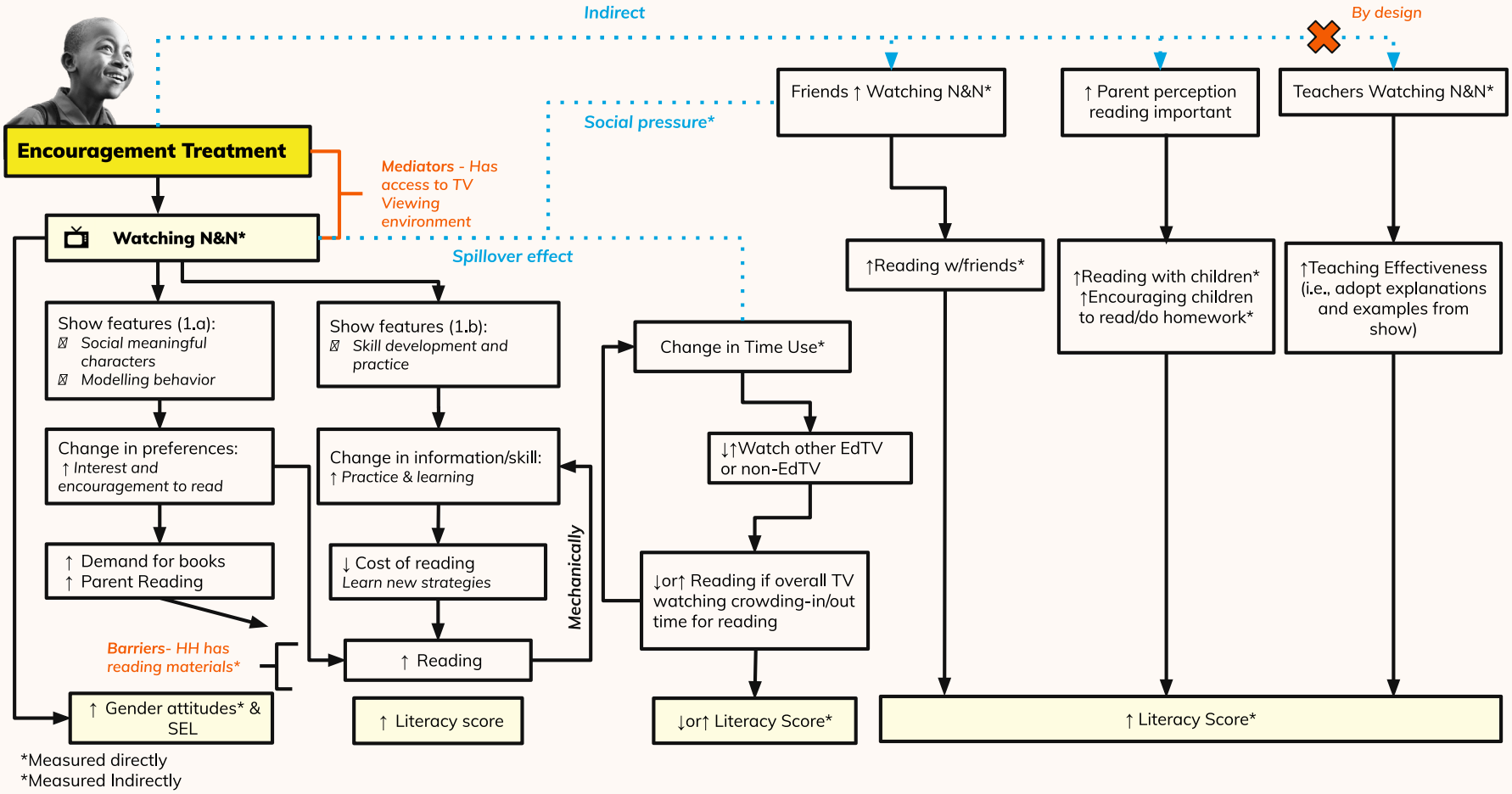
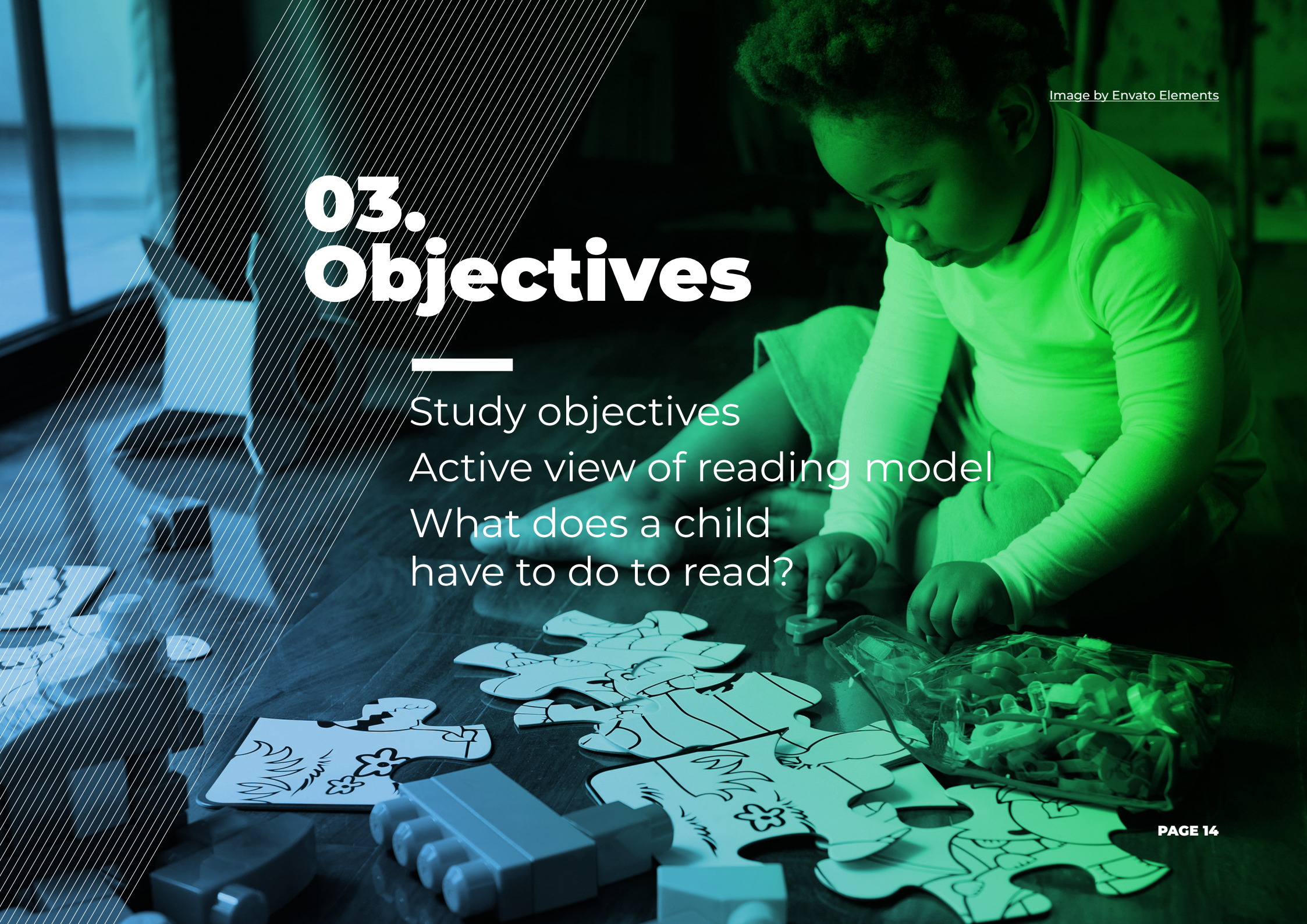


For example, a character may predict a book's content based on the story's cover and title. The audience can then later see them refine their predictions halfway through the story or when they start reading. They may also compare texts they have read in different parts of the book and then self-question their comprehension.

Furthermore, seeing protagonists who are just like the audience (i.e., relatable role models) reading and using stories/books to practice their reading aims to give children agency, confidence, and motivation to improve and practice their own reading skills.

In interactions with the people from different countries in the show, along with their family and friends, viewers witness the protagonists identify and model positive social-emotional learning outcomes and gender attitudes.

The protagonists are taken on adventures where they can try things that earlier may have seemed unsuitable or impossible beforehand. Through the open-mindedness and perseverance of the protagonists, viewers learn that by trying different things and sticking to them for a while, they can find activities that truly suit them and their skills, even if societal norms or early difficulties don't encourage it.



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03. Objectives

Study objectives

Active view of reading model

What does a child have to do to read?

Study objectives

Developed by Ubongo, the Nuzo and Namia show targets children in multilingual contexts. Kenya has an early-exit education policy under which children transition from learning in their first language (L1) to English (L2) as the medium of instruction in grade 4. While designed to strengthen English proficiency, this shift can create gaps in literacy development if foundational skills in L1 are not reinforced.

Research suggests that longer exposure to L1 before shifting to L2 leads to stronger literacy outcomes (Crawford, 2004). Since no single policy fits all contexts, understanding how children transfer reading skills across languages is essential in multilingual settings like Kenya.

The evaluated intervention, an edutainment show titled Nuzo & Namia (N&N), aimed to develop language-agnostic skills known to facilitate reading comprehension.

These include visualizing while reading, skimming, questioning, recalling, predicting, and making connections.

However, language may significantly influence both engagement with the show and the encoding of transferred information. Specifically, language could impact children's understanding of the processes required to cultivate these skills, their curiosity about reading fostered through information gaps, and their ability to practice beneficial intermediary behaviors.

