Strategic Program for Analyzing Complexity and Evaluating Systems (SPACES)

Rwandan Primary Students Learning to Read Kinyarwanda: A Systems Diagramming Approach

December 2019

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RWANDAN PRIMARY STUDENTS LEARNING TO READ KINYARWANDA: A SYSTEMS DIAGRAMMING APPROACH

STRATEGIC PROGRAM FOR ANALYZING COMPLEXITY AND EVALUATING SYSTEMS

December 2019


From July 2019– December 2019, the Strategic Program for Analyzing Complexity and Evaluating Systems (SPACES) Monitoring, Evaluation, Research and Learning Innovations Program (MERLIN) Consortium piloted a systems diagnostic approach in partnership with USAID Education Bureau and USAID Rwanda to develop a systems diagram of the factors impacting a Rwandan primary student’s ability to attend school and learn and identify potential leverage points in the system.

DISCLAIMER
The authors’ views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.
# TABLE OF CONTENTS

ACRONYM LIST .................................................................................................................. 3

EXECUTIVE SUMMARY ..................................................................................................... 4

I. INTRODUCTION ............................................................................................................... 6

II. METHODOLOGY ............................................................................................................. 7
   A. Developing an initial systems diagram based on existing studies and data.......................... 7
   B. Conducting a participatory workshop and refining the systems diagram based on information gathered............... 8
   C. Conducting stakeholder interviews and incorporating additional information into the systems diagram.................. 10
   D. Analyzing the workshop findings and systems diagram .......................................................... 11

III. RESULTS ....................................................................................................................... 11
   A. Systems Diagram.............................................................................................................. 11
   B. Major Network Measures................................................................................................. 15
   C. Critical Points Identified by Workshops............................................................................. 17

IV. DISCUSSION AND RECOMMENDATIONS ................................................................ 18
   Recommendation 1: Address children’s early life and current nutrition and explore interventions to improve their nutrition. 18
   Recommendation 2: Revisit teachers’ current salaries.................................................................. 19
   Recommendation 3: Determine how to increase the social-emotional support and resources for teachers. .................... 20
   Recommendation 4: Explore the option of building new schools or increasing the number of classrooms................. 21
   Recommendation 5: Review the current approaches to discipline.................................................. 21
   Recommendation 6: Review the current learning materials.................................................................. 22
   Recommendation 7: Determine which existing policies are actually being implemented and how and establish mechanisms to monitor their implementation......................................................... 22
   Recommendation 8: Explore the possibility of creating more connections/relationships between the family, the teachers, the schools, the community, and the student...................................................... 23
   Recommendation 9: Explore the possibility of creating community resources that can encourage school attendance and learning. ............................................................................................................. 23
   Recommendation 10: Explore ways of providing more resources to families and potentially elevating their socio-economic status. 23
   Recommendation 11: Explore possibilities of augmenting the national education budget........................................... 24
   Mapping potential leverage points to the 5Rs ............................................................................... 24
   Utility of Approach for other Education and Development Systems............................................... 25

V. CONCLUSIONS ................................................................................................................ 27

VI. RECENT CHANGE TO THE LANGUAGE OF INSTRUCTION AND IMPLICATIONS FOR THIS REPORT .............................................................. 28
MINEDUC announces that English replace Kinyarwanda as language of instruction .................................28
Recommendations in report still largely hold ........................................................................................................28
Further Demonstrates Value of Systems Approaches versus Just Traditional Approaches ............................28

ANNEX .........................................................................................................................................................29
Annex A. Field Work Report ...............................................................................................................................29
Annex B. Systems diagram .................................................................................................................................50
Annex C. Bibliography .........................................................................................................................................51
Annex D. Scope of Work .....................................................................................................................................55
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLF</td>
<td>Building Learning Foundations</td>
</tr>
<tr>
<td>DFID</td>
<td>Department for International Development</td>
</tr>
<tr>
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<td>Early Grade Reading Assessment</td>
</tr>
<tr>
<td>GOR</td>
<td>Government of Rwanda</td>
</tr>
<tr>
<td>MINALOC</td>
<td>Ministry of Local Government</td>
</tr>
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<td>MINECOFIN</td>
<td>Ministry of Finance and Economic Planning</td>
</tr>
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</tr>
<tr>
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<td>Non-government organization</td>
</tr>
<tr>
<td>REB</td>
<td>Rwanda Education Board</td>
</tr>
<tr>
<td>REFAC</td>
<td>Rwanda Education For all Coalition</td>
</tr>
<tr>
<td>RENCP</td>
<td>Rwanda Education NGO Coordination Platform</td>
</tr>
<tr>
<td>SES</td>
<td>Socioeconomic status</td>
</tr>
<tr>
<td>SPACES</td>
<td>Strategic Program for Analyzing Complexity and Evaluating Systems</td>
</tr>
<tr>
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<td>United Nations Children’s Fund</td>
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<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

Introduction
There is a critical problem in the Rwandan education system: despite gains in access and enrollment in schools, many early primary students are failing to gain literacy competencies in Kinyarwanda, which is the mother tongue of an estimated 99% of Rwandans. The challenge is that literacy is affected by a complex system of factors, processes, and relationships that unaided may be challenging to understand and address. Systems methods such as constructing systems diagrams and models can help better understand and delineate the results, roles, relationships, rules and resources of interest that comprise the system.

Methodology
The team built an initial map based on available secondary literature (see Bibliography) and interviews with key stakeholders and educational experts familiar with the Rwandan context, with the goal of representing the experience of a student in basic primary education, his/her decision and ability to attend school and learn, and the system of factors that affect these. In September 2019, the team facilitated a series of five workshops – four at district-level and one with national-level stakeholders. Following the workshops, our team integrated the findings from the in-country workshops into the initial systems diagram. Analysis of the systems diagram and findings from the workshop consisted of a combination of reviewing the morphology, or structure, of the diagram and calculating some common network measures.

Results
Construction of the map began with what we determined to be the three basic steps necessary for a child to achieve literacy in Rwanda. The first is enrollment in school, the second is to regularly attend classes, and the third is to comprehend the materials that are being taught in school. These form the backbone of the systems diagram and are thus positioned at the top of the diagram. The ability of the child to complete each of these three steps is then influenced by three sets of local components: the child’s family, the child’s school/classroom setting, and the child’s teachers. These components are positioned directly beneath the backbone pathway in the diagram as they were found to have the most direct effects on the three-step backbone. The primary role of the family in this system is to help the child serve the aforementioned roles and travel through each of the four steps that serve as the primary results of interest. To this end, the family has the following five major relationships with the child and this role. The primary role of the school and classroom is to provide a setting through which the child and teachers can interact and resources that facilitate learning. This includes both offering adequate learning materials such as books as well as protection from threats such as infectious diseases and malnutrition. The role of the teacher is to impart knowledge to the child and to facilitate the child’s emotional, social, and intellectual growth. The relationships of the teacher to the child are largely mediated through the classroom/school. Located one level beyond the family, the school, and the teacher are the community components. The role of the community is to provide support for the family, the school, and the teacher. Although the family, school, and teachers serve as the gatekeepers to any effects that the community has on the child, the community can substantially facilitate or discourage what these three components end up doing. The next level from the set of community influences are the components related to government, including cell, sector and district level government as well as factors related to the national government. These components have relationships with both the second and first levels. The most frequent direct relationship is with the school/classroom, followed by two connections with the teacher, one connection to the family, and one to community. There were no identified direct relationships with the child. Despite the relatively small number of direct relationships (i.e., the average distance is greater, and the relationships constitute the diameter of the network), the
government components do eventually connect to all of the components on the map, most often indirectly. The greater distance and general lack of direct feedback relationships means that any rules and resources that come from the government components may be more difficult to track and enforce.

Recommendations

The systems diagram and the workshop helped identify components of the system to potentially target and following potential recommendations:

1. Address children’s early life and current nutrition and explore interventions to improve their nutrition.
2. Revisit teachers’ current salaries.
3. Determine how to increase the social-emotional support and resources for teachers.
4. Explore the option of building new schools or increasing the number of classrooms.
5. Review the current approaches to discipline.
6. Review the current learning materials.
7. Determine which existing policies are actually being implemented and how and establish mechanisms to monitor their implementation.
8. Explore the possibility of creating more connections/relationships between the family, the teachers, the schools, the community, and the student.
9. Explore the possibility of creating community resources that can encourage school attendance and learning.
10. Explore ways of providing more resources to families and potentially elevating their socio-economic status.
11. Explore possibilities of augmenting the national education budget.

Conclusions

Our team has identified parts of the system that merit further exploration.
I. INTRODUCTION

There is a critical problem in the Rwandan education system: despite gains in access and enrollment in schools, many early primary students are failing to gain literacy competencies in Kinyarwanda, which is the mother tongue of an estimated 99% of Rwandans.¹ Specifically, according to Soma Umenye’s Early Grade Reading Assessment (EGRA), 3.35% of students in primary level 1 have attained reading comprehension in Kinyarwanda, and further, scores in pre-reading and emergent literacy skills that directly lead to reading fluency in later grades were also assessed as extremely low.² When a significant proportion of children cannot achieve literacy in a region, often a complex system of factors is involved, and all of these factors may not initially be obvious. Globally, and in Rwanda, evidence suggests that literacy in a child’s first language is foundational for their success in school. In Rwanda, the first three years of primary school (P1-P3) are taught in Kinyarwanda with a focus on Kinyarwanda literacy. Even though Rwanda has substantially increased school enrollment, children in Rwanda are not meeting basic primary Kinyarwanda literacy competency. The challenge is that a child and his or her attendance in school and ability to learn are affected by a system of interrelated factors and processes. As stated in Rwanda’s Education System Analysis published in 2017 by the Ministry of Education:

…the measuring factors that affect learning outcomes is complex, as they include contextual or non-school factors over which education policymakers have little power. This includes children’s personal circumstances, their family context and the social status of their parents. Education policymakers can only address issues relating to infrastructure, learning materials, and professional characteristics, such as teacher qualifications, supervision and monitoring of schools.

