TECHNOLOGY
FOR QUALITY EDUCATION AND EQUALITY IN REMOTE INDIGENOUS COMMUNITIES:

TEACHER, STUDENT, AND COMMUNITY PERSPECTIVES
FROM BOSAWAS, NICARAGUA

MARCH 2021

60 million girls

GTI-RAAWB

FIT

Fund for Innovation
and Transformation
Fonds pour l'innovation
et la transformation

MUNDO POSIBLE

45 YEARS · 1976-2021
Change for Children

THE PROJECT

- **NAME:** Technology and Training for Quality Education and Equality in the Bosawas.

- **LOCATION:** Four Miskito indigenous communities in the Bosawas Biosphere Reserve, a tropical forest reserve in northern Nicaragua. This is one of the most marginalized and impoverished regions in Central America. Each community consists of a central village school as well as several surrounding smaller settlement schools. The four communities are: Shiminka, Pamkawas, San Andrés, and Aniwas.

- **THE TECHNOLOGY:** Each of the four central village schools was equipped with a RACHEL (*Remote Area Community Hotspot for Education and Learning*), a classroom set of tablets and laptops, and solar power generators. The RACHELS are small servers that provide reliable access to learning materials on massive digital libraries. A RACHEL delivers free pre-loaded software and content modules—customized to meet local cultural and language needs—to communities without internet access. Teachers and students with a laptop or tablet connect to the RACHEL via a wireless signal. Teachers from the surrounding settlement schools access the technology weekly at the central village schools to receive training and access educational resources for lesson planning.

- **PROJECT FOCUSES:** The project fosters improved education by providing:

    1. Teacher training both in-person and virtually;

    2. Educational resources such as virtual texts, libraries, and learning games;

    3. Miskito cultural and linguistic materials; and

    4. Gender and sexual and reproductive health and rights (SRHR) education.

Teachers receiving materials.

- **PROJECT SPONSORS:** This project is being implemented by Change for Children, a Canadian not-for-profit organization, in partnership with the local Indigenous Government. The project is supported by Nicaragua's Ministry of Education, and is funded by the Fund for Innovation and Transformation (FIT), 60 million girls, and loyal Change for Children donors. Technical development, training and support is provided by Mundo Posible, Guatemala.

THE PHASE I STUDY

PURPOSE OF THIS STUDY: To assess the results from Phase 1 of this project (March, 2020 – February 2021), share the learnings to date, and plan next steps.

TEACHER/STUDENT/COMMUNITY INTERVIEWS CONDUCTED: February 16-24, 2021.

REPORT PREPARED: February-March, 2021 by Tony Llorente

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Pedagogy Training in Shiminka.

ACRONYMS AND DEFINITIONS

BOSAWAS – The Biosphere of protected tropical forest on the northern border of Nicragua with Honduras that is home to various indignous communities

MEL – Monitoring, Evaluation and Learning

MINED – Ministry of Education of Nicaragua

MOOC – Massive Open Online Course. However, in this context, MOOC refers to teacher training modules prepared by Mundo Posible Guatemala for use offline through the RACHEL

RACHEL – Remote Area Community Hotspot for Education and Learning. An offline server with virtual libraries and programs that can be accessed through a wireless signal in a small area, such as a classroom.

THE LESSONS LEARNED TO DATE

1. Teachers need continuous training and support

One-off training for teachers in the use of new technology is not enough. In order to gain confidence, exploit the full potential of the technology, and increase the sustainability of the program, teachers need frequent training, consistent support, and, at minimum, weekly opportunities to utilize the technology and the digital content and programs.

2. Moving from "textbook substitution" to engaged learning takes time

As seen in this project, the first step for integrating technology into the classroom is "textbook substitution;" that is, the use of the technology to fill the gap of the lack of textbooks and books in ill-equipped schools. This is a valuable step for disadvantaged schools; however, it does not exploit the full potential that the technology offers to change how students learn. Teachers and students need additional support to utilize the technology to implement new and diverse teaching and learning strategies and to increase student engagement in their own learning.

3. Access to indigenous language materials is particularly valuable for preschool and early grades

The Miskito materials on the RACHEL were most utilized by the preschool and grades 1 and 2 teachers in this project. Teachers used Miskito poems, songs, stories and other children's activities with their students. Access to books, audio recordings and videos in Miskito was critical as most children begin school with very limited Spanish, the primary language of instruction in the national school system. Availability of these first-language materials (mother-tongue) facilitates the transition of children into school, demonstrates a respect for their culture and language, and encourages staying in school. Technology can facilitate and support this process in contexts where these types of resources are limited.

4. Technology can overcome barriers to education for girls and women, if used strategically

There are often social and geographical barriers, particularly in remote communities, to education for girls and women. Gender norms, early pregnancy, and taboos against girls and women leaving the community often prevent them from continuing their education. In this project, technology was utilized to address social barriers through intentional education on gender dynamics and SRHR both in the school and community settings. The technology also overcame geographic barriers to girls continuing their education beyond primary school and to female teachers continuing their professional development. By offering secondary and professional development opportunities through off-line technology, girls and women do not need to leave their communities to continue their education.

5. Coordination with local and national governments is critical to sustainability and scale-up

In order for the educational improvements offered by technology to be sustained and potentially scaled-up within the country, all levels of government need to be engaged from the beginning. The president of the indigenous territorial government endorsed the project and coordinated with the regional and national education departments to enable its implementation. Education departments provided digital versions of curriculum materials for inclusion on the RACHELs, and local representatives participated in training sessions. National representatives are following the progress of the project and have participated in several monitoring trips to the region.

STUDY METHODOLOGY

To gather information on results and lessons learned to date from the project (March, 2020 - February, 2021), a series of surveys and interviews with a sample of teachers, students, and community leaders were conducted in February, 2021 in the four beneficiary communities: Shiminka, San Andrés, Pamkawas and Aniwas. Each community consists of a central village school (where the technology is based) as well as surrounding settlement schools (whose teachers travel to the central school weekly to receive training with the technology and to access educational resources).

TEACHER SAMPLE

The project includes 124 teachers in the four communities. To obtain a representative sample, interviews were conducted with 29 teachers: 16 women and 13 men. Of these, 19 teachers are empirical teachers (13 women and 6 men) and 10 are certified teachers (3 women and 7 men). "Empirical" teachers are those who have no formal Teacher training. "Certified" teachers have received training through post-secondary education. The majority (70%) of teachers in this region have some secondary school education or have completed high school. Only 3% of teachers have some university education.

To be as representative as possible, the study sample was selected based on criteria such as sex, education level, and grade level taught (see **Table 1**). In some communities, the sample varied slightly from the original plan, given the special conditions of the population being sampled. For example, the interviews in Shiminka were conducted mostly with female teachers, as there are few male teachers. In the case of Pamkawas and Aniwas, there are no female teachers with certification. The establishment of sample selection criteria confirmed that the community where there are the most certified female teachers is in San Andrés.

Table 1: Teacher Sample													
Community	Women	Men	Total	Empirical		Certified		Total	Primary		Secondary		Pre-School	Total
				W	M	W	M		M	W	M	W		
Shiminka	6	2	8	5	1	1	1	8	3	1	1	1	2	**8**
Pamkawas	3	4	7	3	1	-	3	7	2	3	-	1	1	**7**
San Andrés	4	3	7	2	2	2	1	7	2	2	1	1	1	**7**
Aniwas	3	4	7	3	2	-	2	7	1	3	-	1	2	**7**
Total	**16**	**13**	**29**	**13**	**6**	**3**	**7**	**29**	**8**	**9**	**2**	**4**	**6**	**29**

About half (55%) of the teachers interviewed are women and 45% are men. Most of the teachers interviewed were empirical teachers (65%). Of the 19 empirical teachers interviewed, 68% are women, and 31% are men. Even though an attempt was made to include as many certified female teachers as possible, the number of certified female teachers is much lower than the number of certified male teachers. Out of the 10 teachers with certifications who were interviewed, only 3 are women. It is noted that 100% of the preschool teachers are women and are empirical teachers.