Additionally, it is possible that the skills were developed in a language-agnostic manner, but the language used in the assessment limited children's ability to demonstrate them. A previous RCT investigating this show revealed significant effects on fostering curiosity (Baier et al, 2025) and the growing recognition of executive functioning (EF) as a critical factor in both socio-emotional skills and reading, this study also examines the show's impact on three core EF components: inhibitory control, cognitive flexibility, and working memory.

Furthermore, qualitative data collection underscored the pivotal role of parents in fostering children's engagement, habit formation, and learning. This study therefore seeks to quantitatively assess the influence of parental involvement on these outcomes.

This study takes an experimental lab-in-the-field approach to address specific questions that were beyond the scope of the main RCT. It explores whether factors such as cross-linguistic transfer, caregiver involvement, and episode dosage can enhance the program's literacy impact.

The study's objectives are guided by the following research questions:

1. **Does the show facilitate the transfer of literacy skills from the broadcast language to other languages, particularly from L1 to L2?**
2. **How does light caregiver engagement influence the effectiveness of the show in enhancing literacy skills?**
3. **What teaching and learning practices emerge during a typical 30-minute episode of Nuzo and Namia?**
4. **How effective is the program in building understanding and acceptance of neurodivergence, particularly autism, among its audience?**

Image created using Midjourney

Active View of Reading model

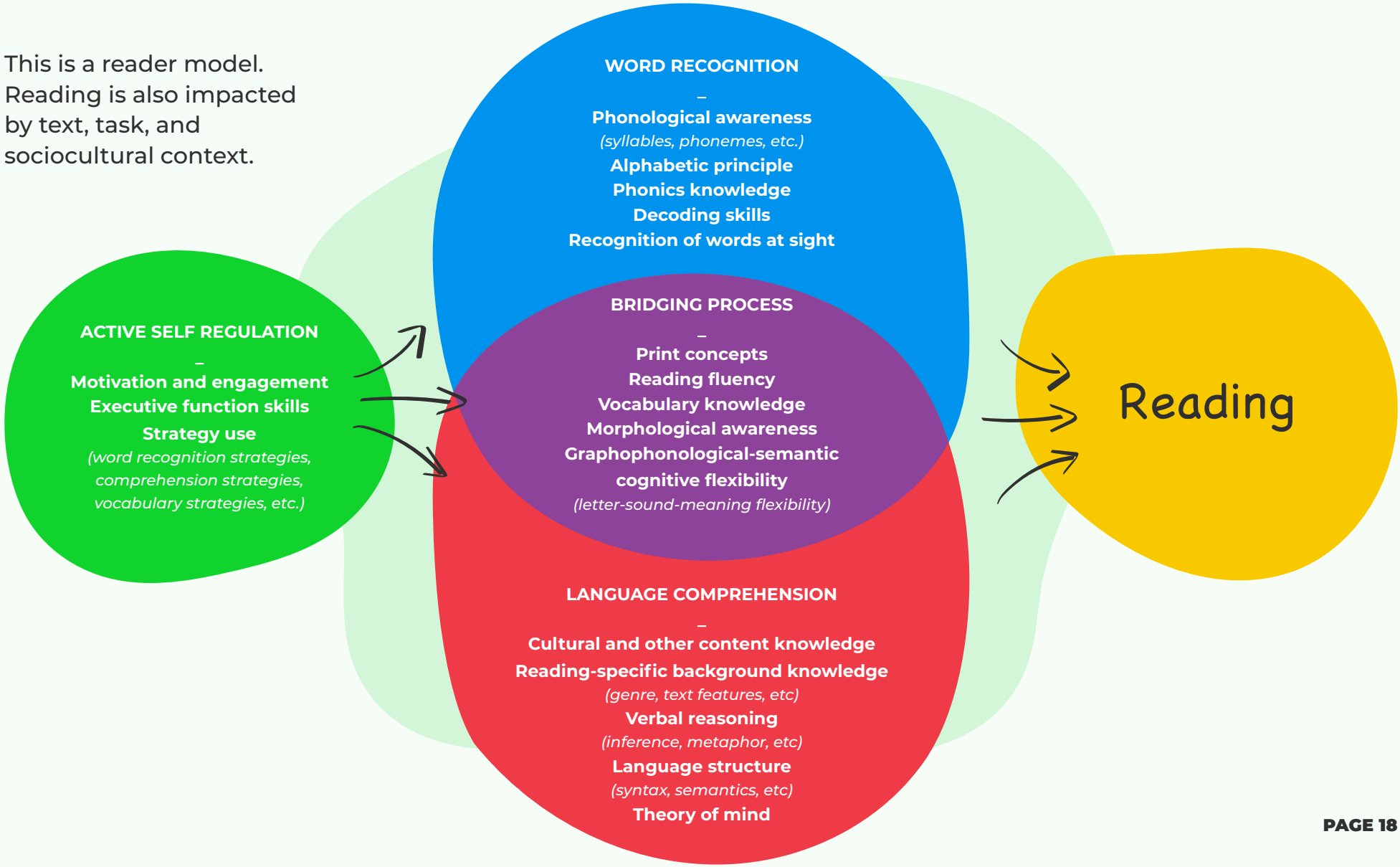
Image created using Midjourney

The Active View of Reading **(Duke & Cartwright, 2021) expands on the widely referenced *Simple View of Reading* by including additional factors that impact how children learn to read. While the Simple View focuses on decoding (word recognition) and listening comprehension, the Active View highlights the importance of motivation, self-regulation, and other skills that support reading success.**

This model acknowledges three key tenets:

1. **Reading difficulties can stem from diverse factors beyond just decoding and listening comprehension.**
2. **Decoding (or word recognition) and linguistic comprehension are deeply interconnected.**
3. **Self-regulatory processes, such as motivation and executive functioning, are fundamental to reading proficiency but were overlooked in the Simple View.**

This is a reader model. Reading is also impacted by text, task, and sociocultural context.



How does this model apply to reading through Nuzo and Namia?

The Nuzo and Namia lab study applies the Active View of Reading as a framework to evaluate how the show supports children's reading development. By focusing on 'Bridging Processes' and 'Language Comprehension', the study examines how the show's content fosters self-regulation.

The various elements of self-regulation and how they relate to reading are:

Motivation and Engagement in Reading

Motivation and engagement drive a child's interest in and persistence with reading tasks. A meta analysis conducted by McBreen and Savage (2020), demonstrates that boosting reading motivation through teaching self-regulation, fostering interest, and emphasizing reading's value can significantly improve reading fluency, comprehension, and word recognition. By instilling a sense of confidence and curiosity, children are more likely to actively engage with texts.

Executive Function Skills

Executive functioning plays a pivotal role in managing the cognitive demands of reading. Skills such as the ability to focus attention on specific aspects of the text (attentional control), create and sustain a mental representation of the text's meaning while decoding the words (working memory), filter out irrelevant information (inhibitory control), switch between essential tasks and processes (cognitive flexibility), and plan and regulate progress toward completing a reading task (planning).

Research highlights how these skills predict reading ability and inform how children navigate the complexities of reading.

Strategy Use in Reading

Teaching children to use specific reading strategies, such as questioning or creating mental images, enhances their ability to understand and retain information. Studies show that strategy use is a stronger predictor of reading success than word recognition or language comprehension alone. Programs focusing on comprehension strategies have been particularly beneficial for young learners and those with learning disabilities (Okkinga et al., 2018).

What does a child have to do to read?[1]

Image created using Midjourney

A scenario:

Esther is a 2nd grade student in a public school in Kenya. She needs to read this sentence for her Environmental Activities class:

Cleaning the school helps everyone stay healthy and safe. It also makes our school a nicer place to be!

1 This section has been designed using Dr. Alessanda Ward's presentation in the CASEL SEL Exchange 2024.

Before Esther got to 2nd grade, she should have...

- Learned how texts work (concepts about print)
- Developed an awareness of the sounds in spoken language (phonological awareness) and an oral vocabulary
- Understood that those sounds can be represented in print by letters and letter combinations (alphabetic principle)
- Learned many basic letter-sound relationships (early phonics) and developed the ability to recognize some words at sight
- Participated in literacy events and practices in her family and community

At the word level, she should know how to...

- ID letters & letter combinations in the word and match those to sounds automatically and fluently
- Flexibly switch between considering those relationships and considering meaning (graphophonological-semantic cognitive flexibility, or GSF)

Cleaning the school helps everyone stay healthy and **safe.** It also makes our school a **nicer** place to be!

For example, she should know that when a vowel is followed by a consonant and then followed by an e, such as in the word safe, it creates a vowel-consonant-E syllable (also known as VCE, Magic E, or Silent E). This turns the sound of the vowel from a short "a" to a long "a" where the "e" is silent and the preceding vowel usually makes a long sound. Esther should also make the connection that adding an "er" to the verb nice means that it is "more nice".

At the sentence level she should know how to...

- Consider how parts of the sentence work together and what this tells her about the relationship between ideas

For example, cleaning the school leads to the place being nicer for everyone.

At the text level, she should...

- Draw on background knowledge and existing vocabulary she has about cleaning and school
- Consider how the information from this sentence relates to the whole text
- Integrate the new information she is learning with what she already knows

Is Esther actually able to employ these strategies?

Wow, that's a lot of work to read one sentence! Now imagine doing all of this in a language that you do not know well. What Esther is possibly going through is that she's learning to read in a mother tongue or common language of instruction in grade 2, while she is learning English as a second language. When she transitions to grade 4, she will learn all subjects, including Environmental Activities in English which becomes the official language of instruction, as per early exit models in a country like Kenya. That is probably going to be very hard for her! This is why supplementary reading programs like Nuzo and Namia are so important.