The challenge is that literacy is affected by a complex system of factors, processes, and relationships that unaided may not be challenging to understand and address. Interventions that have changed just a single aspect of the system (e.g. curriculum development) have not moved the needle, and decision-makers are unclear on the best investment targets, interventions, and programs to remedy this problem. Therefore, determining where best to invest and establishing interventions that will result in sustainable improvements requires a better understanding of the systems around and affecting the child.

Systems methods such as constructing systems diagrams and models can help better understand and delineate the roles, relationships, rules, resources, and results of interest that comprise the system. Developing a systems diagram is often the first step in better understanding a system as it lays out and delineates the components of a system for everyone to see. Therefore, the goal of this USAID-DFID commissioned work was for our SPACES (Strategic Program for Analyzing Complexity and Evaluating Systems) team to construct a diagram of the systems that affect

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child literacy in the country of Rwanda and help identify potential target areas for future policies and interventions.

II. METHODOLOGY

A. Developing an initial systems diagram based on existing studies and data

1. Type of Systems Diagram
As indicated in the Introduction, the goal of this project was to generate an initial systems diagram to generate insights about what may be affecting literacy among children in Rwanda. A systems diagram is a visual depiction of the various components of a system and their mechanistic relationships/connections. Mechanisms mean concrete actions/causes and effects not simply associations or correlations conditions within the system. While there are numerous ways to visualize represent a system, we chose to use a hybrid between an influence diagram and a causal loop diagram. This diagram will incorporate the 5R’s as identified in Figure 1.

2. Review of the Literature and Available Documents
The literature review consisted of an overview of existing evidence pertinent to early primary Kinyarwanda literacy in Rwanda. USAID and DFID provided us with an initial set of 15-20 secondary documents to review, all of which were related to the Rwandan education system. We reviewed these documents and then extended the search through snowballing, a technique which uses the reference list of papers to identify other papers. We also followed up with additional documentation based on experts and studies mentioned during meetings with education stakeholders during the scoping visit, as part of our review. Reviewing existing evidence also entailed a manual search of the literature on PubMed and Google Scholar using search terms including: Kinyarwanda literacy; Early grade literacy in Rwanda; Rwanda basic primary education. We reviewed the papers that appeared in the searches to determine their relevancy to the question of interest and then further reviewed relevant documents to gain insight into the education system and distill key factors and influences in the system. When a secondary research document referred to an
influence, factor or element related to early grade Kinyarwanda literacy in Rwanda we would document that influence to use in the map and then conduct additional searches in the literature specific to that particular factor.

B. Conducting a participatory workshop and refining the systems diagram based on information gathered

In September 2019, the SPACES team facilitated a series of five participatory workshops – four at district-level and one with national-level stakeholders. Participatory workshops are one method by which diverse perspectives in a system can be engaged to develop a more complete understanding of the connections and mechanisms within it. The workshops brought together stakeholders relevant to a particular set of issues around student literacy, including parents, teachers, Government of Rwanda (GOR) officials, and other development partners, and guided them through a systems diagramming process to produce more detailed understanding of the components involved in each of two identified themes, as well as the connections between them.

1. Workshop Design
Through an iterative process, workshop planners identified and proposed a series of themes for the mapping exercises. This uncovered a variety of interests among stakeholders depending on their roles and perspectives, resulting in ideas that ranged from the overall structure of the education system to specific interventions to specific events. Planners sought to identify feasible themes considering factors such as: 1) relevance to GOR and development partner education strategies, 2) political acceptability of discussing the topics in an open atmosphere, 3) expected interest of participants to engage on the topic, 4) a reasonable boundary relative to the expected time available for discussion, 5) the extent to which the topic was novel and presented an opportunity to add to the substantial existing evidence base, and 6) relevance of the themes to an overall systems diagramming diagnostic effort.

2. Workshop Themes
Children’s attitudes toward school: The goal of bringing stakeholders together around this theme was to use a potentially critical and unexplored entry point into the discussion of drivers of primary school dropout. We expected that the theme would generate useful discussion on the overall school experience from the perspective of a child.
Teaching capability: The goal of bringing stakeholders together around this theme was to develop a shared understanding of what and who is helping and hindering teachers applying their skills and knowledge in ways that enhance student learning.

3. Selection of Systemic Diagramming Approach
Many different approaches to participatory systemic diagramming exist. Typically, these approaches are not conducted as standalone activities; rather, they are part of an overall process of systemic inquiry and application. For the purpose of the pilot, we considered approaches that could be conducted in a standalone manner, though we sought to embed the process within ongoing activities at USAID/Rwanda. We considered four main diagramming approaches (Rich Picturing, influence diagram, multiple cause diagram, and causal loop diagram). Based on the time available for the workshops (1/2 day per session) and the local context (the lack of a safe environment for open dialogue among different stakeholder groups), we decided to use influence diagrams based on a process developed by the Open University in the United Kingdom. Influence diagrams are ‘snapshots’ of what influences a situation as it is right now. They seek to identify in general terms ‘who’ or ‘what’ does or may influence a teacher’s capability to teach to their ability or a child’s enjoyment of school.

4. Illustrative Process
Participants worked in small groups according to their role in the education sector: parent, teacher, head teacher, education sector staff, or local government. They identified each of the factors that influence the theme of the workshop (children’s dislike of school or teacher capability), and then the factors that influence those factors, and so on. A brief sharing and exchange exercise towards the end of each workshop allowed for some discussion across stakeholder groups, but this was limited due to the time and context constraints of the pilot setting. Finally, participants conducted a force field analysis exercise based on the maps, in which they identified the major influence relationships in their diagram and what helps those influences and hinders those influences.

5. Selection of Districts and Participants
Districts were selected based on 1) inclusion of perspectives from both a rural and urban setting, 2) the availability of additional data on literacy outcomes, and 3) the presence of local logistical support to assist with participant identification and other preparatory needs. In consultation with USAID/Rwanda’s Soma Umenye project, Kirehe (rural) and Kicukiro (urban) were thus selected as the two districts for the pilot workshops (see Figure 3). Participants were drawn from the local community and intended to reflect a diversity of viewpoints, but not to be a representative group. Participants were selected based on 1) inclusion of women, 2) a mix of age and experience levels, and 3) experience with primary school issues.

3 http://systems.open.ac.uk/materials/T552/
(i.e., to include teachers in P1-3 and parents of children in P1-3).

C. Conducting stakeholder interviews and incorporating additional information into the systems diagram

Finally, SPACES held interviews with key stakeholders and educational experts familiar with the Rwandan context to inform both the workshop approach and, ultimately, the components and connections within the map itself. This began with conducting an in-country scoping trip in July 2019. During the scoping trip, the team met with key government and non-government organization (NGO) stakeholders and other development partners who participate in education programming in Rwanda. Government stakeholders included the Ministry of Education (MINEDUC), Ministry of Local Government (MINALOC), Ministry of Finance and Economics (MINECOFIN), REB (Rwanda Education Board), and donors including USAID (United States Agency for International Development)/Rwanda, DFID (Department for International Development) Rwanda, and UNICEF (United Nations Children's Fund). NGO stakeholders included members of the Rwanda Education NGO Coordination Platform (RENCP) including RENCP chair Wellspring Foundation, Rwanda Education for All Coalition (REFAC), Educate!, Save the Children, Building Learning Foundations (BLF), and Soma Umenye. Meetings were semi-structured and used as an opportunity to describe the pilot project and hear from the stakeholders about their experience with Rwanda's education system. At the same time, these stakeholders brought up evidence that did not appear in secondary literature that helped to refine the systems diagram. SPACES also continued to consult with education experts familiar with the Rwandan context both within USAID and in academia. These experts offered background into insights from previous programs and research efforts undertaken in Rwanda, often elucidating elements and connections based on evidence gathered from firsthand participation in these programs and research efforts.
D. Analyzing the workshop findings and systems diagram

Analysis of the systems diagram and findings from the workshop consisted of a combination of reviewing the morphology, or structure, of the diagram and calculating some common network measures such as:

**Figure 4. Common network measures**

- **Betweenness centrality**: refers to the number of times an element lies on the shortest path between two other elements and the more times an element is the shortest path between two elements the more likely it is that the element acts as a key bridge, or broker in a system.

- **Degree centrality**: refers to the number of connections an element has in the systems diagram. Elements with a high number of connections function as hubs in the system.

- **Closeness centrality**: refers to the distance each element is from all other elements. The distance between an element and all others in the system tends to captures how well and element can spread and reach throughout the map.

III. RESULTS

The systems diagram is available to view in kumu.io at this link.

A. Systems Diagram

The systems diagram represents the components and processes of the system that affect a Rwandan child’s literacy. The diagram consists of shapes (i.e., nodes) that represent different components and lines (i.e., edges) that show how these components are connected to each other. The lines are directional as indicated by the arrow heads, meaning that if component A influences component B then
the arrow between them will be directed towards component B. Such relationships can be unidirectional or bidirectional.