STUDENT SAMPLE

In order to include a representative sample of the student population, interviews were conducted with a mix of grade levels and a balance of male and female students. A total of 23 students were surveyed among the four-beneficiary communities, of which 12 are girls and 11 are boys.

Table 2 outlines the characteristics of the student sample by community, sex, and grade level.

Table 2: Student Sample													
Community	Students			Primary						Secondary			Total
	B	G	T	1° a 3° Grado			4° a 6° Grado			B	G	ST	
				B	G	ST	B	G	ST				Grand Total
Shiminka	2	3	5	-	-	-	1	1	2	1	2	3	5
Pamkawas	3	3	6	-	-	-	2	2	4	1	1	2	6
San Andrés	3	3	6	-	-	-	2	2	4	1	1	2	6
Aniwas	3	3	6	1	1	2	1	1	2	1	1	2	6
Total	**11**	**12**	**23**	**1**	**1**	**2**	**6**	**6**	**12**	**4**	**5**	**9**	**23**

COMMUNITY SAMPLE

Surveys were also conducted with community leaders in the four beneficiary communities. To carry out this process, community representatives holding various positions were included, being mindful of establishing a gender-balanced sample. Among the four communities, 12 community leaders were interviewed: six women and six men. In addition to the community leaders, four women who have children in school were interviewed, for a total of 16 community representatives in the sample. **Table 3** outlines the community representatives interviewed by community, sex, and role.

Table 3: Community Leaders Sample																	
Nucleus	Interviews by Role																Total
	Catechist delegate			Mother-Family	Youth representative			Women's representation	Judge			Coordinator			Councilor			
	M	W	ST	Women	M	W	ST	Women	M	W	ST	M	W	ST	M	W	ST	GT
Shiminka	-	-	-	1	-	-	-	-	1	-	1	1	-	1	-	1	1	4
Pamkawas	-	1	1	1	1	-	1	-	-	-	-	1	-	1	-	-	-	4
San Andrés	-	-	-	-	1	1	1	1	-	-	-	1	-	1	-	-	-	4
Aniwas	2	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Total	**2**	**-**	**3**	**4**	**2**	**1**	**2**	**1**	**1**	**-**	**1**	**3**	**-**	**3**	**-**	**1**	**1**	**16**

RESULTS REPORTING

Based on the information gathered from the teachers, students, and community leaders, the results of the evaluation are presented quantitatively and qualitatively in the following sections, taking into account the answers to multiple-choice questions, as well as open answers provided. The results of the surveys compare the progress for each component and population, and identify strengths and successes as well as areas for improvement.

TEACHER PERSPECTIVES

Teachers reported using the RACHELs for an average of 8 hours per week during Phase 1 of the project. This includes training with the project facilitators, lesson planning, and use in the classroom with students. As expected, the teachers in the central village schools of each community were able to use the technology more hours per week than those from the surrounding smaller settlements. Some teachers in the central schools used the technology up to 30 hours per week.

During Phase 1 of the project, the teachers from surrounding settlements came in once per week to receive training with the technology and to access educational resources. These teachers used the RACHEL one day per week (Fridays) for 4 to 6 hours. During this time, the teachers participated in workshops with the project facilitators, did lesson planning, and explored RACHEL for educational resources and ideas.

Surveys with teachers in the Pamkawas community.

TEACHERS: IMPROVED PEDAGOGY AND ACCESS TO EDUCATIONAL RESOURCES

There is a significant uptake in the use and management of the digital resources. The teachers have learned, through the facilitators, the use and management of the technological components necessary to carry out learning and teaching activities.

Teachers were asked to select which content on the RACHEL they liked the most because of its usefulness and ease of use. **Figure 1** outlines which modules were most liked by the teachers. The modules most identified were the ones that offer valuable information for their lesson planning, such as national curriculum texts and teacher manuals, dictionaries, and grammar and writing exercises for students. These are resources that are essential to teaching the national curriculum, but are not otherwise available in the schools. Teachers also appreciate the programs and resources that enable students to do self-directed learning through learning games or researching information on subjects in the curriculum.

### Figure 1: RACHEL Content most liked by Teachers
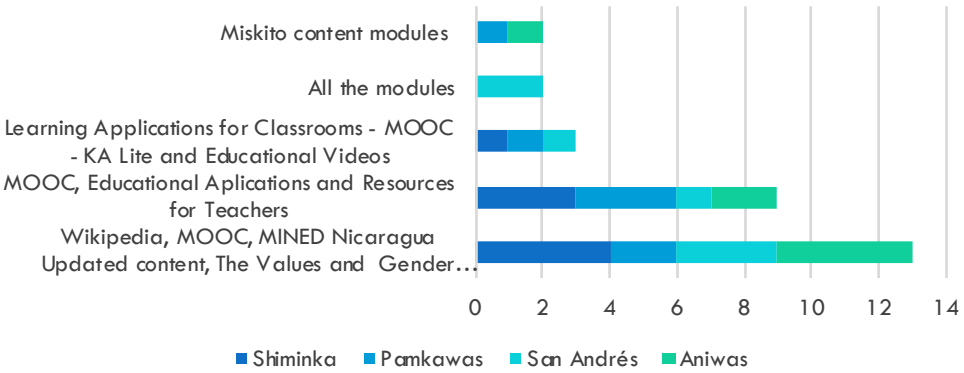
The group of modules that the highest number of teachers identified as liking the most was: "Wikipedia, MOOC RACHEL and MINED Nicaragua Updates, The Values and Gender Module" (45% of teachers). The groups of modules identified by the fewest teachers were "modules in Miskito".

The teachers were also asked about the modules that they liked least or had difficulty understanding (Figure 2). To this, 23 (79%) teachers responded that they had no difficulty in understanding or that there was simply no module that they did not like. Five teachers expressed having difficulty using the modules for teaching English language, as they do not provide Spanish translation, and one teacher reported having difficulty understanding MOOC topics.

The teachers found very few of the modules difficult to use. However, teachers reported that it was difficult to manage their login accounts for KA-Lite and MOOC. There were no issues with the actual content available on these two modules. They feel that they need more practice with these types of accounts to gain confidence in their operation.

Figure 2: Modules and content that represent some difficulties for Teachers
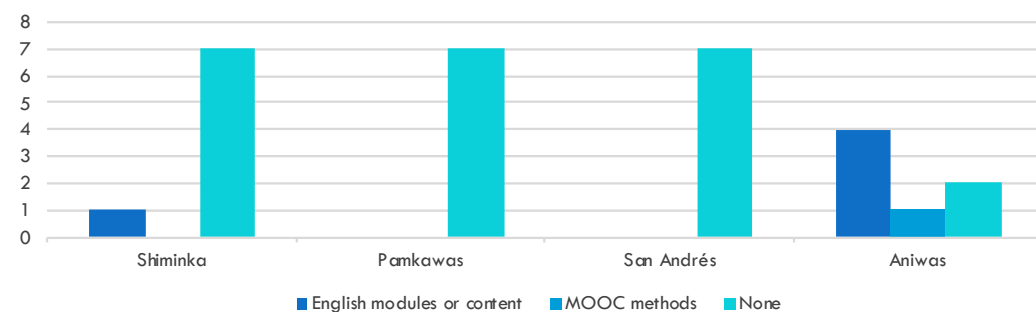
Teachers were queried as to the RACHEL content that they consulted the most **(Figure 3)**. According to the survey, textbooks are the most consulted content (34.5%), followed by MOOC strategies (28%) and spelling, and reading and math exercises (17%). The resources in Miskito and dictionaries or Wikipedia were also selected by some teachers (10% each). The responses reflect content that is *most* consulted and does not mean that teachers have not used the other modules available in RACHEL.