Image by Envato Elements

04. Overview

Experiment overview
Study execution

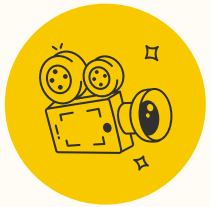
Experiment overview

The study uses a lab-in-the-field Randomized Controlled Trial (RCT) to test the impact of an intervention by comparing groups of people. In an RCT, participants are randomly assigned to different groups to ensure fairness.

One group receives the intervention (in this case, exposure to Nuzo and Namia), while another group does not. This helps researchers see if the intervention truly makes a difference by comparing outcomes between the groups. A lab-in-the-field is a set up where we create a highly controlled laboratory environment where the experiment is conducted, but in the community or context that the participants are familiar with.

RCTs are used because they are one of the most reliable ways to measure cause and effect. By randomly assigning participants, the study avoids bias and ensures that any improvements in reading skills are likely due to the show itself and not other outside factors.

The sample was divided into three groups: a placebo control group and two treatment groups.



1 Control group

Placebo

2 Treatment 1 group

Watches the Nuzo and Namia show in Kiswahili without caregiver intervention

3 Treatment 2 group

Watches the Nuzo and Namia in Kiswahili with an added caregiver engagement intervention

1 Control group

Placebo

A placebo is something that looks like a real treatment but doesn't have the active ingredient or expected effect. In medical studies, a placebo could be a sugar pill instead of actual medicine. In education or behavior studies, it could be showing children a different TV show that is unrelated to literacy, to compare its effects with Nuzo and Namia.

Placebos help researchers check if the intervention is truly working. If children in both groups improve at the same rate, then the show might not be the main reason for the change. But if the Nuzo and Namia group improves more than the placebo group, it suggests the show is making a real impact.

The control group for this study watched a non-educational program, Tom and Jerry, chosen for its complete absence of educational content and relevance to literacy, social-emotional learning (SEL), or neurodivergence awareness. This ensured that the control condition provided no interference with the tested variables while still maintaining an engaging and neutral viewing experience for participants.

Image created using Midjourney

2 Treatment 1 group

Watches the Nuzo and Namia show in Kiswahili without caregiver intervention

Treatment 1 participants viewed six Kiswahili episodes of Nuzo and Namia

Image by Freepik

3 Treatment 2 group

Watches the Nuzo and Namia in Kiswahili with an added caregiver engagement intervention

Treatment 2 extended the Nuzo and Namia experience by incorporating a caregiver engagement component. This intervention involved an additional small video segment that encouraged caregivers to participate in their child's literacy development.

The caregiver-focused content included strategies for engaging in meaningful conversations, conducting simple literacy-building games, and recalling the lessons presented in the episodes. Examples included recaps of episode content featuring characters encouraging recall exercises with caregivers and demonstrations of practical activities, such as bedtime reading and object-word association games.

The caregiver engagement aspect was informed by research emphasizing the role of interactive dialogue and shared activities in fostering early literacy development. By equipping caregivers with actionable tools and encouraging active participation, the intervention sought to amplify the program's impact on children's reading behaviors and habits.

Study execution

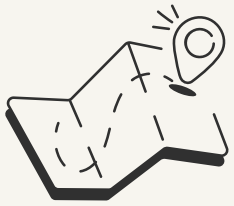
The research study was divided into 3 phases - baseline, experiment and endline.

BASELINE
1 Week
Participants took the baseline survey

RUNNING OF THE EXPERIMENT
6 Weeks
Participants in the three groups attended weekly episode viewing sessions at their respective venues

ENDLINE
1 Week
Participants took the endline survey

The study targeted 155 households within low-income communities in Nairobi.



Each household consisted of a child between the age of 6 and 9, along with any of their caregivers. Kibra and Kawangware neighborhoods were selected for their demographic composition, particularly their concentration of Luo speakers, which was critical for evaluating cross-linguistic transfer between L1 and L2.

The children were sampled from the public primary schools in these communities.

155
households

6-9yr
old children

Image by Envato Elements

05. Findings

Results

Literacy

Mechanisms

Pedagogy

Awareness and acceptance of neurodivergence

Results

What did we want to find, how we measured it, and what we finally found

155

households

49%

girls

51%

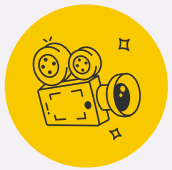
boys

92%

have access to TVs

50%

are from grade 3



49*

Control group

50*

Treatment 1

47*

Treatment 2

*9 households dropped out over the course of the study

We have four main categories of primary outcomes with their respective subcategories and outcome measures:

1 Literacy

Reading and listening comprehension skills

Visuospatial linguistic skills

2 Mechanisms

Socio-emotional learning

Conversational habits

Book and print recognition

Barriers to reading

Executive function skill

3 Pedagogy

Stallings snapshot tool

Observation questions designed in-house

TEACH tool adaptation

4 Awareness and acceptance of neurodivergence

Awareness of neurodivergence

Acceptance of neurodivergence

Literacy

What did we want to find?

We assess effects on literacy on three measures:

- **Reading comprehension, or a child's ability to read a passage and answer questions based on that passage, with a focus on the comprehension skills recall, visualization and inference.**
- **Listening comprehension, or a child's ability to listen to a passage and answer questions based on that passage, with a focus on recall, visualization and inference.**
- **Visuospatial-linguistic skills with subtasks on object-word association and spatial recognition.** Research has proven that object-word association is a vital indicator of literacy development. Research also shows that when a child practices locating objects in relation to oneself (e.g. in front of or behind), they build spatial abilities for word order that leads to future writing skills (Newcombe and Huttenlocker, 2000). In this task, children are shown objects and asked to name them.

We were interested in testing whether the children would show any evidence of cross-linguistic transfer or the ability to apply language agnostic reading skills across various languages, particularly from L1 to L2.

Reading comprehension can be seen as the product of decoding and listening comprehension (Hoover and Gough, 1990) or, more broadly, as the combination of code-based skills and meaning-related skills (Lesaux and Marietta, 2011). Code-based skills include phonological awareness, phonics, and oral fluency. Meaning-related skills include vocabulary and comprehension strategies.

Cummins (1979) first proposed that oral language and literacy skills developed in the child's first language (L1) can transfer to the second language (L2) through a process he described as linguistic interdependence (Cummins, 1979). This theory, suggesting that there is a common underlying proficiency across languages, has guided the research and practice in multilingual classrooms.

How did we measure it?

All the literacy subtasks were designed employing subsections from the Early Grade Reading Assessment (EGRA) developed by USAID (USAID, 2016).

Furthermore, each of these tests were conducted in three languages (English, Kiswahili, and Luo) to test for cross linguistic transfer. Thus we obtained a score for each language and measure (nine in total).

A benchmarking session was conducted with practitioners from Usawa Agenda and teachers from Voluntari School to ensure that the study passages were appropriate and easily understood by students in grades 1 to 3. Adaptations included translating passages into Luo and Kiswahili, aligning language comprehension benchmarks with the students' average proficiency levels, and incorporating familiar names and relatable examples to enhance engagement and understanding.

You can access the study tool here.

What did we find?

Language matters

The most interesting outcome of the study was the impact on comprehension in Kiswahili.

The intervention or the TV show was aired in Kiswahili while the children were assessed in 3 languages - English, Kiswahili and Luo (the sample was selected based on Luo as the mother tongue language).

The children and their families were most well versed with Kiswahili as a conversational language used at home more often. We find no significant impact on the reading skills in English or Luo, but find a significant statistical impact on Kiswahili of 0.485 standard deviations of impact as demonstrated by Figure 1, especially for children in the group with the parent engagement intervention. This means that, on average, the children who took part in the program with the element of the parent engagement, improved their Kiswahili reading abilities more than those who didn't receive the program, and this difference is statistically meaningful. **In education studies, a standard deviation impact of 0.485 is quite large!**

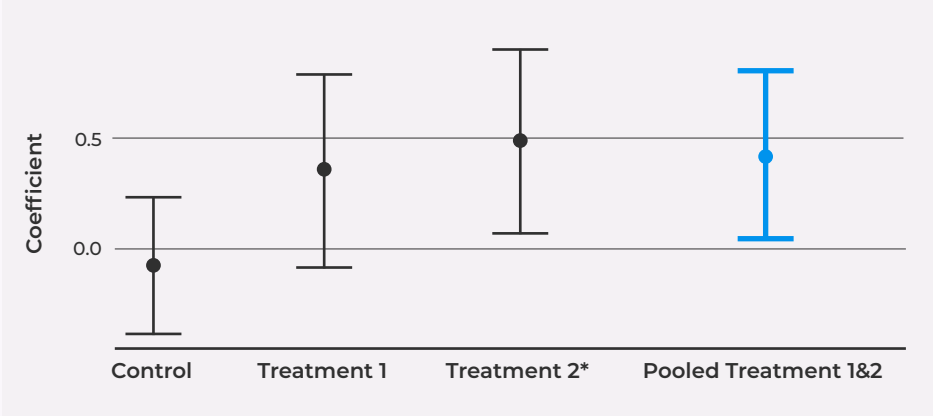
We see no evidence of a cross-linguistic transfer, or the child's ability to apply the same comprehension skills in other languages, a trait that is quite relevant in the policy landscape of Kenya. This reinforces the fact that language matters the most.

If the language of instruction and assessment is accessible to the children, they tend to show improvements in their comprehension skills.