For this diagram/analysis, the boundary of the system was what was occurring within Rwanda. Certainly, favors and components outside of Rwanda can affect what is occurring within Rwanda and ultimately a child’s literacy, but international influences such as trade policies were not included.

1. **Four Step Backbone of the Systems diagram – The Results**

![Figure 5. Backbone of the systems diagram](image)

Construction of the map began with what we determined to be the three basic steps necessary for a child to achieve literacy in Rwanda. The first is enrollment in school, the second is to regularly attend classes, and the third is to comprehend the materials that are being taught in school. The second step is dependent on the first, the third step is dependent on the second. As Figure 1 shows, these form the backbone of the systems diagram and are thus positioned at the top of the diagram. As can be seen by the arrowheads, there are bidirectional relationships between “regular attendance in school” and “comprehension of the material” as well as between “comprehension of the material” and “literacy.” This first bidirectional relationship is because attendance can not only affect comprehension of the material, but also better comprehension of the material can then encourage a child to attend school more frequently. Similarly, comprehension of the material can build literacy, but literacy can also help learning. This means that the relationships here are not necessarily linear but can potentially be exponential beyond a certain threshold.

In the 5 R’s framework, these four steps in the backbone serve as the desired sequential Results. The role of the child is to travel through these steps.

2. **First-Level: Direct Components**

The ability of the child to complete each of these three steps is then influenced by three sets of local components: the child’s family, the child’s school/classroom setting, and the child’s teachers. These components are positioned directly beneath the backbone pathway in the diagram as they were found to have the most direct effects on the three-step backbone.
a. **Family Components**

The primary role of the family in this system is to help the child serve the aforementioned roles and travel through each of the four steps that serve as the primary results of interest. To this end, the family has the following five major relationships with the child and this role:

- **Determining the child’s physical and cognitive growth:** This begins during a mother’s pregnancy and proceeds well before the child reaches school age, and then continues through the child’s school years. The family must provide the resources necessary for this growth, which includes proper food and nutrition, shelter from threats such as the elements, teaching and teaching materials such as books to facilitate cognitive growth, and time with the child. A major rule is that this relationship takes precedence over all others. In other words, if the child is not physically and mentally prepared to complete the four steps then it will be difficult for other relationships to compensate.

- **Providing motivation for the child:** The family can influence the child to want to enroll in school, attend school, and learn in school. They can do this through utilizing the following resources: providing examples, emotional support, and time.

- **Completing requirements and providing resources for the child:** The family needs to complete all of the requirements for the child to complete the four steps. Examples include filling out the appropriate paperwork, attending necessary meetings, and providing any resources that are needed. Also, the family’s ability to afford school tied for third on the betweenness centrality (0.016) score.

- **Freeing up available time for the child:** A key relationship is the need for the child to fulfill other roles such as completing chores that may leave little time for the child to go to school.

- **Helping get the child to and from school:** This includes ensuring that the child chooses to go to school but also facilitating the child’s travel to school.

As can be seen in the diagram, the relationship connections are denser between the family components and enrollment in school and regular school attendance but less so for “comprehension of material.” The primary connection for the last of these three is via the physical health and cognition of the child. As can also be seen, the family serves a major gatekeeper role determining whether the child even enrolls at school and attends school and then whether the child has the capabilities of learning. Much of this role comes well before the child is even of school age. For example, early life nutrition can affect the child’s physical and cognitive development. If the child’s early nutritional status causes stunting the body and cognition, it may be more difficult to overcome these later in childhood.

b. **School and Classroom Components**

The primary role of the school and classroom is to provide a setting through which the child and teachers can interact and resources that facilitate such learning interactions. This includes both offering adequate learning materials such as books as well as protection from threats such as infectious diseases and malnutrition. In fact, the node with the highest in-degree and out-degree were nutrition related. The ratio of schools to students in a district ranked fifth on betweenness centrality measures with a value of 0.011. Of note, there were no strong connections between the family and classroom/school.
c. **Teacher Components**

The role of the teacher is to impart knowledge to the child and to facilitate the child’s emotional, social, and intellectual growth. The relationships of the teacher to the child are largely mediated through the classroom/school. In other words, aspects of the classroom/school serve as brokers for the teachers to do their work. As seen in the map, the teacher serves his/her role largely through the following relationships:

- Providing social-emotional support
- Covering the curriculum
- Providing feedback and assessment
- Instilling discipline

Based on observation of the morphology of the diagram and network measures, the teacher’s stress level plays a central role. The teacher’s stress level has both the highest betweenness (0.035) and degree centrality (17) measures of all the nodes in the map. As the diagram shows a number of nodes have connections or relationships with teacher stress, including the teacher’s workload, emotional-social support available, the teacher’s experience and training, the feedback that the teacher receives, and teacher pay (which had the third highest betweenness in the diagram at 0.016). Of note, not many connections in the diagram exist between the family and teachers. The only connection is between the family’s ability to afford school and the teacher’s salary.

3. **Second Level: Community Components**

Located one level beyond the family, the school, and the teacher are the community components. The role of the community is to provide support for the family, the school, and the teacher. This can occur through providing the following relationships:

- Affecting how many children a family will have and when
- Determining how difficult the route to school will be to traverse
- Supporting or discouraging educational endeavors
- Affecting the well-being and situations of the family, child, and teacher.

Towards these ends the community can provide resources such as birth control, knowledge about birth control and family planning, food, roads and routes, educational materials, emotional and social support, and funding for all of these resources. Although the family, school, and teachers serve as the gatekeepers to any effects that the community has on the child, the community can substantially facilitate or discourage what these three components end up doing.

Aside from *Amount of time spent reading with adults outside school* and *My exposure to Kinyarwanda text*, there are not any direct relationships between the community and the student in the systems diagram.

Many community effects begin well before the child is enrolled in the school, the school if built, or the teacher begins teaching. For example, a family’s attitudes towards nutrition, education and available resources to support both the number and characteristics of the school, and the attitudes of and towards the teacher can be determined by the community. Many of these effects accrue over time (e.g. exposure to text, nutritional deficiency, teacher workload, amount of experience a teacher has implementing certain techniques)
4. Third Level: Government Components

Underneath the set of community influences are the components related to government, including cell, sector and district level government as well as factors related to the national government. These components have relationships with both the second and first levels. The most frequent direct relationship is with the school/classroom, followed by two connections with the teacher, one connection to the family, and one to community. There were no identified direct relationships with the child.

Despite the relatively small number of direct relationships (i.e., the average distance is greater, and the relationships constitute the diameter of the network), the government components do eventually connect to all of the components on the map, most often indirectly. The greater distance and general lack of direct feedback relationships means that any rules and resources that come from the government components may be more difficult to track and enforce. For example, while the government as a rule requires national testing, it is unclear how the results flow back to the government to then inform policy making and resource allocation. There is even significant variability in how district officers collect test scores. All of this raises question about how uniformly and consistently rules such as compulsory education and accommodating for special needs are being applied and whether the resources such as funding are reaching their intended targets.

B. Major Network Measures

We have presented the top five ranked elements in the systems diagram for each of the metrics described in the Methods. These elements represent critical points or areas of emerging significance in the map.

Table 1. Betweenness Centrality Ranking in Map

<table>
<thead>
<tr>
<th>Betweenness Centrality Ranking in Map</th>
<th>Value</th>
<th>Critical Point from Map</th>
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<tbody>
<tr>
<td>1</td>
<td>0.035</td>
<td>My teacher’s stress level</td>
</tr>
<tr>
<td>2</td>
<td>0.018</td>
<td>My regular attendance in school</td>
</tr>
<tr>
<td>3</td>
<td>0.016</td>
<td>My teacher’s salary</td>
</tr>
<tr>
<td>4</td>
<td>0.016</td>
<td>Family’s ability to afford school</td>
</tr>
<tr>
<td>5</td>
<td>0.011</td>
<td>Ratio of schools to district</td>
</tr>
</tbody>
</table>
The categories of critical points emerging from the map include national education budget, number of schools, policy implementation, family socioeconomic status, regular attendance in school, teacher stress and ability to pay attention.

Interestingly, the top three ranking elements under closeness centrality, or those with a high reach of impact in the system, were all related to the national budget. Since closeness centrality captures the reach of different elements, or the spread of influence, the fact that funding ranks highest on this list underscores the potential for funding (or lack thereof) to trickle throughout the entire system. My family's socioeconomic status and ability to afford school highlight the role of familial resources in student's education. My teacher's stress level and My regular attendance in school both appeared as top ranking factors for both betweenness and degree centrality.
C. Critical Points Identified by Workshops

After identifying critical points in the initial map, we then distilled the critical points from the workshops.

Figure 6 is an example of a map developed during the workshop with village leaders and head teachers. (See Annex A for all maps). It shows the influence of a limited education budget on insufficient classrooms and low teacher salary. They also identified how the frequency of both education policy and curriculum changes are associated with lack of interest from teachers to teach, a lack of relevant teaching aids, and a lack of motivation by teachers to make changes in the classroom.

Below is the list of critical points that emerged from the five workshops.