The results illustrate that in some communities, the schools have decided to focus on particular subject areas. For example, in San Andrés, reading, spelling and mathematics are focus areas of learning, whereas communities, such as Pamkawas and Aniwas have more diversified approaches and are making use of an array of content and materials such as the MOOC strategies, resources in Miskito, research using Wikipedia, and the use of books from texts and self-learning exercises.

Figure 3: RACHEL resources most used by Teachers
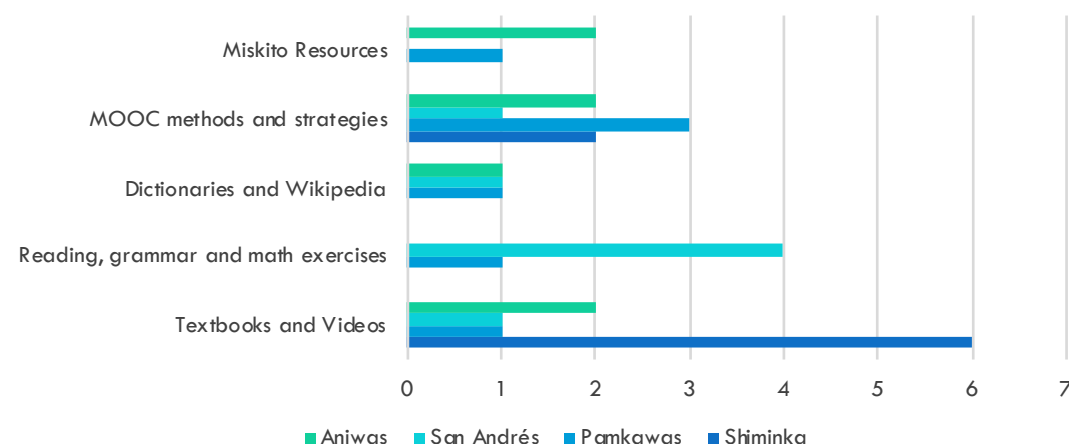
The importance of the digital textbooks is a reflection of the lack of physical textbooks in the schools in the regions. In this application, the technology is being used primarily as a substitute for the lack of physical books, and not necessary in an innovative way to facilitate learning. However, it is clear that teachers are beginning to explore the potential of the technology to facilitate more interactive and engaging ways of learning, such as interactive learning games, creation of content, and self-directed research.

The modules most consulted by teachers for the preparation of lesson plans were also identified through the survey interviews. **Figure 4** identifies the most-used modules for lesson planning by teachers in each community. These modules are the most prominent in the development of academic activities; however, they are not the only modules that teachers consult.
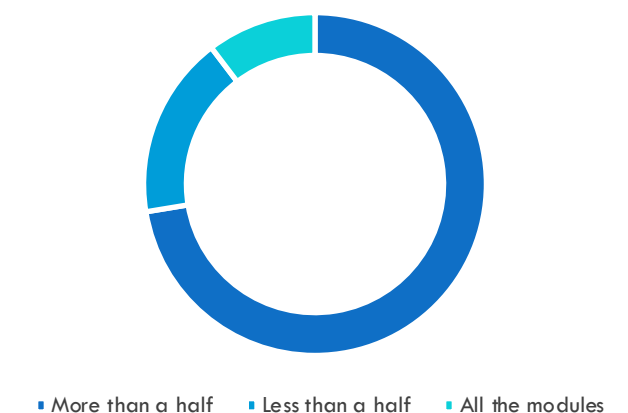
Figure 4: Modules used for lesson planning
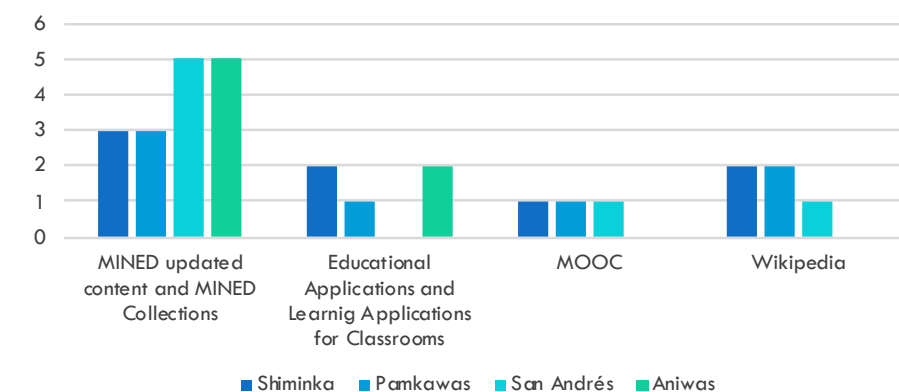
The modules that do not appear in the graph, such as the resources in Miskito or the gender and SRHR materials continue to be used for lesson planning, however were not identified as the *most-used*. The resources in Miskito are used by several preschool educators to develop activities with young children, while the gender awareness materials are consulted according to the needs of each grade.

In terms of the application of technology by subject area, RACHEL digital resources were most often used for Language and Literature (55% of teachers) and Mathematics (34% of teachers). The remaining 11% of teachers use resources either for various subjects, all subjects, or social studies, science, and English.

With respect to the use of the full extent of the RACHEL content **(Figure 5)**, 72% of teachers answered that they have used "more than half of all RACHEL modules," 10% of the teachers answered that they have explored or used "all RACHEL modules", while 17% of the teachers responded that they have seen "less than half" of all the modules, focusing on those modules that are most useful to them.
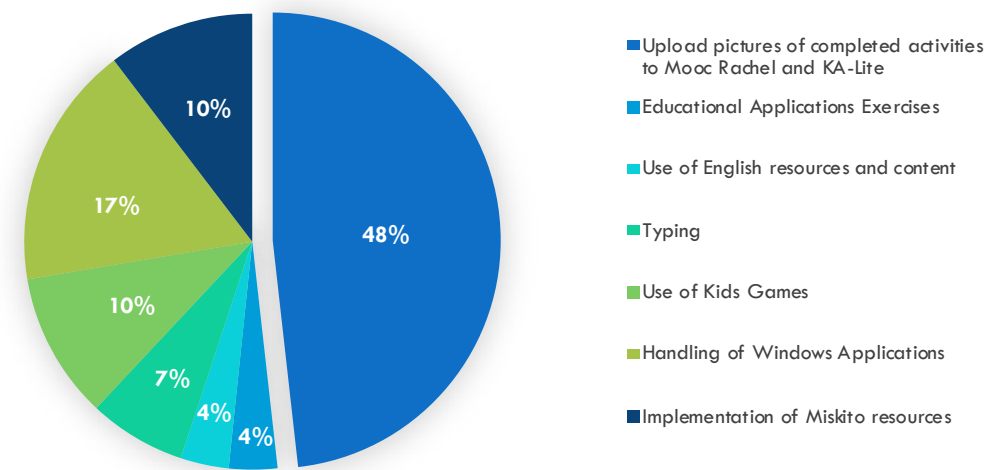
Figure 5: Teacher use of RACHEL Modules

Teachers identified some areas where they needed additional support in the use and management of RACHEL. **Figure 6** represents the areas in which teachers request more support, identifying which are areas that should be prioritized more than others moving forward.