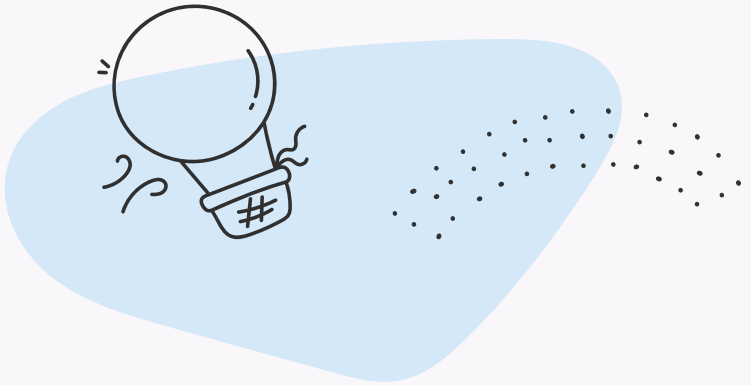
This result is consistent with the findings in a large-scale RCT by Baier et al (2025) that evaluated the same program but with English as the primary language of instruction and assessment. They found that only children who spoke English at home showed a significant growth in comprehension.

Our study detects no impact on the literacy index as a whole that contains the visuo-spatial linguistic skills. This implies that the children's ability to associate names with objects and identify where items are located spatially in relation to them has not been impacted through the study. *Only comprehension is impacted which is an expected outcome, given that the show explicitly demonstrates the application of comprehension skills.*

Figure 1: *Treatment effect on Swahili comprehension index*



*The standard deviation for Treatment 2 is significant at p<0.05



Mechanisms

Socio-emotional learning

What did we want to find?

We wanted to understand if the program created a sense of confidence and curiosity towards reading, thus creating important mechanistic pathways for generating healthy reading habits. Our starting point was self-efficacy, which following Bandura is:

> *"The belief in one's capabilities to organize and execute the courses of action required to manage prospective situations.*

Basically, self-efficacy is related to whether a student believes that s/he has sufficient control over his/her environment in order to succeed. High self-efficacy reflects confidence in the ability to exert control over one's own motivation, behavior, and environment and allows students to become effective advocates for themselves. Self-efficacy as a critical competency also maps incredibly well to the newly implemented Competency Based Curriculum introduced by the Government of Kenya in 2019. We use confidence and curiosity as a **proxy** for self efficacy owing to the suitability of the item to the context and sample.

How did we measure it?

Our biggest point of contention was the ambiguity around language used to define SEL items and the ways in which they are measured. Contextual adaptability is also a key point of consideration here and we tested various scales and standardized tools before selecting the Confidence and Curiosity scale developed by RTI.

To begin with, we piloted and tested a few different standardized measures of self-efficacy such as the Self-Efficacy Questionnaire for Children (Cherewick et al., 2021), the Short Grit Scale/ Grit-S Scale (Duckworth et al., 2007, Duckworth and Quinn, 2009), the ISELA task-based Grit measure (Save the Children, 2018), an Adapted

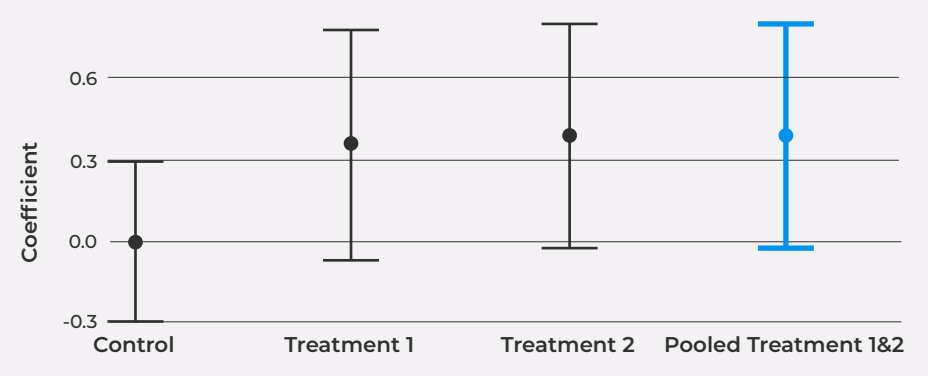
Yeager Growth Mindset Scale (Cherewick et al., 2021), the Child adapted Rosenberg self-efficacy scale (Rosenberg, 1979), and the New general self-efficacy (NGSE) (Chen, Gully and Eden, 2001). All these scales were not a good contextual fit for our sample based on the types of narratives portrayed in them (many examples did not capture the African experience and were too western learning) or were too difficult for the children in our sample to understand conceptually.

We finally settled on Confidence and Curiosity as a proxy for self-efficacy: measured using the RTI confidence and curiosity scale, which has been validated in both our East African context and our age group (Jukes et al., 2021).

This item performed the best in our pilots, had good inter-rater reliability results, and was relevant to the children's experiences. The score is created as a simple sum of all items, where relevant items are reverse coded so that a higher final score reflects higher confidence and curiosity. This was administered as a survey to the children where the responses are primarily self-reported.

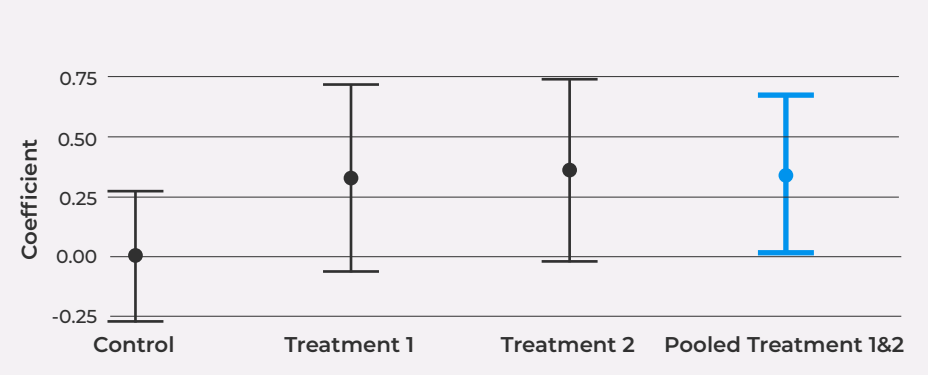
What did we find?

Figure 2: *Treatment effect on trait curiosity*



*The standard deviation for Treatment 2 is significant at p<0.05

Figure 3: *Treatment effect on social and emotional learning*



*The standard deviation for Treatment 2 is significant at p<0.05

We discovered that there was a meaningful improvement in two areas. First, the overall Social-Emotional Learning (SEL) measure improved by about 0.35 standard deviations, and second, curiosity increased by about 0.37 standard deviations.

Both of these changes are statistically significant.

0.35
standard deviation improvement of overall SEL measure

0.37
standard deviation increment on curiosity

While exploring whether the shift in curiosity is directed towards reading specifically, we find no significant correlations between the two. This implores further inquiry into whether the increase in curiosity amongst the viewers of the program was more generally directed or has a strong tie with the literacy scores. Our analysis does not provide any proof that the two are related.

This has several implications: **the first** being that this sparks a conversation around the core Theory of Change that guides the program design. If curiosity is indeed improved, however not specifically for reading, what are some ways in which this connection can be built in more explicitly in the programming?

Additionally, if reading improves without any support from crucial SEL indicators which have been proven to be instrumental in driving reading success, could we expect to see better impact if SEL programming were to be more explicitly built in with a strong relationship to reading?

Conversational habits

What did we want to find?

We were interested in capturing data on the conversational habits encouraged by the caregiver in the home environment. Research shows that engaging in meaningful conversations with a caregiver leads to language and literacy development, especially in the earlier stages of life (Dupas et al., 2021).

We wanted to test whether this element is salient in the Nuzo and Namia show as well. Congruent to testing out a crucial caregiver engagement element that was built into the second treatment arm, we wanted to understand whether the program creates sticky habits in the home learning environment where caregivers and children engage in quality conversational habits.

How did we measure it?

The tool was inspired by a study on caregiver conversational inputs from Ghana on employing infant-directed speech and adapted from a tool developed by the Harvard Laboratory for Developmental Studies (Dupas et al., 2021).

Both caregivers and children were asked a series of questions on the quality of conversational habits over a 3-week period before the endline survey. The questions were as follows:

In the last 3 weeks, how often did you:

1. ***Talk to child while doing an activity w/ child around***
2. ***Describe things to child when walking***
3. ***Pointed, named object and asked child to repeat***
4. ***Read/ looked at a book with your child***
5. ***Told a story to your child***

In the last 3 weeks, did any adult (including yourself):

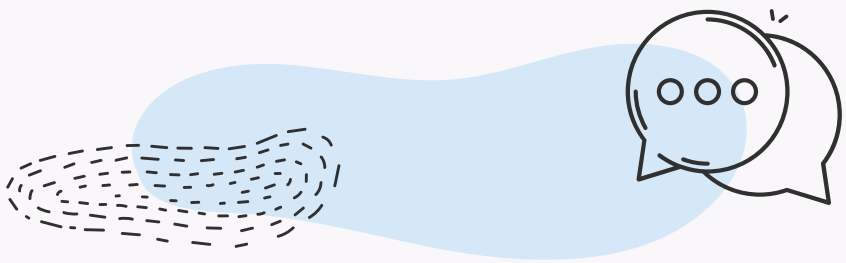
1. ***Sang to the child***
2. ***Played with the child***
3. ***Read/ looked at a book with the child***
4. ***Told a story to the child***
5. ***Described things to the child***

What did we find?

We do not detect any significant impact on conversational habits between the caregiver and child, both from the perspective of the parent and the child.

However, an interesting observation here is that the children in the treatment groups, especially in treatment 2 which had the caregiver intervention element, reported a decline in quality adult conversations that were not their primary caregivers.