Table 4: Critical Points from Workshops

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<thead>
<tr>
<th>Critical Points from Workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent to which content is engaging</td>
</tr>
<tr>
<td>Teacher motivation</td>
</tr>
<tr>
<td>Frequency of changes to policy and curriculum</td>
</tr>
</tbody>
</table>
The factors that emerged from the workshops were similar to those in the map: national education budget, number of schools, policy implementation, family socioeconomic status, regular attendance in school, teacher stress, and ability to pay attention as it is related to stunting.

IV. DISCUSSION AND RECOMMENDATIONS

The systems diagram and the workshop helped identify components of the system to potentially target and the following potential recommendations:

**Recommendation 1: Address children’s early life and current nutrition and explore interventions to improve their nutrition.**

Although early life nutrition ostensibly doesn’t seem to be a school education issue, it serves as a gatekeeper affecting what is possible later in life.

A student’s ability to pay attention involves improving child nutrition to reduce stunting. According to the World Health Organization (WHO) definition, “children are defined as stunted if their height-for-age is more than two standard deviations below the WHO Child Growth Standards median.” In Rwanda, stunting affects 38% of children under 5

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3 https://www.who.int/nutrition/healthygrowthproj_stunted_videos/en/
years old. As seen in Figure 7, childhood stunting connects to level of cognitive disability, which, depending on their level of cognitive impairment, may serve as a barrier to paying attention in class and comprehending curriculum and learning Kinyarwanda. Childhood nutritional deficiency is dependent on the amount and the nutritional content of the foods available at a student’s home and at school. The home food environment is directly related to the extent to which local supply of food is used for nutritional gain. Food policies that incentivize selling locally grown foods rather than retaining and consuming them have in some instances led to families selling nutritious locally grown options and consuming a nutrient-deficient diet. At the school level, Rwanda has mandated a HomeGrown School Food Policy, which was initially introduced by the World Food Programme in 2002 and has since been incorporated into the School Health Policy. The Home-Grown School Food Policy calls for expanding and improving the school-based health and nutrition services. While there seem to be some efforts to strengthen school feeding programs, previous education interventions in Rwanda have not directly addressed stunting as part of their program efforts. Therefore, a potential leverage points is to bolster school lunch programs. Additionally, interventions focused on diagnosing stunting, along with programs that allow teachers and school leadership to tailor curriculum to the learning abilities of students with childhood stunting. Programs may also want to consider indicators to track progress among students with stunting, such as literacy rate among students experiencing childhood stunting.

** Recommendation 2: Revisit teachers’ current salaries.**

As shown in Figure 8 below, My teacher’s salary ultimately affects their workload. In several of the workshop maps, teacher salary appeared as an influential factor; one group of head teachers described the salary as not meeting market price. Through consultation with education experts we learned that their low pay requires them to find work in addition to teaching, which increases their overall workload and stress. Thus, a potential leverage point is to increase teacher salary.

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Recommendation 3: Determine how to increase the social-emotional support and resources for teachers.

Another way to address teacher stress involves increasing social-emotional support for teachers. This can occur by increasing the positivity of their relationships with their co-workers and the school administration. Perhaps having more regular convenings or programs to improve their relationships with school staff. This can also be coupled with efforts to improve parent-teacher relations so they can support each other in furthering their student’s education. Additionally, providing general counseling opportunities for teachers, as well as counseling for teachers struggling with substance abuse.
Recommendation 4: Explore the option of building new schools or increasing the number of classrooms.

As described in the results, the Ratio of schools to district and Number of Classrooms and Teachers appears to be issues. This suggests that a potential leverage point is building more schools and classrooms. In Rwanda, schools are extremely overcrowded. The average primary level class sizes exceed 80 students\(^\text{10}\) even when double-shifting is in effect. Double shifting is a system where they teach half the students for half the first part of the day and the other half of students for the second part of the day, which reduces student class time by half. There are also many students that have to travel far between home and school, which deters them from regularly attending. It is important that these schools are strategically located to alleviate these travel issues. The World Bank currently has an initiative targeting this gap in the education system.\(^\text{11}\)

Recommendation 5: Review the current approaches to discipline.

Workshop discussions highlighted how the classroom environment was not always a fun and engaging setting. This was further underscored through discussions about the use of corporal punishment and the effect that had on students.

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**Recommendation 6: Review the current learning materials.**

Another option is reviewing the current learning materials, determining how engaging they may be, and potentially replacing them with more engaging learning materials.

**Recommendation 7: Determine which existing policies are actually being implemented and how and establish mechanisms to monitor their implementation.**

As has come out in our analysis, in Rwanda, many policies such as the Special Needs and Inclusive Education and the Compulsory Education policies have been developed, but there seems to be a breakdown when translating the policy into action. For example, many schools are not equipped with necessary infrastructure or materials for students with disabilities despite a clear guideline that states: A school must have adequate and appropriate equipment that support level of education. Also, 97% of students enroll in school, but a high proportion drop out, with dropout rates in secondary students around 12.6%, despite the compulsory basic education policy which requires students to attend all levels of basic education. While the systems diagram demonstrates the importance of these critical points, we currently we do not have a clear understanding of all of the mechanisms between policy and program development and implementation. This needs further exploration before recommending a potential leverage point.

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Recommendation 8: Explore the possibility of creating more connections/relationships between the family, the teachers, the schools, the community, and the student.

As indicated in the Results, there is a dearth of relationships between the family, teachers, schools, and community. This reduces the possibility of constructive feedback, adaptation to changing circumstances, were situations in which various components were not well connected (e.g., families and teachers) and a dearth of redundant connections.

Figure 12. Snapshot 6 of systems diagram

Recommendation 9: Explore the possibility of creating community resources that can encourage school attendance and learning.

The relationships between the community and the family and student can include resources that encourage children to attend school and learn. Examples include educational opportunities outside of school, mentorship possibilities, easier transit to schools, and resources such as reading materials.

Recommendation 10: Explore ways of providing more resources to families and potentially elevating their socio-economic status.

Family socioeconomic status (SES) also appeared as a critical point in the student experience of learning to read. While SES is more removed from the education sector’s reach than other critical points that emerged, there are a number of pathways through which it impacts the student experience. For example, regular attendance is affected by a family’s ability to afford school fees as well as the student’s chore/work burden. SES also affects hunger and nutrition status which influences ability to pay attention and thus comprehend the material. It is also tied to the available time a family has to reinforce lessons
outside school. Programming around these mechanisms need to be aware of the influences of children’s family SES and build programs that are intentional about compensating for these effects.

**Recommendation 11:** Explore possibilities of augmenting the national education budget.

The limited national education budget results in many of the programs (e.g. training teachers, developing curriculum) operating under significant constraints, and many of the policies, such as the inclusive education policy and compulsory basic education policy, cannot be fully implemented and monitored.

**Mapping potential leverage points to the 5Rs**

Next, each of the potential leverage points bolded in the previous section can be mapped to the 5Rs. The 5Rs is a framework for capturing and organizing potential interventions. They consist of the following Rs: Results, Resources, Roles, Rules and Relationships. ‘Results’ refers to the main outcome of interest, which in this case is Kinyarwanda literacy, so the potential leverage points are mapped to the remaining 4 Rs.

By mapping the potential leverage points to the 5Rs, development practitioners can gain a better sense of how the actions cover the various key system components. Future education programming and
investments should aim to invest in actions covering the 5Rs in order to ensure that the basic components of a system are addressed in their efforts.

Table 5. Potential Leverage Points Mapped to the 5Rs

<table>
<thead>
<tr>
<th>Element</th>
<th>Potential Leverage Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results</td>
<td>• Kinyarwanda literacy</td>
</tr>
</tbody>
</table>
| Roles       | • Program to allow teachers and school leadership to tailor curriculum to the learning abilities of students with childhood stunting  
             | • Training teachers on appropriate disciplinary measures                                    |
| Relationships | • Programs to increase positivity of parent teacher relationships                           
                 | • Programs to increase positivity of relationship between teachers and their colleagues   |
| Rules       | • Regularly assess students for stunting                                                  |
| Resources   | • Building more schools and classrooms                                                    
                 | • Increase availability of social-emotional support for teachers (e.g. access to general counseling, or counseling for substance abuse)  
                 | • Increase teacher salary                                                                  
                 | • Improving school feeding                                                                
                 | • Develop and distribute more engaging student learning content                            |

Utility of Approach for other Education and Development Systems

Without a systems approach and a mechanistic representation of the system which visualizes its interconnectedness, it is difficult to identify key points of intervention that connect to the outcome of interest. The map, coupled with participatory workshops, integrates multiple perspectives in one diagram of the Rwandan primary student’s education experience and journey to Kinyarwanda literacy and allows users to see the pathways by which a particular factor or intervention may impact the outcome of interest as well as elucidate potential leverage points.

In any education system, there are many actors, institutions, resources, and components that interact with one another in complex relationships. As visualized in the systems diagram, a program addressing one part of the education sector does not only change that part, but rather reverberates throughout the entire sector because of how that part relates to all the others. As the systems diagram represents how parts of the system interrelate, it demonstrates how overlooked forces can have secondary or tertiary consequences.

This pilot also demonstrates how a systems diagramming approach engages diverse stakeholders, including those on the front lines. Workshops engaged stakeholders ranging from parents to teachers, head teachers, village leaders, and local government officials. The participation allowed for proactive engagement beyond the directive settings in which stakeholders are typically engaged, which was highly valued and appreciated by participants. Developing a systems diagram can establish and strengthen
communication between involved and affected stakeholders that may have been previously disconnected. In this way, the approach serves as a problem-solving opportunity for education sectors.