Figure 6: Teacher requests for Additional Support

- 48%
- 10%
- 17%
- 10%
- 7%
- 4%
- 4%

Legend:
- Upload pictures of completed activities to Mooc Rachel and KA-Lite
- Educational Applications Exercises
- Use of English resources and content
- Typing
- Use of Kids Games
- Handling of Windows Applications
- Implementation of Miskito resources

Figure 7 identifies the modules that teachers identified as the ones for which they feel they need more training. While some of the teachers (27%) reported that they "fully understand all the modules and their content," others wanted additional training. The use and management of the MOOC and KA-Lite accounts are the modules that the most teachers identified needing more support with, (identified by a total of 10 teachers, 34%). The group of English modules, such as Phonetics, were identified by 20% of teachers as an area that is challenging. According to the teachers, there is no translation of the content into Spanish, which is why comprehension is difficult for them as they do not have mastery of the English language. Three teachers (10%) expressed having difficulties with Wikihow.

Figure 7: Modules for which Teachers need more training
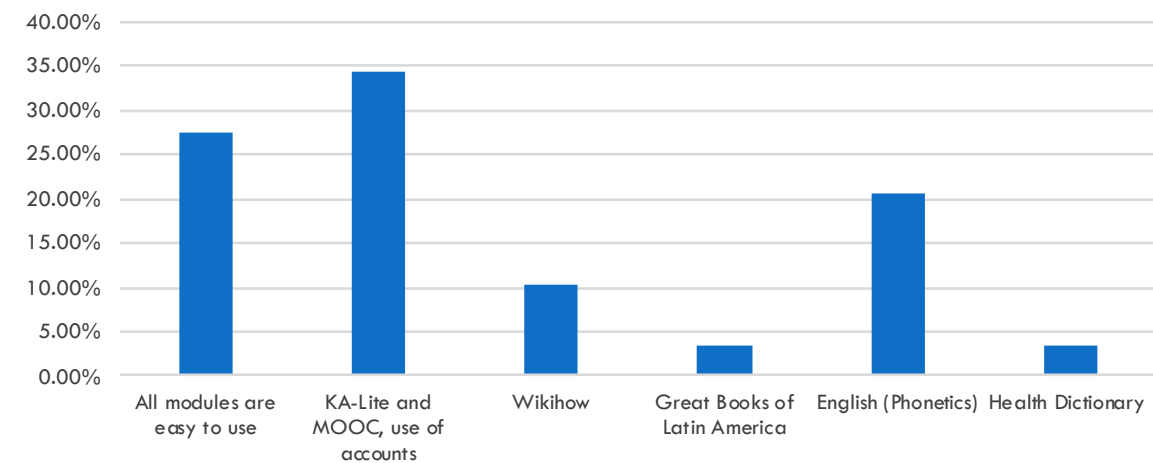
All of the teachers evaluated pointed out the great utility that the digital library provides through the provision of curricular resources and a great variety of academic resources necessary to enrich the knowledge of both teachers and students.

Comments from teachers:

"The importance is enormous. The digital resources that we did not have are now accessible and students now have more learning resources. These are very supportive in our ongoing formation as individuals and as a community. The impact has been visible in strengthening education, speaking and understanding of content in Spanish and many other areas." *Female teacher, Primary School, Shiminka*

"The importance of RACHEL is the way in which the instruments and digital resources available there move us to a digital world, replacing traditional education with a more modern one adapted to the current world." *Male teacher, High School, Pamkawas*

"The description of the importance of RACHEL is immense. Many activities that we develop in class are thanks to the resources we have on RACHEL. RACHEL, as a digital library, promotes entertaining and lasting learning, things that were inaccessible to us, which now we can use as learning and teaching tools" *Female teacher, Primary School, San Andrés.*

"Since we don't have a library, this digital library has strengthened our knowledge and has facilitated access to curricular materials that we did not have." *Male teacher, Primary School, Aniwas*

Surveys with teachers in the Pamkawas community.

Facilitator in Siminka.

Focus group discussions with teachers.

TEACHERS: MOOC TRAINING

The MOOC (Massive Open Online Course, although used offline in this case) is a series of short training modules for teachers, developed by Mundo Posible Guatemala. The MOOC on the RACHEL used in this project teaches teachers methods and strategies to promote 21st century skills such as critical thinking, communications, collaboration, and creativity. These teaching strategies support improved pedagogy and enable students to engage more directly in their own learning.

The seven lessons in the MOOC are:

- Mind Mapping
- Concept Maps
- Comparison-based Learning
- Video-based Learning
- SOLE (Self-Organized Learning Environments)
- Creative Learning Spiral
- Project-based Learning

Teachers report implementing these seven new teaching strategies at all levels and subject areas. They report seeing results within the framework of promoting skills such as critical thinking, information analysis, and teamwork, among others, in the classrooms.

The majority of teachers (97%) highlighted that these methodologies are easy to understand and use, yet very powerful in promoting promising learning in students. Over 83% of the teachers indicated that they have used more than three of the methodologies proficiently with their students. The rest of the teachers (17%) indicated that they have utilized one or two methodologies proficiently. The methodologies that are being used the most are Comparison-based Learning, Mind Mapping, SOLE, Video-based Learning, and Concept Maps.

The only challenge reported by the teachers is the lack or scarcity of material supplies, such as paper and markers which many of the methodologies require. In order to overcome this, the project has provided a supply of materials to each school to that teachers can implement the new methodologies.

"The knowledge of MOOC has helped me a lot to awaken students' creativity since they can now develop better group and individual activities, learning with an enterprising mind." **Teacher**

"The MOOC strategies create less difficulties, less boredom, and better educational quality, since there is a space where students learn by doing." **Teacher**

TEACHERS: MISKITO CULTURAL RESOURCES

With the purpose of promoting student learning with linguistically adapted and appropriate materials, modules have been designed in Miskito, some for informational purposes and others focused more on teaching. The number of Miskito resources on the RACHEL has been increasing during the execution of the project.

At the time of the interviews, about half of all teachers (55%) had used the modules in Miskito, either for exploratory or self-learning purposes. Almost one-third (31%) of teachers have used or have reviewed the modules in Miskito only a few times. The remaining 14% of teachers have not explored or used the modules in Miskito yet.

Preschool teachers make the most use of the resources in Miskito, particularly resources designed for young children. Particularly popular is the "children's audio" module (which was added in one of the regular updates that are carried out with the RACHELs). The popularity of this module is likely because many children start school speaking very little Spanish, as they speak Miskito almost exclusively in the home. Teachers bring creativity into play by developing poems, songs, and dances using these resources. This is one of the components that project staff will continue to work on in the coming months, through various activities that include the creation of new local materials in Miskito, and promoting the knowledge of the territory.

The results generally point to very little or no use of Miskito resources in the classrooms among primary and secondary school teachers. Teachers at these levels make use of the Miskito resources for themselves, not to apply it with students, because there is no specific subject of the Miskito language in the educational curriculum. In addition, few textbooks are available in primary or secondary levels. The teachers also pointed out that they themselves do not have very good writing skills in Miskito, which hinders the process of preparing lesson plans without a previous workshop on teaching in the Miskito language.