Treatment 2 children reported a -0.2 standard deviation of statistically significant impact in the types of conversations other adults who are not their primary caregivers have with them. This could be attributable to perceptions around quality conversations changing with the children in treatment 2 now exposed to ways in which they can have richer conversations with adults.



Book and print recognition

What did we want to find?

We wanted to know whether reading habits are improved when a child is aware of the functions of a book and how to navigate reading experiences.

How did we measure it?

In each group, we placed different types of books in the lab room, including picture books, books with heavy texts, books of different languages, and some supplementary reading material aligned to the Nuzo and Namia show.

Through an observational survey designed in-house, children were provided a book and were asked to correctly point towards the cover, index, spine and whether or not they answered correctly was recorded.

What did we find?

99%
of children recognized the cover correctly

15%
of children recognized the spine correctly

72%
of children stated the number of pages correctly

34%
of children recognized the index correctly

Barriers to reading

What did we want to find?

We wanted to understand the structural challenges that influence children's reading development.

To understand the obstacles families face, we examined access to reading materials, parental perceptions of reading proficiency, and the factors that encourage or hinder reading habits at home and in the community.

How did we measure it?

A survey was developed in house for capturing this data. We asked caregivers about their child's access to books both at home and in external spaces such as schools or religious institutions.

Additionally, we inquired about their perceptions of their child's reading abilities and their thoughts on how reading skills could be improved.

What did we find?

We found that:

- 90% of caregivers felt their child has access to books at home
- 85% of caregivers believed their children have access to books outside the home
- 88% believed that reading more books could make their child a proficient reader
- 57% felt the biggest barrier stopping their child from reading at their best capacity was playing
- 62% believed that dedicated reading time could promote healthy reading habits between them and their children
- 62% believed that parents being busy was a barrier to building healthy reading habits between them and their children

Executive function skill

What did we want to find?

Given the earlier study's significant effects on fostering curiosity and the growing recognition of executive functioning as a critical factor in both socio-emotional skills and reading, we wanted to examine the show's impact on three core executive functioning components:

1. **Inhibitory control- The ability to control impulses and resist distractions.**
2. **Working memory- The ability to hold and manipulate information in mind over short periods.**
3. **Cognitive flexibility and creativity- The ability to think creatively about alternative uses of a common object**

Several executive function skills play a direct role in reading, including cognitive flexibility (also known as shifting; Georgiou & Das, 2018; Kieffer, Vukovic, & Berry, 2013), inhibitory control (Kieffer et al., 2013; Potocki, Sanchez, Ecalle, & Magnan, 2017), working memory (Nouwens, Groen, Kleemans, & Verhoeven, 2020; Potocki et al., 2017; Sesma, Mahone, Levine, Eason, & Cutting, 2009), planning (Nouwens et al., 2020; Sesma et al., 2009), and attentional control (Conners, 2009). These contributions are logical, considering the complexity of the reading process, which involves several cognitive skills. These include the ability to focus attention on specific aspects of the text (attentional control), create and sustain a mental representation of the text's meaning while decoding the words (working memory), filter out irrelevant information (inhibitory control), switch between essential tasks and processes (cognitive flexibility), and plan and regulate progress toward completing a reading task (planning).

How did we measure it?

1 **Inhibitory control** was measured through a game called 'Go/ No-Go Task' where children are asked to press a button or perform an action (Go) when they see a certain stimulus and to refrain from acting (No-Go) when they see a different stimulus (Donders, 1969; Verbruggen & Logan, 2008).

You can try playing a demo version of this game using the QR code

2 **Working memory** was measured through a game called 'N-back Task' where the tasks involve recalling sequences of numbers, words, or objects after a short delay or while managing distractions (Baddeley & Hitch, 1974).

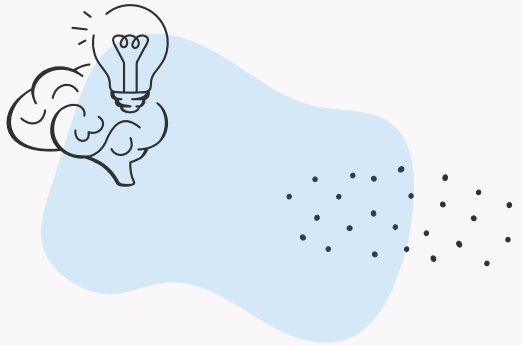
You can try playing a demo version of this game using the QR code

3 **Cognitive flexibility and creativity** was measured through an 'Alternative Uses Task' where children were asked to think of as many different uses as possible for a common object (e.g., a pencil or a tyre). This task requires them to shift their thinking from conventional uses to more creative and unconventional uses.

What did we find?

We do not detect a statistically significant impact on any of the key executive functioning measures which lead us to some very interesting insights: as executive function has been identified as a crucial pathway to reading success, the programming in Nuzo and Namia should explicitly include key strategies that build executive function amongst children. Executive Function should be taught as a separate skill that is aligned to the comprehension strategies, and not an implicit skill that is embedded into the program.

This could lead to holistic learning experiences, especially around building long-term habits that are imperative for a lasting impact on children's reading abilities.



Pedagogy

To understand the pedagogical practices employed in the show, as well as the engagement demonstrated by the viewers, we employed 2 tools:

1. Stallings Snapshot Tool (Stallings and Mohlman, 1988)
2. TEACH tool (Molina et al, 2022)

Both these tools lend to a nuanced understanding of the pedagogy at play through granular timed observations.

Stallings snapshot tool and observational tool

What did we want to find?

In this study, we wanted to uncover the pedagogical elements or active ingredients in Nuzo and Namia, how these methods were distributed, and how they influenced children's learning experiences and engagement with the episodes. Specifically, we sought to answer:

1. **What teaching methods are present, and how do they differ across episodes?**
2. **What are the behaviors that portray engagement and active learning through the episodes?**
3. **What materials support learning during viewing sessions?**
4. **How does episode structure affect instructional time and engagement?**
5. **What are the types of interactions observed between children and caregivers & children and their peers?**
6. **What are the mimicking behaviors observed during a viewing session?**

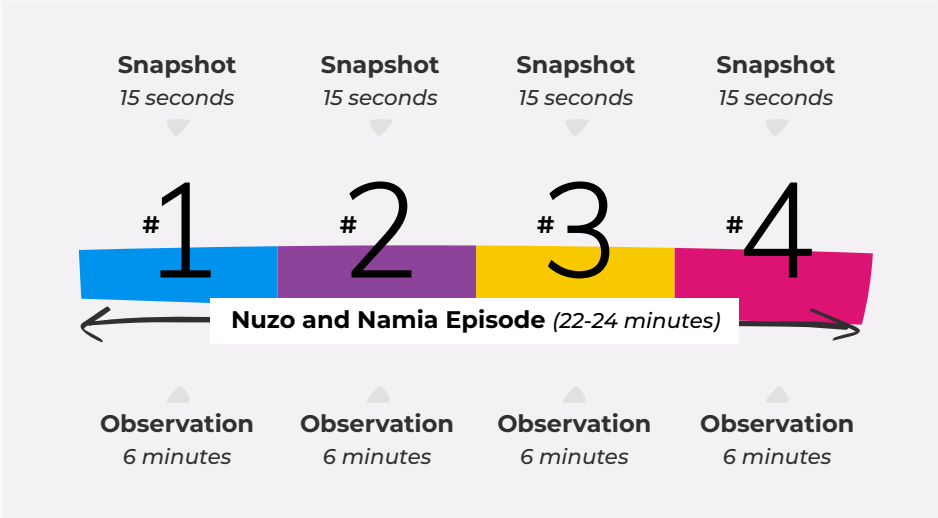
How did we measure it?

To answer these questions, we used the Stallings Snapshot Tool—a classroom observation method originally developed for in-person classrooms, it provides a structured way to document how teachers allocate time, the methods they use, and how students engage during lessons (Stallings and Mohlman, 1988).

For this study, we adapted the tool to suit a media-based, lab-in-the-field context.

Key adaptations included:

- **Focus on media content:** We replaced questions like "What activity is the teacher involved in?" with "What is happening in the episode now?" This allowed us to capture teaching methods delivered through the show, such as characters demonstrating skills or giving instructions.
- **Observation of group behavior:** While the original tool focuses on individual behaviors, our adaptation focused on group dynamics, including caregiver-child and peer interactions.
- **Adding extended observations:** We conducted four 15-second snapshots to capture quick activities and behaviors, followed by four 6-minute intervals for more detailed observations of group engagement and interactions.



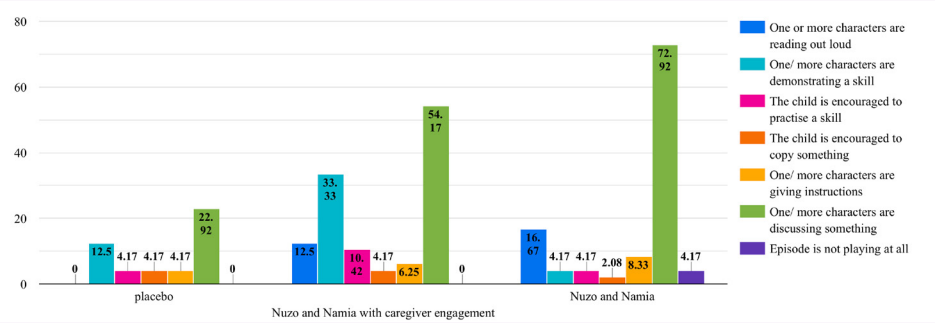
By coding these observations at four equal intervals during each episode, we were able to identify trends in instructional time, child behavior, and the use of materials as well as types of interactions observed, mimicking behaviors and engagement with the show.