Systems diagnostics help decision makers better understand and address the complex situations that affect many development issues. Not understanding and addressing these situations can result in band-aids rather than solutions, unsustainable interventions, missing secondary and tertiary effects, unintended consequences, and expended time, effort and resources from trial and error. Across all development sectors, systems diagnostics can help to identify and target key interventions and increase the likelihood that those interventions will lead to sustained improvements in outcomes of interest.

LIMITATIONS

The systems diagram focused on the perspective of the child, though we acknowledge that our approach took parents, teachers, community members, etc. as proxies for their perspective, as we could not speak directly with students. While the map includes elements related to factors such as peer relationships at school, we would expect direct interactions with students to further underscore the mechanisms related to influences such as their peers. This approach was supplemented by the ethnographic studies and other previously collected data surveying students in Rwanda and their experience (see Annex C, Bibliography). Additionally, due to limited time for the workshops, there was not sufficient time to probe into all of the gaps identified by the map during the workshops themselves or have workshop participants validate the map themselves. However, we did gather information about additional gaps with other field experts following the workshops.

We have listed factors, mechanisms and pathways for future exploration in a box beneath the system map, which includes a set of factors representing potential elements and pathways that play a role in the student’s ability to attend school and learn but either did not surface in secondary literature or workshops or we did not find enough evidence to fully represent the pathway in the map.

We acknowledge and recognize that we are not education experts in Rwanda and this initial assessment of critical and potential leverage points could be refined if coupled with a more in-depth understanding of the nature of the relationship between key education stakeholders, financial and resource considerations, political will among national government, donors, and implementers as well as the existence of techniques or approaches, globally and in Rwanda, to help affect potential leverage points. Further, we have limited understanding of the extent to which previous interventions have attempted to address the critical points, which could provide additional context for which potential leverage points fill gaps in previous interventions and/or can build off pre-existing work. Depending on the success of previous interventions as well as an understanding of what helped or hindered the work can further refine the map and selection of potential leverage points. Nevertheless, the systems diagram we developed serves as an important starting point to understanding the system and experts can continue to iterate on the current diagram.

There are three elements from the list of critical points that do not directly fall in to one of the recommendations we present. We did not include them for the following reasons: we did not include a
It is important to emphasize that each of these critical points play a significant role within the system. For example, Proximity that my family lives to a certain village is important as it connects to whether or not there is a community surrounding the student, supporting them and keeping them accountable in their school attendance. It is an important factor for families, teachers, and communities to be aware of, even if the education sector does not have control of where families live. Again, the critical points represent places of emerging significance and ought to be revisited as our understanding of the system evolves.

V. CONCLUSIONS

Our analysis yielded 11 recommendations that encompassed various roles, relationships, and resources across the system that could help yield the results of interest. Examples of ones that may not be immediately apparent are addressing early life nutrition and determining how to increase the social-emotional support and resources for teachers. Helping everyone gain a better understanding of the systems involved through the diagramming and the workshop also may increase mutual engagement and determine what to do when unexpected changes occur such as changing the language of focus to English. Systems approaches provide insight and understanding which is resilient to changes to the system.
VI. RECENT CHANGE TO THE LANGUAGE OF INSTRUCTION AND IMPLICATIONS FOR THIS REPORT

MINEDUC announces that English replace Kinyarwanda as language of instruction

As this report was being prepared for the final deadline, the Ministry of Education announced on December 2, 2019, English will replace Kinyarwanda as the language of instruction for P1-P3 starting in the 2020-2021 school year. This is the fifth change to the medium of instruction since 1997 and this changes the previous mandate set in 2012, which set Kinyarwanda as the language of instruction from P1-P3, and English in P4.

Recommendations in report still largely hold

The recommendations we presented are still applicable despite this announcement. Recommendations around reviewing materials (e.g., recommendation 6) now need to include consideration of the need to provide English learning and teaching materials for schools, students, and teachers. Recommendation 8 may become even more relevant for education programming as families may be more engaged in connecting with the school and their student’s teachers. As stated in a December 10, 2019 Devex article, “Parents want children to learn the ‘language of broader communications,’ such as English, to help them access the global economy...” Education programming may consider how to leverage a potential change in familial interest in their students’ education. It may also impact the way that Recommendation 9 could be operationalized: since English literacy rates in the community may be low, projects may need to be constructed in a way that either addresses this issue (e.g. by simultaneously promoting adult literacy) or avoids it by providing other ways for communities to support students (e.g. transportation). For both recommendations 8 and 9, it may be important for education projects to capitalize on any additional interest amongst families and the communities to cooperate and share information between the home and school.

Further Demonstrates Value of Systems Approaches versus Just Traditional Approaches

Many different types of traditional inquiries and evaluations (e.g., surveys, randomized control trials) exploring questions about why Kinyarwanda literacy rates are so low, would become less relevant when a key policy change occurs in the system. The specific questions may have to be reinvestigated, duplicating work to generate results specific to the new policy. Our systems approach, however, involved determining the system of factors involved in early-grade literacy and how they are connected, which can help show how the policy change will reverberate throughout the system. Thus, we can still use the mechanistic diagram as a starting point to inform our understanding of the system and where to invest and intervene. Overall, the systems diagram is resilient to these types of changes to the system.

14 Republic of Rwanda Ministry of Education. MINEDUC endorses the use of English language as a medium of instruction in lower primary. Retrieved from: https://mineduc.gov.rw/index.php?id=113&tx_news_pi1%5Bnews%5D=1170&tx_news_pi1%5Bcontroller%5D=News&tx_news_pi1%5Baction%5D=detail&cHash=4fad2ee07de9533a742411555b9ae0c

ANNEX

Annex A. Field Work Report

Field Work Summary
A participatory approach to stakeholder engagement in strategic program design

Summary
The goal of the Rwanda education system mapping workshops was to better articulate pathways from students’ subjective experience that can lead to improved Kinyarwanda literacy. The workshops were intended to probe more deeply into connections that lack sufficient evidentiary support in the literature but are expected to be crucially situated in the system.

In September 2019, the SPACES team facilitated a series of five workshops – four at district-level and one with national-level stakeholders. The workshops brought together stakeholders relevant to a particular set of issues around student literacy – including parents, teachers, Government of Rwanda (GOR) officials, and other development partners – and guided them through a systems diagramming process to produce more detailed understanding of the components involved in each of two identified themes, as well as the connections between them.

The workshops were designed to 1) create opportunities for multi-stakeholder dialogue, encouraging systemic inquiry approaches among participants, and 2) to generate new learning for use at the policy and program planning level. Additionally, the information and connections identified between system components captured during the workshops were used to validate and refine an initial map developed with existing secondary data.

Facilitation Team

Workshops were facilitated by LINC team members Sylvestre Musengimana, Bob Williams, and Megan McDermott with technical and logistical support from Katerina Chilikova, Diana Harper, and Patrick Sommerville.

Workshop Design

Through an iterative process, workshop planners identified and proposed a series of themes for the mapping exercises. This uncovered a variety of interests among stakeholders depending on their roles and perspectives, resulting in ideas that ranged from the overall structure of the education system to specific interventions to specific events. Planners sought to identify feasible themes considering factors such as: 1) relevance to GOR and development partner education strategies, 2) political acceptability of discussing the topics in an open atmosphere, 3) expected interest of participants to engage on the topic, 4) a reasonable boundary relative to the expected time available for discussion, 5) the extent to which the topic was novel and presented an opportunity to add to the substantial existing evidence base, and 6) relevance of the themes to an overall systems diagramming diagnostic effort.

Workshop Themes
Drivers of primary school drop-out / children’s attitudes toward school: The recent dropout study (2017) commissioned by MINEDUC and UNICEF generated meaningful and clear results that appear yet to be absorbed and used by local stakeholders. Additionally, qualitative analysis in the study showed that “dislike of school” was among the top three reasons for dropout, along with cost and illness. This aspect was not analyzed in the study’s report, but prompted an interesting, potentially critical and unexplored entry point into the discussion of drivers of dropout and the overall school experience. Where does this dislike originate? To what extent is this dislike associated with the school environment and teaching vs. non-school factors? Which of these reasons relate to teacher training? What is the effect in the classroom of children who either like or dislike school? While it was not feasible within the realistic constraints of this activity to develop an ethically sound activity with children, the participatory activities with school counselors, parents, teachers, youth leaders and other actors was expected to serve as background for development programming and future research.

Teaching capability: As teachers play a central role in students’ learning and education, teacher training has been a major focus of education reform and improvement efforts. However, this framing on teacher “capacity” (i.e., the technical skills and abilities of teachers to teach) may be too narrow. It may be more valuable to consider the actual capability of the system to use those skills and abilities—the factors that help and hinder translating teacher capacity into learning capability. Mapping was expected to indicate whether or not and how teachers can manage “capability” issues that has some implications for teacher training as well as broader literacy issues. The goal of bringing stakeholders together around this theme was to develop a shared understanding of what and who is helping and hindering teachers applying their skills and knowledge in ways that enhance student learning.