Despite this, primary and secondary teachers stressed the importance of adding more resources in Miskito, especially those of local origin, as part of the preservation of the Miskito language and culture. Likewise, teachers agree that training in the use of and teaching of the mother tongue in the classroom, and the commitment of MINED (Ministry of Education) to define the mother tongue as a subject in the educational curriculum, would be critical to promoting the survival of the Miskito language.

Pedagogy session with teachers.

TEACHERS: GENDER AND SRHR EDUCATION

Teachers and schools in the region have historically had almost a complete lack of culturally and linguistically appropriate materials to promote gender equality and SRHR education, despite awareness that these are critical issues for students. A variety of gender and SRHR materials have been included on the RACHELs, some translated into Miskito. In addition, teachers have participated in some training sessions to learn strategies for stimulating dialogue, reflection, and learning with their students.

The gender and SRHR materials available on RACHEL have been used by 100% of female teachers and 92% of male teachers sampled in this study. **Figure 8** summarizes the use of and attitudes toward the gender and SRHR education materials available on RACHEL.

The majority of teachers indicated that the resources available on RACHEL on gender and SRHR have been very useful. Almost all of the female teachers surveyed (94%) indicated that the gender videos and Wikihow content on SRHR have helped them discuss these issues with their students, while 92% of all male teachers expressed the same. Teachers recognize the great importance of having these resources and request the incorporation of more similar materials to further strengthen learning on these issues both within class and individually.

The majority of teachers (93%) also identified that their students showed an interest in gender and SRHR issues; however, as teachers, they still feel the need to have more materials and knowledge to better serve students by age and gender. There are certain barriers or difficulties in teaching young students as these are student populations where the topics need to be further explored with materials more suitable for their age group.
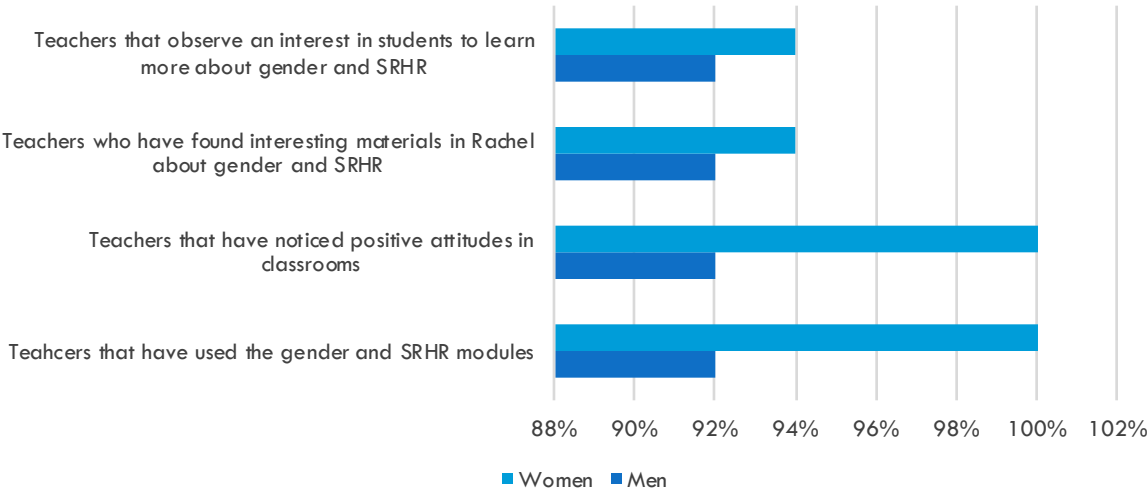
All of the teachers who have used the materials have indicated that they noticed some changes in the attitudes and behaviours of students in their classrooms. Positive attitudes are reflected in the way girls and boys interact in class, showing respect and tolerance, working in mixed groups of boys and girls, as well as carrying out activities that previously only girls engaged in, such as cleaning classrooms. The teachers confirm that the youngest children absorb this knowledge and put it into practice in less time than the older students, because certain behaviors of the older students have been learned and reinforced at home over longer periods of time. As such, inclusion of workshops or specific talks for each age is necessary in order to individualize the lessons and encourage gender equality in all age groups.

Most teachers (62%) talk to their students about gender issues on a daily or weekly basis through daily planned sessions. The remaining teachers develop activities related to these topics on a biweekly or monthly basis. These issues are addressed through class sessions and discussions, or in brief talks at the beginning of a class. Teachers also integrate gender content into various classes where appropriate, such as biology, social studies, and political science. Content is geared to the appropriate age and development of the students. Teachers noted that students in higher elementary and in secondary grades need more in-depth information on these issues.

Technology development in Siminka.

While teachers can address these topics in school, they recognize that these are wider social issues and thus they must also be addressed within the family and community context. Teachers suggest that the way to address this is through continuous training involving parents and community leaders. If parents play a leading role in reinforcing gender equity and SRHR knowledge, there will be a solid base to dive more deeply into these issues without misunderstandings or resistance from the community.

Figure 8: Teacher prespectives on gender and SRHR education

Teachers that observe an interest in students to learn more about gender and SRHR

Teachers who have found interesting materials in Rachel about gender and SRHR

Teachers that have noticed positive attitudes in classrooms

Teahcers that have used the gender and SRHR modules

88% 90% 92% 94% 96% 98% 100% 102%

■ Women ■ Men

STUDENT PERSPECTIVES

The ultimate objective of this project is to improve learning outcomes for students. A sample of students from the four communities were interviewed to capture their feedback on their experience with the technological innovations in the schools.

Overall, the initiative of technology in the classroom has been received by students with open arms since, for them, this learning system is very entertaining, innovative, empowering, and provides wide access to information, something that they could not have imagined years ago.

Interview questions were based on the project objectives set out at the beginning of the project in order to establish a base understanding of what has been satisfactorily accomplished and other tasks that can still be improved upon during the remainder of the project.

Teachers receiving materials.

## STUDENTS: TECHNOLOGY IN THE CLASSROOM

The students in the central villages have been participants in the use and management of technological components either through the exploration of modules on their own or in some cases with instructions from the project facilitators or teachers.

The majority of the surveyed students (20 out of 23) have used the RACHEL and can navigate through the modules using the Chromebooks. 2 students surveyed from Aniwas indicated that they have used RACHEL very few times or do not manage the equipment very well. A single student from San Andrés indicated that he had never used the technology.

The students who have used RACHEL the most are those from Shiminka and Pamkawas, and they demonstrated the most proficiency with the use of the digital library. Students from only one community, San Andres, expressed having very little participation in the use of the technology room. In the coming months, further direction will be given with respect to the ways in which students can be and should be included in the use and management of RACHEL and its resources. In the case of Aniwas, students have used a Chromebook but have invested little time in this task. Students in the 1st to 4th grade group revealed the lowest understanding of the use of technology.

Students who do use the technology attend a class with a RACHEL 2-3 times a week. The schedules are characterized according to the needs and the modalities of the class. Just over 52% of students surveyed attend class in the afternoon to do research work or homework and 39% of the students surveyed attend in the morning, while 9% of the students attend on the weekends. The majority of students (90%) say they have good support from facilitators and teachers.

All students indicated that they used the technology for multiple purposes: practicing new skills, researching, self-directed learning, and exploring. **Figure 9** shows the activity for which the students used the technology the most. Students reported most often using the RACHEL to either carry out research for assignments (39%) or to complete teacher-instructed learning (30%). The modules most commonly mentioned by students are MINED Nicaragua, Wikipedia, Didactic Applications, resources in Miskito, and entertainment modules, which they apply mainly in the subjects of Language and Literature, and Mathematics.