Image by Freepik

What did we find?

1. Insights on how Nuzo and Namia uses instructional time

Figure 4: Usage of instructional time within the show

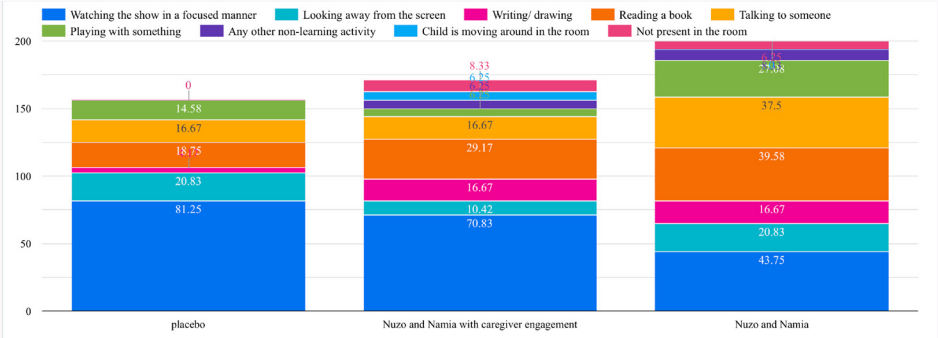


The show primarily uses dialogue-based learning, with characters engaging in discussions that encourage inquiry and critical thinking. Skill demonstrations were particularly emphasized in T2 episodes, while reading aloud appeared occasionally, especially in T1, reinforcing listening and literacy skills. The show prioritizes exploratory learning over direct instruction, allowing children to engage with concepts independently.

Non-instructional time was minimal, ensuring that episodes remained focused and engaging throughout.

2. Insights on child behavior during instructional time

Figure 5: Child behavior per treatment group



Across all groups, the most common behavior was focused watching, indicating strong engagement with the content. Other behaviors, such as reading books, talking to peers or caregivers, and brief distractions, were observed but often contributed to learning.

Conversations and reading during viewing reinforced key concepts and encouraged active engagement.

3. Insights on materials used during instructional time

Books were the most frequently used material, especially in the placebo group. Technology (tablets, phones, computers) was occasionally used, more so in T1 than in T2.

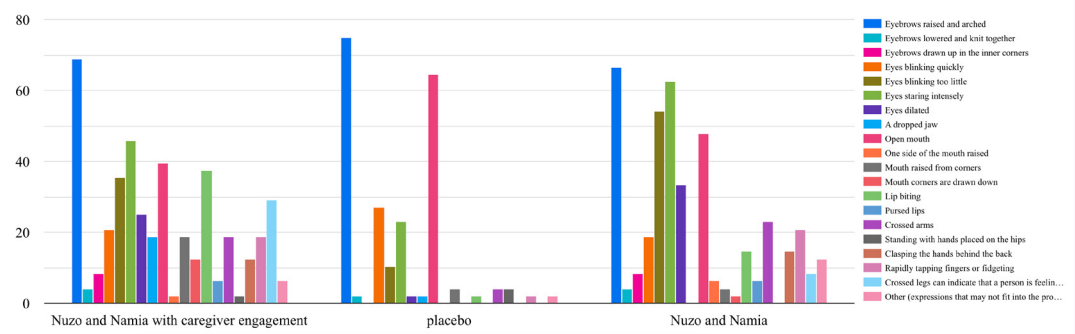
However, many children engaged with the show without additional materials, demonstrating that the episodes alone were effective in capturing attention and supporting learning.

Insights from the 6-minute viewing observation

Researchers used the Viewing Observation Tool to record real-time engagement after each viewing segment. This allowed them to capture facial expressions, body language, and social interactions that revealed how children responded to Nuzo and Namia.

1. Facial expressions observed

Figure 6: *Observed facial expressions per treatment group (%)*



Children displayed a range of expressions—from raised eyebrows signaling curiosity or excitement to focused gazes indicating deep concentration.

Body language cues like crossed arms or tapping fingers sometimes suggested restlessness, while wide eyes or smiles pointed to active interest and enjoyment.

2. Types of interactions between children and their caregivers

We noticed that the way caregivers interacted with children while watching the show varied across groups. Most caregivers took a hands-off approach, quietly observing while children watched.

In T2, however, caregivers offered non-verbal encouragement, gentle redirection, and practical tips, demonstrating how added support can guide a child's focus and understanding.

3. Types of interactions between children and their peers

Children frequently talked about the show with peers, reflecting curiosity and shared engagement.

Occasionally, they distracted each other with unrelated chatter, but overall, these discussions showed that the content sparked meaningful conversations.

4. Mimicking behaviors observe

Children often imitated on-screen actions and repeated dialogue, indicating that they were actively internalizing and practicing what they saw.

Some even used the show's ideas to inspire creative play or problem-solving.

5. Engagement with the episodes

Maintaining eye contact with the screen was the most common indicator of focus, while looking away or fidgeting suggested brief lapses in attention.

Children also responded verbally or emotionally to the show's dialogue and sounds, showing that they were not just watching passively but interacting with the content on a deeper level.

Image created using Midjourney

TEACH tool adaptation

What did we want to find?

We wanted to understand the pedagogical elements of the show for which the TEACH primary tool, developed by the World Bank was adapted for use (Molina et al, 2022).

The original tool was intended to be used in primary classrooms (grades 1-6) and was designed to help countries collect data on teaching practices to improve teaching quality following the Teach Primary framework. In this particular context, Busara adapted it to capture specific pedagogical insights that are relevant to media based programming spectrum, specifically Nuzo and Namia.

How did we measure it?

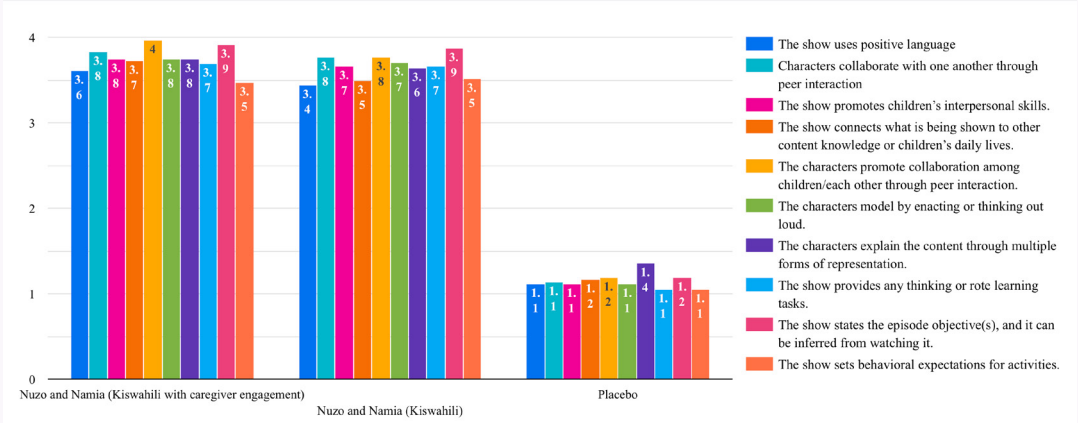
Each show was rated on 10 different elements of a media based intervention- a rating from 1 till 4, where 1 means Below Expectations, 2 means Basic, 3 means Advanced, and 4 means Exemplary.

The rating process involved a team of six field officers who convened weekly to watch and rate one episode from each of the three shows. Inter-rater reliability tests were also conducted to check for the level of agreements between the raters.

Image created using Midjourney

What did we find?

Figure 7: *Average of TEACH tool item scores for each show*



An overview of data from the TEACH tool reveals that the average ratings across all items are consistently higher for the Nuzo and Namia episodes (both with and without the caregiver intervention) compared to the Placebo group show.

On a rating scale of 1 to 4, the Placebo show has a mean score between 1.1 and 1.4, consistently falling in the 'Below Expectations' category. In contrast, the Nuzo and Namia episodes with caregiver intervention achieve mean ratings between 3.5 and 4, and the ones without it between 3.4 and 3.8, consistently aligning with the 'Advanced' to 'Exemplary' categories.

The findings also suggested that caregiver involvement may enhance viewer engagement and comprehension, contributing to the slightly higher ratings for episodes that included this intervention.

Awareness and acceptance of neurodivergence

What did we want to find?

Nuzo and Namia incorporates neurodivergence by featuring characters who think and learn in different ways. The main character, Namia, is Autistic. Some characters in the show like routines and structure, while others solve problems creatively.

The show also uses features that support neurodivergent viewers, like clear visuals, predictable patterns, interactive moments, and repetition to help with learning.

Hence we wanted to find how effective ithe program is in building understanding and acceptance of neurodivergence, among the caregivers who watched it. Specifically, we aimed to see whether they recognize diverse learning styles, accept variations in attention and engagement, and adapt their support accordingly.

How did we measure it?

Caregivers of participants were asked self-reported questions on neurodivergence during the baseline and endline stages of data collection.

For **awareness of neurodivergence,** caregivers were asked about the different ways children learn best—whether through reading, writing, listening, playing, or hands-on activities.

We also explored how they identify when a child is paying attention, acknowledging that signs of engagement can vary from sustained eye contact and taking notes to fidgeting, movement, or even drawing and doodling. Additionally, we examined the environments caregivers consider suitable for learning, ranging from schools and homes to playgrounds, religious spaces, and community areas.