Several additional themes were identified during the scoping process as potentially of interest but not suited to the format, timing, and constraints of this activity. These included the relationship between health and basic primary education, local engagement in national policy-making processes, and the physical environment/physical environment/

Selection of Systemic Diagramming Approach

Many different approaches to participatory systemic diagramming exist. Typically, these approaches are not conducted as standalone activities; rather, they are part of an overall process of systemic inquiry and application. For the purpose of the pilot, we considered approaches that could be conducted in a standalone manner, though we sought to embed the process within ongoing activities at USAID/Rwanda. We considered four main diagramming approaches (Rich Picturing, influence diagram, multiple cause diagram, and causal loop diagram). Based on the time available for the workshops (1/2 day per session) and the local context (the lack of a safe environment for open dialogue among different stakeholder groups), we decided to use influence diagrams based on a process developed by the Open University in the United Kingdom.16

Influence diagrams are ‘snapshots’ of what influences a situation as it is right now. They seek to identify in general terms ‘who’ or ‘what’ does or may influence a teacher’s capability to teach to their ability or a kid’s enjoyment of school. These influences can be many things: roles, states, variables, viewpoints, or given constructs (e.g., student’s attitude to school, teacher’s capability). This means that the diagram may display that parents “influence” children’s enjoyment of school (a general statement of influence but not cause), as well as specific school rules may prevent teachers from applying their knowledge and skills (a more detailed causal statement).

16 http://systems.open.ac.uk/materials/T552/
Participants worked in groups of four. Commonly in systems diagramming the group comprises different stakeholder roles (e.g. parent, teacher, district officer). However, because we were unfamiliar with the local power dynamics we mostly chose to organize groups on a single stakeholder basis. The appropriateness of this decision was highlighted in an instance where a group became mixed and we observed significant power issues at play. Consequently, we split the group into the two stakeholder roles.

The incorporation of a brief sharing and exchange exercise towards the end of each workshop allowed for limited cross-stakeholder pollination. To strengthen the potential insights gained from the diagramming as well as identify potential solutions, we designed the diagram debrief around a Force Field Analysis. This analysis helps participants identify the major influence relationships in their diagram and then identify what helps those influences and hinders those influences. Potential solutions can flow from questions around how to reinforce the helpful influences and reduce the impact of unhelpful influences. This process also subsequently formed the basis of other systems diagramming approaches such as causal loop diagrams.

Illustrative Process
Each group has a sheet of paper with one of the two end states (student enjoyment of school or teacher capability) written in the center, a pile of post-it notes and something that allows connections to be shown but is easily removable.

1. Individuals identify as many factors as they can that contribute to the respective issue within the time allotted and select three most important.
2. Share three selected factors with group. Group as a whole decides on five most influential. Write on post-its and place on paper.
3. The group as a whole goes through each of the five and identifies next layer of factors that ‘influence’ each of the five initial factors. Group decides on most influential. Writes on post-its and places on paper.
4. Group identifies factors ‘in-between’ the factors.
5. Move beyond linear model. Now participants are asked to draw the links across the various factors.
6. Group discusses the relationships mapped, their certainty and significance and then remove all chains that do not contain ‘important’ or ‘powerful’ or ‘influential’ relationships. This will help simplify the diagram and focus on key drivers.
7. Group prepares a five-minute presentation, that includes not only the ‘what’ but the ‘so what’ (i.e. what actions by whom would lead to resolving the issue).

Selection of Districts and Participants

District selection was based on a desire to incorporate perspectives from both a rural and urban setting, the availability of additional data on literacy outcomes (participation in the LEGRA\textsuperscript{17} pilot program), and the presence of local logistical support to assist with participant identification and other preparatory needs. In consultation with USAID’s Soma Umenye project, Kirehe (rural) and Kicukiro (urban) were thus selected as the two districts for the pilot workshops.

Kirehe is located in Rwanda’s Eastern Province. The Kirehe district population is predominantly rural with 97% of the population residing in rural areas. Kirehe is also a very young district, with 63.3% of the population under the age of 25. Average household size in Kirehe is 4.4 persons. Among district

\textsuperscript{17} Local Early Grade Reading Assessment (LEGRA)
residents over the age of 3, 28% of have no education, 57.8% attended primary school, 7.9% reached secondary school, and only 0.6% attended university. The unemployment rate is 3.4%.

Kicukiro is located in Kigali City Province. The Kicukiro district population is predominantly urban with 87.9% of residents living in urban areas. Kicukiro residents under the age of 25 account for 58.1% of the district population. Average household size in the district is 4.1 persons. Educational attainment among Kicukiro residents is higher than Kirehe: of the population over the age of 3, 10.7% have no education, 45.8% have a primary level education, 25.6% attained secondary level schooling, and 11.3% have a university education. The unemployment rate is 10.8%.

Workshops were planned in each district at the school level (parents, teachers, and school administrators) and at the government level (district government, sector government, and village leaders). Due to the time limitations of participants and other ongoing activities in the schools and communities, workshops were designed for a half day (4 hours). The main language spoken in the local workshops was Kinyarwanda.

Participants were drawn from the local community and intended to reflect a diversity of viewpoints, but not to be a representative group. Participants were selected with consideration of inclusion of women, a mix of age and experience levels, and relevance to primary school (to include teachers in P1-3 and parents of children in P1-3). Local partners helped to identify individuals who were expected to be participatory and active in discussion, which was important given the short timeline and pilot status.

<table>
<thead>
<tr>
<th>Stakeholder Role (District)</th>
<th>Qty</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>7</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Head Teachers</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Parents</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
<td><strong>6</strong></td>
<td><strong>10</strong></td>
</tr>
<tr>
<td>Workshop 2 (Kirehe)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sector Staff</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>District Staff</td>
<td>6</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

18 Fourth Population and Housing Census, Rwanda, 2012 – District Profile: Kirehe
19 Fourth Population and Housing Census, Rwanda, 2012 – District Profile: Kicukiro
### Workshop 3 (Kicukiro)

<table>
<thead>
<tr>
<th>Role</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Teachers</td>
<td>12</td>
</tr>
<tr>
<td>Village Leaders</td>
<td>8</td>
</tr>
<tr>
<td>Sector Staff</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

### Workshop 4 (Kicukiro)

<table>
<thead>
<tr>
<th>Role</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>16</td>
</tr>
<tr>
<td>Parents</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

## Workshop Proceedings

Each workshop generally followed the timeline listed below.

<table>
<thead>
<tr>
<th>TIME</th>
<th>OBJECTIVES</th>
<th>CONTENT/TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>15m</td>
<td>Introduction</td>
<td>Participants are welcomed and oriented to the purpose of the workshop.</td>
</tr>
<tr>
<td>5m</td>
<td>Identify of major direct influences</td>
<td>Individuals individually identify <em>important</em> factors that influence students disliking school/teacher capability. Identify the three most important.</td>
</tr>
<tr>
<td>10m</td>
<td>Identify major influencers</td>
<td>Share with group. Group as a whole decides five most influential. Write the five on post-its and place on paper surrounding the ‘end state’</td>
</tr>
<tr>
<td>20m</td>
<td>Identify secondary influences</td>
<td>The group as a whole goes through each of the five influences, and identifies what influences each of these five. Writes them on post-its and places them around the original five – close to the relevant influence.</td>
</tr>
<tr>
<td>20m</td>
<td>Identify relationships between the influences</td>
<td>The group identifies more broadly how the influences relate to each other. Relationships are marked with green ribbon lines.</td>
</tr>
<tr>
<td>30m</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>10m</td>
<td>Promenade</td>
<td>Stakeholder groups examine maps developed by other stakeholder groups and hold a brief Q&amp;A session.</td>
</tr>
<tr>
<td>10m</td>
<td>Map updates</td>
<td>Groups update their maps based on reflections during the break and promenade.</td>
</tr>
<tr>
<td>15m</td>
<td>Identify the important influences</td>
<td>The important influence relationships are identified. Red ribbon lines are used to replace the green ribbon lines for the influences identified as most important.</td>
</tr>
<tr>
<td>40m</td>
<td>Analysis of the influences</td>
<td>Participants discuss the implications of the maps for practice</td>
</tr>
<tr>
<td>5m</td>
<td>Further analysis</td>
<td>Participants select main influencers</td>
</tr>
<tr>
<td>15m</td>
<td>Force Field analysis</td>
<td>Prioritization of similarities and differences</td>
</tr>
<tr>
<td>15m</td>
<td>Closing</td>
<td>Participants are thanked for their time, receive completion certificates, and share reflections on the workshop.</td>
</tr>
</tbody>
</table>

Final maps from each workshop are included below.

- Each connecting line is directional, starting from the dot on one post-it and leading to a different post-it. This represents that one factor influences another.
• Green lines indicate influence, and red lines indicate the most important influences as identified by participants.
• The color of the dots does not have any significance.

Workshops in Kirehe examined the theme of children’s dislike of school, and workshops in Kicukiro examined the theme of teacher capabilities.

The emerging factors highlighted below were determined by reflecting on the final maps produced, as well as participant discussions and the culminating force field analyses. These factors were selected based on the following criteria: 1) Identified as a cause or influence on a large number of factors in the map relative to other factors (a source from which many outward arrows were drawn), 2) Identified among different stakeholder groups, 3) Identified in different locations, 4) Generated a high level of discussion during the workshop among participants relative to other factors, 5) Associated with a specific need, intervention, and/or action in the force field analysis. With a small sample of workshops among locations and participants that were purposefully selected, the workshop results alone are neither complete nor representative. Nevertheless, the fact that common factors were identified by this process lends credibility and should increase interest in further understanding and analyzing them in the local context.