Figure 9: Students' most frequent use of the technology
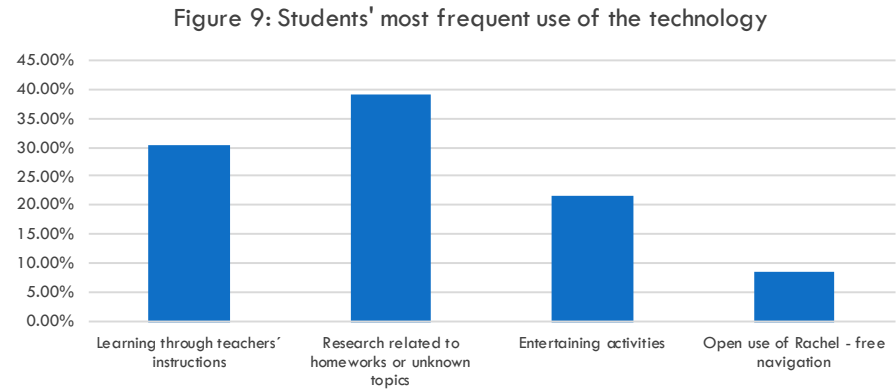
Specific activities which are carried out with the use of RACHEL include:

- learning through spelling exercises and comprehensive readings;
- doing math exercises and games;
- watching instructional videos; and
- conducting group and individual investigations.

Students also appreciate learning to use the technology itself. Students are able to obtain competencies and skills that serve them to live in a digital age. According to their own comments, students hope to leave high school with a good knowledge of the use and management of technology and with a good knowledge of the topics learned, and then study and complete their university studies, so that one day they can serve their communities. Girls, in particular, expressed these hopes.

With regard to the importance of RACHEL for classes, the following student comments were received:

"It is very important because it helps me acquire new knowledge and deepen my learning of each topic". Female Secondary student, Aniwas.

"The digital library allows me to continue learning and understanding issues that are unknown to me. I can do research and activities; I can do a lot, and everything is educational". Female Secondary student, Pamkawas.

"The educational technology we have today is a tool that we never dreamed was possible, so the importance of the technological project for the community is immeasurable, and we are facing the opportunity to train as professionals with similar capacities to other professionals outside of our region." Male Secondary student, Shiminka.

STUDENTS: NEW LEARNING METHODOLOGIES

Students reported that when teachers used the new methodologies they learned in the MOOC, their lessons were more engaging, motivated group learning, and promoted spaces for creativity and fun. **Figure 10** illustrates the most frequently to the least frequently used strategies. Mind maps, concept maps, comparative charts, and SOLE are the most widely applied methods in classrooms.

Figure 10: New Methodologies from MOOC Training used in the Classroom

Figure 10: Mooc Rachel methodologies practiced at schools
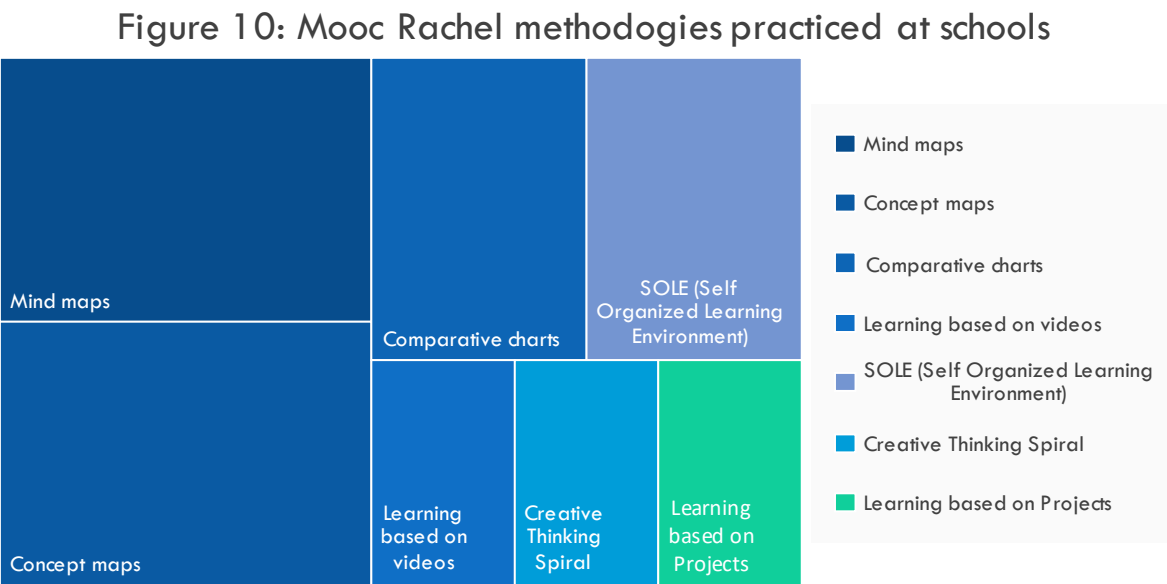
Most of the methodologies are applied weekly or at least 2 to 3 times a week in Aniwas, Pamkawas, and Shiminka, by almost all teachers. According to the results of the evaluation, the community that least applies the MOOC RACHEL methodologies is San Andrés, which was confirmed by the students surveyed. In order to follow up on this issue, a meeting was held with the MINED delegate, the project facilitator from San Andrés, and the teachers, where it was agreed that schedules would be established to promote the use of MOOC RACHEL's valuable knowledge. This situation will be monitored through continued visits to the community.

Students who have been exposed to MOOC teaching methodologies feel they have learned a lot and highlight the great utility of these strategies in class. Additionally, they have said that they like when their teachers apply these methodologies in class through homework assignments or content development in classrooms.

STUDENTS: MISKITO CULTURAL RESOURCES

The Miskito resources available on RACHEL have been incorporated in order to promote the preservation of Miskito language and culture. Catalyzing learning in the Miskito language is an important purpose of this project.

Since mother-tongue education is not established as a subject in the MINED curriculum, teachers and primary and secondary students do not currently maximize the use of these resources. However, preschool educators, who work with children of younger ages, have made efforts to educate their children using resources in Miskito.

The majority of students (80%) have had an opportunity to explore and use the Miskito materials available on RACHEL in some capacity. Surveyed students reported that the Miskito resources on RACHEL are very useful to keep their culture and identity alive, but that they have only explored some of these resources. To date, the Miskito resources have been primarily used for the investigation of unknown words, book readings in Miskito, and for observation of videos. Students highlight the great importance of having resources in Miskito, as well as the great need to diversify content in Miskito, taking into account the resources that can be produced locally. Among the resources that were suggested to be added to RACHEL are stories, legends, and anecdotes in forms of videos, audio recordings and readings (preferably produced locally)— a task that will be promoted in the coming months.

Student learning through exploration of the Miskito resources has included the names of some animals and objects, cardinal and ordinal numbers, the names of the months and days of the week. This seemingly basic vocabulary is no longer widely used; therefore, there is a great need to continue promoting the use of materials in Miskito to strengthen the survival of the mother tongue.

STUDENTS: GENDER AND SRHR EDUCATION

Gender and SRHR education is a very important driver of the project. Girls achieving their right to a dignified education is one of the goals of this innovative educational-technological initiative. This includes provision of an education without discrimination or gender-based violence. Making knowledge related to sexual health and reproductive rights available in schools and communities is also a goal of the project. To this end, gender equality and SRHR materials that fill information gaps on these issues have been incorporated into RACHEL. In this evaluation, students were consulted about their use of these resources. 74% of surveyed students (17 of 23) have consulted the gender and SRHR modules for learning purposes or short explorations. The balance of the students have not yet used gender and SRHR modules with their teachers or individually.