For **acceptance of neurodivergence,** primarily two questions were asked-

Question 1:

"I will now tell you a story about a child named Wanjiku. Wanjiku loves to play and prefers to build things with her hands over reading and writing. Wanjiku's teacher has found her "distracted" in class, constantly doodling in her notebook in math class. Wanjiku's teacher is worried about her. If Wanjiku's teacher expressed this opinion to you, what is your most likely recommendation to the teacher?

Question 2:

"Wanjiku's teacher has also noticed she tends to walk around in the middle of class and fidgets a lot. She has trouble maintaining eye contact with her peers and teachers and looks away when asked a question. Her teacher is worried that she is being disrespectful and would like your advice on how to handle this situation.

Image created using Midjourney

What did we find?

Awareness of neurodivergence

According to **100%** of caregivers, the school is an acceptable space of learning for their child.

54% of caregivers reported noticing that their child learns "differently." When asked to elaborate, they described this as:

- **A child who prefers drawing over writing,**
- **A child who is a "slow learner" and takes more time to understand concepts compared to peers,**
- **A child who needs repeated exposure to material before grasping it, and**
- **A child who is slower to read and comprehend.**

The caregivers' observations reflect an emerging awareness of neurodivergence, as supported by caregivers becoming more attuned to the unique ways their children learn, even if they may not yet have the formal language or diagnostic framework to describe these differences.

Acceptance of neurodivergence

Responding to the first question, **65%** of caregivers recognized when Wanjiku is learning differently and suggested special attention to help her learn math through drawing.

Based on the second question, **70%** of caregivers acknowledged that Wanjiku requires special attention as she may have different learning needs. She needs a learning environment where she can move around freely.

59%

of caregivers also stated that they knew a child like Wanjiku

94%

of caregivers believed that Wanjiku would be able to learn like other children

Image by Envato Elements

06. Conclusion

Limitations and risks
Learnings and recommendations
References and resources
Tables and figures

Limitations and risks

Sample size

The study targetted 150 households, which is a relatively small sample for detecting significant changes. This means that while some trends in learning or behavior may have emerged, the sample size may not have been large enough to confidently conclude that these changes were due to the intervention.

Participant drop-out (attrition)

Not all participants who initially joined the study completed all sessions or the final assessment. A major reason for this was school holidays, which disrupted attendance. As a result, some children missed the final evaluation, reducing the amount of data available for analysis.

Study duration

The study lasted for six weeks, which may be too short to observe long-term behavioral or learning changes. While short-term improvements were measured, a longer study might have provided a clearer picture of how these changes persist over time.

Caregiver involvement

Caregivers played a key role in the intervention, but their participation was inconsistent. Some caregivers were unable to attend lab sessions regularly due to time constraints, and often different caregivers accompanied the children at different times. This inconsistency may have affected the impact of the caregiver-focused intervention.

Controlled lab setting

The lab study was conducted in a controlled and structured environment, which may not fully reflect how children learn in real-world settings. However, it is reassuring that the study's findings were similar to those from the larger RCT, which took place in a more natural setting. This suggests that the results are still relevant beyond the lab.

Learnings and recommendations

1 Language Matters

The biggest learning from our engagement is that the language of instruction and assessment is crucial in the child's learning journey.

For supplementary programs such as Nuzo and Namia, it is important to ensure that the child is learning the content in a language that they understand well and are then assessed in a language in which they can express themselves.

We do not find any evidence of cross-linguistic transfer of knowledge and skills which means that the children were not able to apply the skills they learned through the program to languages which poses a barrier in learning such as English or even their mother tongue.

Takeaways

- *The foundational language skills required by a child to navigate more complex tasks such as comprehending text are crucial, no matter how well a program is designed.*
- *The need to innovate and create strong collaborations and partnerships such that a program like Nuzo and Namia is truly complementary in nature. Without the necessary partnerships that simultaneously build foundational literacy, advanced literacy skills such as listening and reading comprehension cannot be achieved, especially for languages that pose a barrier in accessibility.*

2 Integration of SEL and literacy

The link between social-emotional learning and literacy is undeniable as evidenced by research on these topics.

We understand now that without a sense of self-efficacy or the ability to demonstrate executive functioning skills, strong reading abilities cannot be developed. This is especially true for children on the margin who have historically been denied access to quality learning opportunities and continue to find themselves in resource-constrained learning environments.

In this study, we do not find a significant linkage between SEL and literacy, thus reinforcing the need to integrate intentional programming that connects SEL and literacy very explicitly. We find evidence of clear demonstration of literacy strategies in the program but a more implicit integration of SEL.

Takeaways

- *SEL needs to be taught explicitly through active demonstration of relevant skills, and mapped comprehensively to the literacy strategies in the program.*
- *We need a perspective change that SEL skills are embedded emotional skills that are separate from other forms of learning such as literacy and numeracy. SEL skills are measured as rigorously as another other learning outcome and should be demonstrated and taught in an aligned way.*

3 Importance of mechanistic pathways

A big learning from this study, especially for the research team, is the way we understand the mechanistic pathways that lead to reading gains from exposure to programs such as Nuzo and Namia.

We do not find any significant relationships between our hypothesized mechanistic pathways and literacy, such as reading more books or having more conversations about books with peers. This poses a unique challenge in understanding what cognitive mechanisms are triggered when a child is exposed to such programs, with the main question being: why are children showing improvements in literacy in Kiswahili when seemingly, their reading habits have not changed?

While an obvious answer here is that the reading strategies are demonstrated really well in the program, this negates some part of the underlying theory of change that posits that such an intervention creates lasting behavior change that lead to improved reading gains.

A puzzle piece at the moment is whether such reading gains are long-term and whether children who are exposed to this program will continue to demonstrate improved literacy skills even years after watching the show.

If our hypothesized reading habits are not impacted, does this mean that the impact is sustainable? What key contextual factors are we missing as researchers that need to be studied to understand how children in low-resourced and multilingual settings learn to read?

Takeaways

- *We need more rigorous research on this topic, especially from a longitudinal perspective where children who are exposed to Ubongo's programs are assessed at various intervals in distinct developmental stages to gauge the long-term impact of this program.*
- *Further inquiry into non-traditional mechanistic pathways that may be activated from exposure to such shows which are not overly reliant on materials such as books or community learning environments such as reading with peers.*

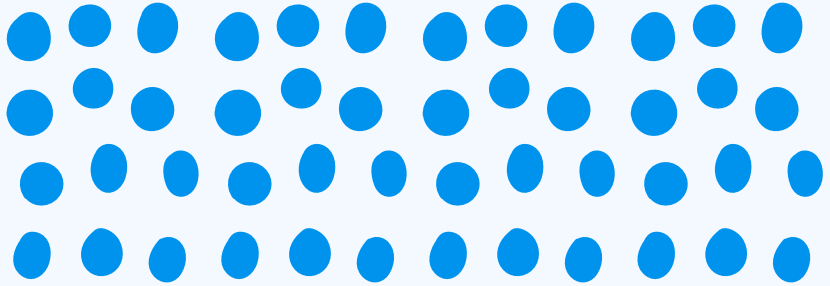
4 Caregiver engagement is crucial

We conducted an experiment to see if caregiver involvement is important in building better readers and we find that the group with the caregiver engagement element outperforms the other groups in many key outcome measures such as literacy and SEL.

We believe that a more robust caregiver engagement component, along with strategies to build better home learning environments can significantly augment learning levels amongst the children.

Takeaway

- *Supplementary reading interventions administered in the homes of children can benefit greatly from including caregivers as active participants in the child's learning process.*



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Resources

The complete study instrument used is linked here.

Or scan QR code

More information about the Nuzo and Namia show can be found here.

Or scan code to website

Tables

Table 1: Conversational habits between the caregivers and the child

In the last 3 weeks, how often did you:	Value	Percentage of caregivers (%)
Talk to child while doing an activity with the child around	Never	**0.77**
	Less than once a week	**1.54**
	2 times a week	**17.69**
	3-4 times a week	**26.92**
	5-6 times a week	**7.69**
	Daily	**45.38**
Describe things to child when walking	Never	**3.08**
	Less than once a week	**19.23**
	2 times a week	**27.69**
	3-4 times a week	**33.08**
	5-6 times a week	**5.38**
	Daily	**11.54**
Pointed, named object and asked child to repeat	Never	**10.77**
	Less than once a week	**23.85**
	2 times a week	**22.31**
	3-4 times a week	**30.00**
	5-6 times a week	**5.38**
	Daily	**7.69**
Read/ looked at a book with your child	Never	**14.62**
	Less than once a week	**13.85**
	2 times a week	**16.92**
	3-4 times a week	**18.46**
	5-6 times a week	**13.08**
	Daily	**23.08**
Tell a story to your child	Never	**46.92**
	Less than once a week	**18.46**
	2 times a week	**17.69**
	3-4 times a week	**9.23**
	5-6 times a week	**3.85**
	Daily	**3.85**

Table 2: Activities between caregivers and children

In the last 3 weeks, did any adult (including yourself)	Value	Percentage of caregivers (%)
Sang to the child	Yes	70.00
	No	30.00
Played with the child	Yes	82.31
	No	17.69
Read/ looked at a book with the child	Yes	88.46
	No	10.77
	Don't know	0.77
Told a story to the child	Yes	70.77
	No	27.69
	Don't know	1.54
Described things to the child	Yes	94.62
	No	5.38

Table 3: Barriers to reading

	Value	Percentage of caregivers (%)
Does your child have access to books at home?	Yes	90.00
	No	10.00
Does your child have access to books outside home (for example school, church, etc)?	Yes	85.38
	No	13.85
	Don't know	0.77
Do you believe your child is a proficient reader?	Yes	62.31
	No	37.69
What, in your opinion, are ways in which your child can be a better reader?	Reading more books	87.69
	Access to more books such as libraries	41.54
	Studying in school	34.62
	Listening to more stories	34.62
	Talking to friends	24.62

Table continued on the next page

Table 3: Barriers to reading (continued...)