**Workshop 1 – Kirehe Parents and Teachers (September 29, 2019)**

Teacher group 1 identified the themes related to the child’s social, emotional, and physical condition as influencing factors for students’ dislike of school. Interactions among family conflicts, corporal punishment, and economic status were clustered together. Negative conditions at home were influenced by negative conditions at school, such as teacher absence, lack of role models, and the lack of a child-friendly setting (interpreted as a place that was not fun or engaging).
Teacher group 2 also identified the mindset of parents about education as an influence within the system, as well as the lack of information sharing among teachers and parents. Climate change and flood was also identified as a factor that influenced family economic and food insecurity, which directly influenced a child’s experience at school.

Head teachers highlighted the influence of teachers not fulfilling their responsibilities with regards to classwork as well as classroom environment. They noted the lack of cooperation between school representatives and parents, as well as the negative home environment, including family conflict and drunkenness. Given their insight into overall school operations, they also discussed the role of school leadership and lack of transparency.
Parents identified underlying issues at home including conflict and poverty, which are influenced by early marriage and lack of family planning. They also saw ineffective teaching styles and methodologies, teacher motivation, and corporal punishment as a cluster of important factors.

**Force field analysis**
Participants identified a range of strategies and actions to address the key underlying negative influences. These included:
- Counseling, promotion of child well-being, healing psychological wounds, and understanding the child’s perspective and problems
• Programs to promote teaching conditions and teacher motivation
• Play-based and child-friendly teaching strategies
• Sensitizing parents to play a role in their child’s education and visit them at school
• Promoting joint accountability among teachers, parents, and school officials

Workshop 2 – Kirehe Local Government (September 30, 2019)

Sector education officers considered the lack of love and care at school directly related to overcrowded classes. They also saw family economic security and the long distances between home and the school as important influences.

District officials also highlighted the importance of family socioeconomic conditions, including poverty that results from climate change and the lack of family planning. Poor economic conditions and lack of household asset management were associated with inadequate food supplies and stunting, and were related closely to family conflict and drunkenness.
**Force field analysis**
Participants identified a range of strategies and actions to address the key underlying negative influences. These included:

- Economic relief, poverty reduction, and job creation activities
- School feeding programs
- Positive parenting programs and sensitization on the rights of children
- Classroom construction near children’s homes

*Workshop 3 – Kicukiro Local Leaders (October 3, 2019)*

This workshop was originally planned for local government officials, but these participants were called away to another pressing priority shortly before the workshop. Instead, the workshop was held with village leaders and teachers. Some stakeholder groups were mixed as there were no anticipated challenges to open discussion among these groups.

Village leaders saw conflict among teachers and lack of respect of school administrator as important influences in teacher capability and performance. Lack of resources including the number of teachers and classrooms as well as structural issues such as favoritism in recruitment were highlighted as well.
Mixed group 1 (village leaders and head teachers) saw ineffective leadership – specifically from school administration and sector officials – at the core of the issue of teacher motivation and workload. This lack of leadership correlates with poor behavior, under-preparedness, and ineffective school and classroom operations. One of the factors influencing poor school leadership is the perception by those in power of being unreachable and beyond the rules.
Mixed group 2 of village leaders and head teachers focused on the influence of a limited education budget that leads to insufficient classrooms and low teacher salary. They also identified how the frequency of both education policy and curriculum changes is associated with lack of interest from teachers to teach, a lack of relevant teaching aids, and a lack of motivation by teachers to make changes in the classroom.
Mixed group 3 of village leaders and head teachers highlighted the importance of how insufficient salaries influences teacher motivation and poor individual performance. They also discussed how low participation of parents (children without materials, parents who do not follow up the learning of their children, parents who do not collaborate with teachers) signals the low value families place on education, influencing teacher motivation in the classroom.
Force field analysis
Participants identified a range of strategies and actions to address the key underlying negative influences. These included:

- Community sensitization for family planning
- Community sensitization for parental engagement in education
- Increasing the number of classrooms; increasing the number of teachers; advocacy for increased education budgets overall
- Increasing teacher salary; rewarding best performers; improving the perception of teaching as a profession
- Encouraging competence-based hiring without favoritism
- Improving education policy development and implementation, including the evaluation and learning of past and current policies, as well as encouraging stakeholder participation in development of new policies and proposed changes

Workshop 4 – Kicukiro Parents and Teachers (October 6, 2019)

Parents group 1 identified the new leadership, education curriculum, and changes to the education program over time as a cluster of influences that restricted teachers’ ability to use their knowledge and skill. This reflected the challenges of managing the content of the education program with inadequate teaching aids to an overcrowded classroom. Parents also saw family conflicts and insufficient teacher salary as influencing factors.

Parents group 2 identified a cluster of family factors including poverty, lack of family planning, inadequate household asset management. In addition, the lack of parents’ knowledge and engagement in education were highlighted. At the leadership level, they identified gaps in management and leadership as characterized by a failure to take assigned responsibilities due to the fear of breaking relationships.
Teachers reflected how low teacher salaries negatively influenced respect for teachers, job interest, tardiness and absenteeism. They also identified poor parental engagement and the volume and changes of the school curriculum as other influences.

Force field analysis
Participants identified a range of strategies and actions to address the key underlying negative influences. These included:

- Regular dialogue by local leaders about the role of parents in learning of their children; mobilizing parents to actively participate to the education of their children; holding parents accountable who do not participate in the education of their children
- Increasing the number of classrooms
- Increasing teacher salary; increasing the number of teachers
- Holding accountable leaders who do not fulfill their responsibilities (head teachers and committee)
- Establishing a legal framework for education program change, so that policy reform is guided by the legislation rather than being ad-hoc and linked to the perspectives of key individuals
- Establishing education curriculum program with more input from experienced educators and other experts in the field of primary education
Workshop 5 – National Stakeholders (October 7, 2019)

Whereas the previous four workshops reflected 'ground-level' and 'middle management' experiences, the national stakeholder meeting comprised senior civil servants and members of interested NGOs. The 'end state' used in this workshop was 'students dislike school'.

National stakeholder group 1 identified unengaging teachers as a key, convergent factor – among a cluster of classroom related factors – influencing student satisfaction in school. Other important factors highlighted include limited parental encouragement, as well as student hunger.

Group 2 identified a lack of funding as the most critical influencer in the system of factors contributing to student dislike of school. A lack of classroom engagement as a result of prevailing teacher-centric teaching methodologies was also cited as a key factor by this group.
The third group identified several issue clusters – two of the most prominent clusters are centered around 1) lack of parental support to students and 2) inappropriate teaching styles. The most influential factors related to inappropriate teaching styles focused classroom disciplinary measures, specifically on the continued use of corporal punishment in the classroom. Influencers of low parental involvement include a lack of skills to effectively support child learning, limited resources, and the impact of parents’ own experiences in school.
The last group also identified an unengaging classroom as central to the issue of student dislike of school. Boring teaching and learning experiences are influenced by poor pre-service teacher training (PRESETT), limited coaching/support and feedback opportunities for teachers, and a lack of teaching and learning materials (TLMs) such as textbooks, lesson planners, curriculum guides, etc.

Force field analysis
Participants identified a range of strategies and actions to address the key underlying negative influences. These included:

- Improve teacher motivation and satisfaction by increasing salaries, providing better classroom equipment, training and through more regular teacher appreciation activities
- Support availability of teacher learning materials (TLMs) by increasing local production of TLMs; or building capacity of teachers to develop their own TLMs using locally available materials
- Develop more effective school leadership through capacity building (school management e.g. use of data/statistics for planning and professional development); and regular school monitoring and evaluation (M&E)
- Reduce student hunger by promoting alternative school feeding programs; creating synergies with social protection programs
- Build parental capacity to support their child’s education in the home, as well engaging the whole community to support education (education stakeholders, local leaders, opinion leaders, parents, etc)

Discussion
An overwhelming theme from all five workshops was the lack of compassion, care and respect for the child. This was featured as an issue both in the classroom as well as in the home. A number of additional consensus themes emerged that were in alignment with general literature and understanding of the sector. These common themes included:

- Resources: Lack of budget, school infrastructure, number of classrooms and teachers
• Classroom factors: Low teacher motivation, ineffective teaching styles and methods, unengaging content; inappropriate disciplinary measures
• Household factors: Poverty, household conflict, lack of family planning, lack of parental involvement in education
• Leadership factors: Ineffective leadership and role models at school, for both students and teachers

However, different stakeholders considered the relative importance and the relationships among these factors in different ways. Certain other factors were not featured prominently in the mapping exercise, though we would have expected to see them based on the literature. These included peer-to-peer student relationships, community engagement, and the role of local government.

A number of themes emerged with a level of prominence that was not expected based on literature and on typical educational program discussions. These included:
• Climate change and its role in family poverty and instability, demonstrating the vulnerability of poor households
• Stunting, which highlighted the role between poor economic conditions, nutritional outcomes, and educational outcomes
• Teacher-to-teacher conflict underscores school environments where staff are overburdened and unincentivized to perform their duties, cooperate, and treat one another with basic respect
• Household asset management issues and the impact on financial resources available to support school related costs, as well as on the psycho-social well-being of children.
• Drunkenness among parents, teachers, and in the community, and the negative effect this has on children’s well-being

Reflections and Lessons Learned
An extensive effort is underway by Oxford Policy Management to document the process and lessons learned through these efforts, including feedback from participants and stakeholders during and following the workshops. In the meantime, we have included a few reflections and lessons learned from our perspective.