Aniwas and San Andrés have the lowest rates of learning gender issues and SRHR and lowest use of gender and SRHR materials available on RACHEL. 100% of Pamkawas and Shiminka students have applied gender equity knowledge in their classrooms and their environments.

Students who have used gender equity and SRHR materials have confirmed changes in the behaviours in the classroom. The way in which group participation is promoted involving girls and boys without a distinction of sex, is something that can now be seen in the classrooms. Historically, students were divided into groups of boys and girls separately, and classroom responsibilities like cleaning were assigned based on gender. Since gender equity started being promoted in the classroom, students have begun to coexist with mutual respect, changing attitudes towards gender roles that have often been instilled at home.

Students are willing to acquire more and new knowledge on these issues. In addition, students in grades 5 or greater say they are willing to talk openly about these issues. They classified the training workshops that provide knowledge related to these issues as 'very important'. They are also in favor of continuous workshops and activities involving their fathers, teachers, and the student population as a solid path to instilling gender equity and SRHR awareness.

COMMUNITY PERSPECTIVES

Community leaders were surveyed in order to identify and understand their points of view on the initiative and on the importance of education based on technology, on gender issues and SRHR, and on the importance of mother tongue preservation. Among the interviewees, community leaders included youth representatives, coordinators, judges, and parents.

COMMUNITY: QUALITY OF EDUCATION WITH TECHNOLOGY

Parents and community leaders highlighted the great use of technology in their communities. According to some testimonies, technology strengthens the learning of children of all ages, as well as supports empirical teachers with materials and knowledge through training workshops. Almost all of the leaders and parents in the evaluation (92%) have two to four children in school. They have seen a great positive change in their children, who are motivated to go to classes every day. For this reason, parents do not hesitate to give credit to the technology project in providing the best education to their children.

"Teachers and students have learned a lot from these technological tools and have understood several topics of interest. Restoring knowledge is one of the challenges that has been achieved, as marginalized Indigenous peoples can now be involved academic and technological issues." **Male Coordinator, Shiminka Coordinator**

"My expectation is that we can have better professionals in the future, technologically and scientifically trained, young people who can serve their community." **Male Community Leader, Pamkawas**

"The advantages of technology are the focus on the training of human resources for the future, with capability of advancing the development of the region." **Male Coordinator, San Andres, who also recounted that he does not see any disadvantage with the use of technology."**

The leaders of each community highlighted the great impact and the transformative results that the technological project has achieved since its implementation.

"The community is very grateful. All community members share the responsibility of taking care of the technological assets that have been provided. Having these resources is a great step in developing knowledge." **Community Leader, Aniwas.**

"Students in the community are grateful to the project because they maintain great expectations regarding the professionalization of young people in the territory, advancing towards development as Indigenous communities." **Community Leader, Pamkawas**

"Community members feel grateful since students have begun to know a digital world that was initially impossible, and this knowledge strengthens their education."

"Community members really like the implementation of technology in the educational community, being aware that teachers and students are improving significantly."

COMMUNITY: MISKITO CULTURAL RESOURCES

All of the community leaders surveyed consider it very important to preserve the Miskito culture, tradition, and language. The digitization of ancestral knowledge, histories of communities, as well as customs and traditions, create opportunities to acquire and preserve knowledge. It is of great importance that this knowledge is collected in one way or another to preserve the root and identity of the Miskito people.

The majority of community leaders surveyed (75%) identified that they know how to read and write in Miskito, but are not sure if they are using correct grammar, and they highlight the confusion in some grammatical and alphabetical uses. Leaders assert that a high percentage of community members, housewives, and youth cannot read or write in Miskito. This highlights the great need that exists in promoting learning the Miskito language. Only through nurturing the education of future professionals with materials and content in their own languages will the region be able to successfully promote and preserve the Miskito language and culture.

Leaders consider that the inclusion of the Miskito language as a subject in the educational curriculum, as well as the increase and creation of Miskito materials through the collection of stories, legends, and local traditions, would be excellent ways to preserve the Miskito language.

There is no doubt that this component must be taken into account through the next months of the project. All community leaders identified willingness to submit their ancestral knowledge about the Miskito culture if the program requires it.

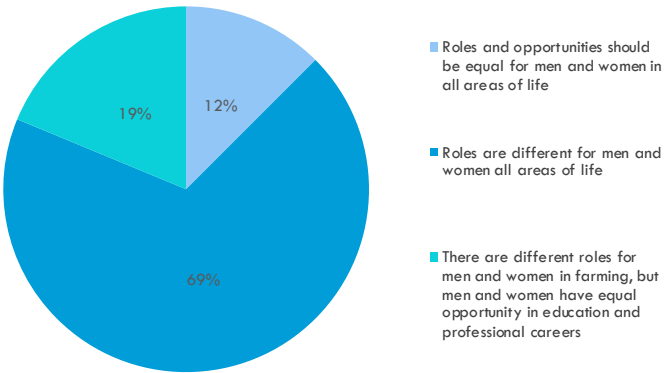## COMMUNITY: GENDER AND SRHR EDUCATION

While the majority of community leaders think that gender equality is important, there is some diversity of opinion and attitudes. The majority of community leaders surveyed (83%) believe that it is as important for girls to receive education as boys.

> "The rights of boys and girls are equal. We are aware that there is a need to cover these issues in many families, but theoretically we know that both sexes have the same rights and privileges."
> *Community Leaders, Shiminka*

However, one male leader stated that boys have more rights than girls and said that *"women's ability will never exceed that of men."* It is important to acknowledge that many community members have these beliefs at home. Another female leader stated that *"women have more rights than men."* The varying attitudes and perspective about who has more rights or if the rights are equal highlight the need to discuss these issues, even at leadership levels.

Within the Miskito communities of this region, there are traditional cultural and social norms and practices which assign roles and responsibilities based on gender. Most of leaders and parents surveyed (69%) affirm that there are defined roles for men and women; that is, that men are responsible for field work and work outside the home, while women are responsible for domestic duties and caregiving. A smaller group (19%) reported that they believed that there are different gender-based work roles, such as field work is for men, but that in terms of education, boys/men and girls/women should have equal opportunity. Only 12.5% of all leaders felt that both boys and girls should have equal opportunities in both work and education. **Figure 11** illustrates the relative extent of these perspectives among the community leaders interviewed.

Figure 11: Community Leader perspectives on Gender Roles and Opportunities

- Roles and opportunities should be equal for men and women in all areas of life
- Roles are different for men and women all areas of life
- There are different roles for men and women in farming, but men and women have equal opportunity in education and professional careers

Community leader perceptions of the occurrence of discrimination and violence against women within their communities is summarized in **Figure 12**. Two-thirds of leaders surveyed (69%) reported that they are aware that discrimination against women and even violence occurs in their communities. They report that discrimination and violence against women are accepted in some households, and that children bring these views to school. In school, teachers are tasked with addressing and changing these mentalities. About one-third (31%) of leaders believe that there are no or very few incidences of discrimination and violence against women in their communities. The leaders of the largest communities, such as San Andrés, state that there are very few cases in the community because they follow up on these issues, and that with external help, they could continue to combat these issues in homes and at school.