	Value	Percentage of caregivers (%)
What, in your opinion, are ways in which your child can be a better reader?	Talking to parents	**40.00**
	Tutoring	**55.39**
	Watching TV shows	**41.54**
	Listening to and singing songs	**20.77**
	Going to church/ religious institute/ religious studies	**23.85**
	Playing	**26.92**
	Learning a language	**23.85**
	Social norms, the child is expected to read	**6.15**
What are some factors that promote healthy reading habits between you and your child?	Access to books	**74.62**
	Access to stories	**36.15**
	Dedicated reading time	**62.31**
	Other family members	**21.54**
	Teacher's influence	**23.84**
	Religious leader's influence	**8.46**
	Religious leader's influence	**8.46**
	Library access	**18.46**
	Role models- if the parents says they were inspired to read by anyone outside of this list	**10.00**
What, in your opinion, are barriers/ factors blocking your child from reading at their best capacity?	Reading/ access to more books	**27.69**
	Studying in school	**3.84**
	Listening to more stories	**1.54**
	Talking to friends	**4.62**
	Talking to parents	**1.54**
	Tutoring	**4.62**
	Watching TV shows	**22.31**
	Listening to and singing songs	**0.77**
	Going to church/ religious institute/ religious studies	**0.00**
	Playing	**56.92**
	Not knowing a language very well	**20.00**
	Social norms- the child is not expected to read	**4.62**

Table continued on the next page

Table 3: Barriers to reading (continued...)

	Value	Percentage of caregivers (%)
What are some barriers to building healthy reading habits between you and your child?	Access to books	**40.77**
	Access to stories	**10.77**
	Dedicated reading time / parent is too busy	**61.54**
	Other family members - social norm where the caregiver is not expected to read	**3.85**
	Teacher's influence - social norm where the caregiver is not expected to read	**1.54**
	Religious leader's influence - social norm where the caregiver is not expected to read	**0.00**
	Library access	**7.69**
	Poor role models- social norm where the caregiver is not expected to read by someone other than the people specified on the list	**4.62**
	Watching TV	**23.85**
	Child does not have time- busy with schoolwork/ other workload	**12.31**

Table 4: Book and print recognition

In the last 3 weeks, did any adult (including yourself)	Value	Percentage of children (%)
Cover recognition	Correct	**99.23**
	Incorrect	**0.77**
Index recognition	Correct	**33.85**
	Incorrect	**53.85**
	No Answer	**12.31**
Spine recognition	Correct	**14.62**
	Incorrect	**73.08**
	No Answer	**12.31**
Number of pages recognition	Correct	**72.31**
	Incorrect	**27.69**

Table 5: Awareness of neurodivergence

According to you, what are some ways in which your child/ other children can learn best?	Percentage of caregivers (%)
Reading	96.15
Writing	68.46
Listening	60.77
Playing	33.85
Making things with their hands	43.08

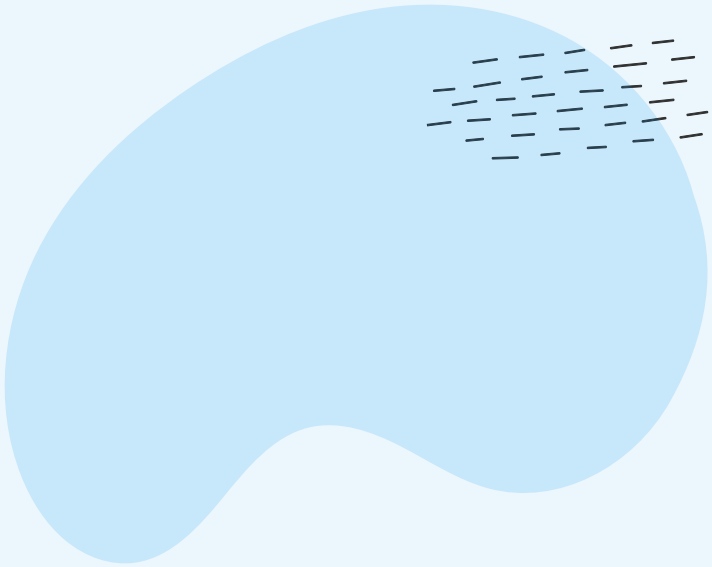


Table 6: Indicators of paying attention in a learning environment

According to you, what are some indicators that your child is paying attention in a learning environment?	Percentage of caregivers (%)
Sustained eye contact, facing the person who is giving instructions	84.62
Conversations	67.69
Movement, fidgeting	2.30
Walking around	2.30
Playing	0.77
Taking notes	40.77
Drawing/ doodling	4.62
Laying down	0.77

Table 7: Acceptable places for learning

According to you, what are some acceptable spaces of learning for your child?	Percentage of caregivers (%)
School	100
Home	74.62
Playground	12.31
Religious space	51.54
Family/ neighbor's homes	12.31
Community spaces	41.54

Table 8: Observed instances of a child learning "differently"

	Value	Percentage of caregivers (%)
Have you observed instances of your child/ children around you learning differently?	✅ Yes	46.15
	❌ No	53.85

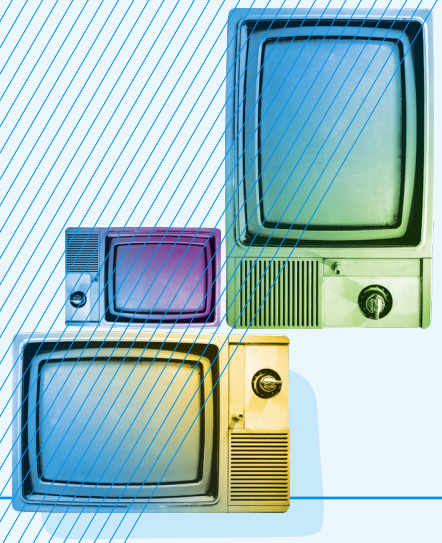
Table 9: Acceptance of neurodivergence

	Value	Percentage of caregivers (%)
I will now tell you a story about a child named Wanjiku. Wanjiku loves to play and prefers to build things with her hands over reading and writing. Wanjiku's teacher has found her "distracted" in class, constantly doodling in her notebook in math class. Wanjiku's teacher is worried about her. If Wanjiku's teacher expressed this opinion to you, what is your most likely recommendation to the teacher?	Wanjiku might learn in different ways and possibly requires special attention to help her learn math through drawing	65.38
	Wanjiku requires both discipline and special attention to help her learn math through drawing	21.54
	Wanjiku requires strict discipline to ensure that she learns math	5.38
	Other	7.69
Wanjiku's teacher has also noticed she tends to walk around in the middle of class and fidgets a lot. She has trouble maintaining eye contact with her peers and teachers and looks away when asked a question. Her teacher is worried that she is being disrespectful and would like your advice on how to handle this situation. What would you recommend?	Wanjiku requires special attention as she may have different learning needs. She needs a learning environment where she can move around freely	70.00
	Wanjiku should be disciplined and taught how to behave in an appropriate way in class, including sitting still during a lesson	24.62
	Other	5.38
Do you know a child like Wanjiku?	✅ Yes	59.23
	❌ No	40.77
If yes, do you believe Wanjiku will be able to learn and thrive like other children?	✅ Yes	93.85
	❌ No	6.15

Table 10: Regression results for the primary outcomes

Outcome measures		Treatment 1	Treatment 2	Pooled Treatment 1 & 2
Literacy	Literacy index- Swahili	0.358 (0.302)	0.111 (0.288)	0.222 (0.258)
	Literacy index- Luo	-0.012 (0.174)	-0.095 (0.164)	-0.059 (0.147)
	Literacy index- English	-0.185 (0.282)	-0.188 (0.263)	-0.187 (0.234)
Comprehension	Comprehension index- Swahili	0.349 (0.222)	0.485** (0.211)	0.424** (0.189)
	Comprehension index- Luo	-0.195 (0.213)	-0.253 (0.204)	-0.227 (0.180)
	Comprehension index- English	-0.111 (0.194)	-0.058 (0.181)	-0.081 (0.161)
Visuo-spatial	Visuospatial index- Swahili	0.035 (0.256)	-0.122 (0.254)	-0.045 (0.220)
	Visuospatial index- Luo	-0.167 (0.192)	-0.028 (0.189)	-0.095 (0.165)
	Visuospatial index- English	-0.138 (0.225)	-0.135 (0.221)	-0.136 (0.192)
SEL	Curiosity	0.356 (0.215)	0.386* (0.210)	0.372** (0.183)
	SEL	0.329* (0.198)	0.359* (0.194)	0.345** (0.169)
Executive functioning	Alternate uses- Tyre	-0.101 (0.115)	-0.055 (0.113)	-0.078 (0.098)
	Alternate uses- Book	-0.002 (0.069)	-0.051 (0.068)	-0.027 (0.060)
	Inhibitory control	-0.035 (0.084)	0.020 (0.083)	-0.007 (0.072)
	Working memory	-0.159 (0.465)	-0.623 (0.454)	-0.402 (0.397)

*Note: * p<0.1; ** p<0.05; *** p<0.01*



How to build better readers through a television program

Lead authors

Anushka Ghosh

Gitanksh Sethi

Lara Katumbi

Supporting researchers

Brian Barazah

Christine Okeyo

Cliodhna Ryan

Jasmin Baier

Jaspreet Singh

Jonathan Karl

Nicolas Bottan

Phillip Kakande

Design

Lynette Gow

Busara

ubongo