1. Systems diagramming should be embedded into a larger process. For the purposes of this pilot, we first identified the analytic tools to be tested, and then sought appropriate settings in which to apply them. As a result, the activities were implemented by outsiders to the local community, who do not necessarily have the context and background in order to plan and follow through on the results appropriately. When mapping activities are integrated into a program, the planning process moves more smoothly. In addition, the validity of the findings and the use of the results are amplified.

2. Careful attention needs to be paid to balancing the opportunity for stakeholders discuss within like groups (parent, teacher, education officer, etc.) and the extent to which different perspectives are uncovered and reflected upon. This is important in all settings, but particularly in an environment where open dissent is not the norm. In this context, we were advised that separate stakeholder groups would result in the most productive dialogue, as well as avoid unintended negative consequences. With limited time for the workshops, we included a brief exchange and learning opportunity among groups (a ‘promenade’), but it was very limited. As a result, we received perspectives from different roles, but the outputs tended not to be self-reflective. For example, teachers tended to focus on problems with parents and children; administrators and parents tended to focus on teachers. In a more relaxed setting, there would
have been an opportunity for each role to reflect on their contributions to the issue and their position in the overall system.

3. Participants demonstrated a high level of satisfaction and engagement during the workshops. Participants were readily engaged in the sessions, providing feedback that they appreciated the opportunity to provide input, develop ideas, and propose solutions. This activity stood in opposition to other settings where they are told what to do or talked at. In addition, creating a safe space for sharing and discussion was highly valued by participants.

4. Participants accepted the value of the methodology, and several indicated they would like the replicate the exercise for their own purposes. For example, one head teacher planned use the mapping in his school to help teachers identify and discuss the specific issues in their context. At the national workshop, a multinational donor found so much value in the methodology that they incorporated a version of the method into their collaborative design workshop in the same week. Our mapping approach can easily be modified, expanded, or contracted according to local circumstances. In the future, we would recommend setting aside time following the session for whatever smaller group emerges with interest in the methodology.
Annex C. Bibliography


Annex D. Scope of Work

SPACES
Rwandan Primary Students Learning to Read Kinyarwanda: A Systems Mapping Approach

Proposed Scope of Work

The Challenge

Globally, and in Rwanda, evidence suggests that literacy in a student’s first language is foundational for their success in school. In Rwanda, Kinyarwanda is typically students’ first language, and the first three years of primary school (P1-P3) are taught in Kinyarwanda with a focus on Kinyarwanda literacy. Even though Rwanda has substantially increased school enrollment, children in Rwanda are not meeting basic primary Kinyarwanda literacy competency.

The challenge is that a child and his or her attendance in school and ability to learn are affected by a system of factors and processes. For example, the policies governing teacher hiring and salaries, a student’s household economics, a community’s attitude towards education, and the child’s health all affect whether or not a student attends, and remains in school as well as whether or not they meeting basic primary Kinyarwanda literacy competency. Therefore, determining where best to invest and establishing policies and interventions that will result in sustainable improvements requires a better understanding of the systems around and affecting the child.

Decision makers such as MINEDUC (Ministry of Education) and REB (Rwanda Education Board), donors such as USAID and DFID and local stakeholders, who understand the importance of being unified in their efforts in order to achieve systems change, are unclear on the best investment targets, interventions, and programs to remedy this problem. Interventions that have changed just a single aspect of the system (e.g. curriculum development) have not moved the needle.

Unaided, understanding and addressing this complex system can be difficult. Previous studies such as Understanding Dropout and Repetition in Rwanda, the Education Sector Analysis, The Political Economy of Primary Education: Lessons from Rwanda, ethnographic studies and analyses conducted by MINEDUC, USAID, DFID, REB and National Bureau of Statistics have helped provide insight about different parts of the Rwanda education system, but there is a need to bring all of these different studies and insights together in a way to allow decision makers to see how the different factors and components of the system are connected.

Systems maps can serve as visual methods to accomplish this. For example, when the Bill and Melinda Gates Foundation, UNICEF, and other vaccine decision makers needed to understand how different measures would reflect different parts of vaccine delivery systems, our team created a systems map of these measures, as published in the journal Vaccine. The map helped identify the best set of measures to use to evaluate the performance of vaccine supply chains and ways to re-design supply chains. Therefore, we propose to develop a type of systems map, a causal loop diagram, of the components/factors that affect a child’s attendance at school and ability to learn.

The Approach

We will develop a causal loop diagram, representing the experience of a student in basic primary education, his or her decision and ability to attend school and learn, and the system of factors, ranging from home and classroom factors to national policies, that affect these. Our goal will be to represent the connections that apply across Rwanda, though we are aware that the extent to which these influences impact student experience will vary by district, sector, and even at the school and student level.

First, the child has to attend school, so we will represent the factors and processes, for example, the resources and familial support to send them to school as well as a viable mode of transportation that will then determine whether the child makes it to school. Each of these key factors or components will be represented in shapes with lines connecting the elements involved in the decision and process to go to school. The map will also represent a student’s ability to learn, which involves components such as their relationship with the teacher, the curriculum and the classroom environment. Each of these components may also be connected to factors that directly impact learning outcomes such as attention in class, comprehension, reinforcement outside the classroom, etc. The student’s experience at school also play a role in whether or not they continue attending.

A causal loop diagram is a visual depiction of the dynamic relationships of factors and parts of a system. A causal loop diagram consists of a set of variables/factors/components represented as nodes connected by links which usually take the form of arrows and indicates the causal relationship between them. By representing the problem and its basic causal mechanisms, you can elucidate the forces that result in the puzzling behavior or outcomes. The visual nature of the causal loop diagrams makes them useful or explaining the complexity of a system to others, and also identifying and understand which parts of the system can be leveraged to achieve sustainable improvements.

The team will develop a preliminary causal loop diagram, to develop an initial map structure of the student’s experience with education and pathways to learning outcomes, based on a detailed review of secondary literature.

Leveraging existing research in order to develop the preliminary map structure will also enable the most effective activity in-country. The preliminary map structure will inform the in-country work by identifying, for example, gaps in knowledge around relationships between particular components which can be obtained during the field work. The goal of the in-country workshops will be to better articulate pathways from students' subjective experience that can lead to improved Kinyarwanda literacy. The workshops will provide the opportunity to probe more deeply into connections that are not as well-characterized in the literature but may be crucially situated in the system.

The information and connections between system components captured during the workshops will then be used to update the causal loop diagram.

This causal loop diagram will focus on the perspective of the child, though we acknowledge that we will be using parents, teachers, community members, etc. as proxies for their perspective, as we will not speak directly with students. This approach will be supplemented by the ethnographic studies mentioned above and potentially other previously collected data surveying students in Rwanda and their experience.

Research Questions
We will use USAID’s 5 Rs framework (Roles, Rules, Resources, Relationships, and Results) as a starting point to frame our inquiry. Our research questions include:
1. What mechanisms (including rules, roles, resources, reasons and relationships) affect students’ subjective experience of basic primary levels of school in Rwanda?

2. How do these elements connect to one another and basic Kinyarwanda literacy results in early primary levels?

3. Where are leverage points within the system where intervention would improve learning through these identified connections?

Activities

Activity 1: Compiling and reviewing available secondary data sources

In addition to the reports, studies and sources provided by USAID and DFID, as well as the OPM landscape analysis, SPACES will leverage the wealth of quality research that exists on Rwanda’s basic education sector to begin to inform an initial causal loop diagram.

Activity 2: Determining the different actors and components in the system

Identify the actors and components directly involved in a student’s attendance and ability to learn, as well as the indirect factors, including those not traditionally part of the education system.

Activity 3: Determining linkages and connections between the different components

Draw lines/arrows between components and factors to represent relationships between factors and the pathways that ultimately influence Kinyarwanda literacy.

Activity 4: Use preliminary systems map to determine the gaps to inform in-country work as well as further data collection

By identifying gaps in knowledge around relationships between particular components, the preliminary map structure will enable the most effective in-country work by informing the focus of the workshops.

Activity 5: Conduct in-country workshop series

A workshop or series of thematically distinct workshops will focus on the areas of the system targeted for further inquiry. During 2 weeks of field work in September, SPACES will conduct 2-3 workshops with stakeholders. The workshops will bring together stakeholders relevant to these particular areas of the system and guide them through a systems mapping process to produce more detailed understanding of the components and connections in these identified areas. The in-country scoping visit identified several promising themes for unique and actionable contributions to local stakeholders understanding, to be further refined based on secondary research. Initial identified themes included: 1) drivers of primary school drop-out including kids like/dislike of school, 2) teacher capacity and capability and 3) school calendar.

Field work will conclude with a 1-day workshop with USAID, DFID, and MINEDUC representatives, in order to provide a deeper understanding of the findings of the secondary and primary research as well as the methodology used.

The anticipated results of the fieldwork are to offer opportunities for multi-stakeholder dialogue, encourage systemic inquiry approaches among participants, and to generate new learning for use at the policy and program planning level.

Activity 6: Identify potential leverage points and frame findings within 5Rs

As part of the field work and during additional data gathering efforts to refine the systems map, our team will also work with key stakeholders to identify potential leverage points for action and change. Map the key findings to the 5R framework.

Activity 7: Share final deliverables

SPACES will share causal loop diagram as well as a document outlining the education system diagnostic methodology, including fieldwork summary report.
**Deliverables**

Causal loop diagram representing the experience of a student in basic primary education, his or her decision and ability to attend school and learn, and the system of factors that affect these.

Document outlining education system diagnostic methodology including field work summary report.