Figure 12: Community leader perceptions of discrimination and violence against women in their communities
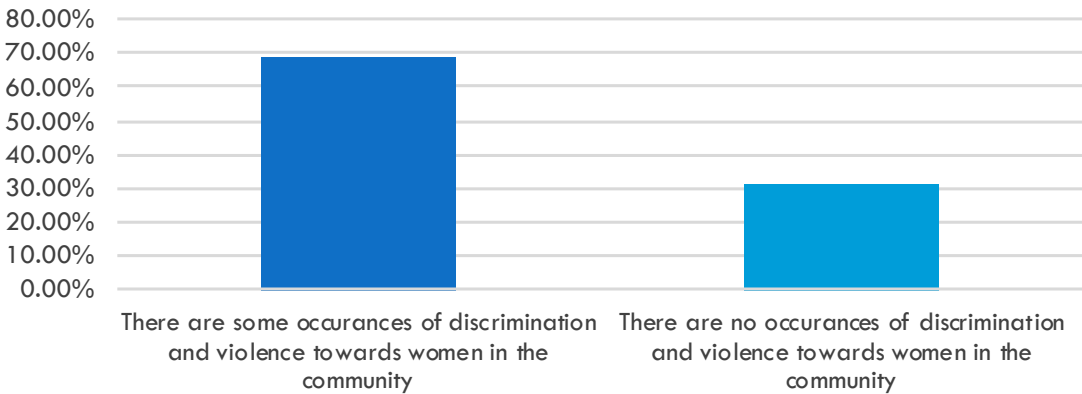
It is evident that discrimination and violence against women does occur in the communities. As a way of remedying these situations, leaders agree that open dialogue and training sessions with community leaders, parents, youth, and students will serve to make changes in men's behaviors in the communities.

Regarding what parents should teach their children, one of the male leaders stated that it is necessary to talk *"about pregnancy prevention at an early age, preventing disease, having constant communication, studying the consequences of irresponsible behaviours related to these topics."*

Some other leaders think that young people have to be taught to *"get to know themselves better and to establish behaviours of respect and liability before the aspects of sexual and reproductive health."* It remains clear that these topics are seldom reinforced in schools, and that they should be promoted in the coming months of the project.

About half of parents surveyed (56%) report that they do not talk about these issues with their children because they consider it the responsibility of teachers to educate on these issues. Parents do not talk with their children because they feel that they lack knowledge or they consider the topic a taboo. Nearly 44% of the leaders have spoken with their children about SRHR, but only very basic concepts and have not touched the issues in depth.

Meanwhile, all of the surveyed leaders say they need to acquire more knowledge to discuss these issues, and that they are willing to speak to the community about the importance of education in these issues, and also ensure that the entire community will be open to participating in talks or workshops that address this subject matter. Most of the leaders surveyed (63%) consider that it is everyone's responsibility in the community to learn about, talk about, and address these issues.

PROJECT OUTCOMES TO DATE

1. Teachers have basic capacity to effectively utilize the new educational technology

All of the teachers interviewed reported that they are have acquired the essential skills needed to use the Chromebooks, navigate through RACHEL, and explore the modules for lesson planning purposes and self-learning. Teachers also feel confident to use the technology with their students in the classroom.

2. Classroom instruction has been improved with access to high-quality and up-to-date educational materials

Access to current and superior educational materials has improved the teaching and learning process for both teachers and students. The addition of the latest MINED materials, including over 45 digital textbooks for all grades of primary education, and other important materials such as lesson-planning instruments has been particularly valuable to teachers.

3. Teachers are implementing innovative MOOC pedagogical strategies

The MOOC teacher training modules have increased the capacity of teachers to use methodologies and strategies that promote 21st century skills such as critical thinking, teamwork, and creativity. Both teachers and students report that through the implementation of the methodologies, the classrooms are more dynamic and the topics of the class are better understood.

4. Students have immensely increased access to educational resources and libraries

The extensive availability of educational resources and libraries has been revolutionary in schools that previously had no resources at all. The students highlighted the importance of using RACHEL as learning resources, especially the dictionaries, interactive grammar and mathematics exercises, and reference materials.

5. Students have enhanced engagement in their own learning with technology

On their own and with teacher support, students have learned how to use the technology to advance their own learning. The students conduct independent research, practice new skills, complete assignments, and undertake group projects.

6. Miskito language and cultural materials are beginning to be captured and shared with technology

The Miskito language and culture are at risk of disappearing. The capture and digitization of Miskito ancestral and cultural knowledge before it is extinct is crucial. The majority of leaders, youth, and adults from the communities along the Coco River do not know how to read or write in their own language. Leaders and elders believe that a good way to preserve the language is creating documents, videos, and other materials where traditional and local knowledge is highlighted and can be shared.

7. The need for gender and SRHR education is being addressed

Teachers, students, and community leaders recognize the ongoing gender gaps and lack of SRHR education. Limited access to good information is a challenge. Students also emphasized how valuable it is to have a basic understanding of gender concepts and SRHR. Young people value the ability to look up information in a safe and confidential manner. Teachers, students, and community leaders request further education for the entire community on these topics.

8. Gender and SRHR information available on RACHEL has generated attitude and behavior changes

There is anecdotal evidence that sharing information and opening dialogue has already created change. Teachers report that both girls and boys participate equally in all class activities, respecting each other, something that was difficult to see before the implementation of the project. This shift in attitudes and behaviour has also been verified through direct class observations by project staff.

Surveys with students.

NEXT STEPS FOR THE BOSAWAS PROJECT

1. Add new materials to RACHEL as requested by teachers

New modules and materials will be created and uploaded to RACHELs for students and teachers to use that address gaps and specific needs in the region. There is also a list of materials that teachers have requested to be included in the digital library, such as textbooks in English and resources specific to the BOSAWAS context.

2. Support teachers to implement new pedagogy methods from the MOOC training program

Teachers will be encouraged and supported to practice the new pedagogy methodologies and strategies that they are learning in the MOOC teacher training program. As teachers gain confidence using these techniques, their ideas and adaptations for implementation in the BOSAWAS context will be captured and uploaded to the RACHELS for sharing with other teachers in the region.

3. Facilitate student self-directed learning

Facilitators and teachers will work to create a space for student self-directed learning during out-of-school hours in the coming months. Going forward, there will be a focus on the students' self-learning environments, identifying and providing tools that will create a space for students to learn by themselves, explore content of their interest, and where help will always be available. This can potentially improve student learning outcomes and decrease the desertion of students.

4. Create Miskito educational resources

Available Miskito resources are primarily oriented towards preschool. Few Miskito resources exist for primary and secondary grades. This project will work with elders and members of the community to share their knowledge and to create digital materials, including videos, to upload on the RACHEL for public use. Project staff will closely coordinate with representatives from URACCAN (the indigenous university) and MINED (Ministry of National Education) to add new textbooks and materials in Miskito that are currently in development onto the RACHELs.

5. Emphasize gender and SRHR education within the classroom

There have been positive results from teaching gender-sensitive topics in the classroom, by building the basis of respect and tolerance between the children, and through equitable allocation of school activities. However, the fight does not stop there; there is more work to be done. One of those tasks is to create communication materials for each school showing the importance of girls remaining in schools in such a way that girls' rights to education are claimed. One of the project's focuses for the coming months is also training teachers who can assume the role of teaching their students weekly and monthly on SRHR.

6. Promote gender awareness and SRHR knowledge within the communities

To complement learning within the school, awareness-raising and education regarding gender dynamics and equality, as well as sexual health and rights, will be fostered within families and the community in general. This will be done through workshops, public campaigns, and parent-teacher meetings.