

1. Context

Adolescence is a critical intervention window through which the developmental trajectories for children can be influenced in hopes to improve their chances of making a safe, healthy and empowered transition into adulthood. Conversely, gender inequalities are accentuated during adolescence, especially against girls, and limit their access to socio-economic opportunities later in life.

UNICEF, alongside other actors, recognises that adolescents, especially young girls, need contextualised and targeted support to overcome systemic barriers they may face because of their age and gender. In fact, adolescent girls are often the least likely to be in school and the most likely to be pulled out early for work or marriage. They also experience the burden of domestic work, the expectation to be married or sexually active, and the likelihood of pregnancy. In Mali, according to the partial data for the 2017-2018 school year, the gender parity index based on completion rate was 0.9 for both primary and lower secondary education (both at the disadvantage of girls).

In secondary school, the gross intake ratio increased from 42 per cent in 2013 to 49 per cent in 2018, which whilst positive, means that one in two children are still denied this level of education. Other factors, such as the lack of adequate water and sanitation infrastructures limit access to lower secondary school and predominantly affect teenage girls because they do not have supplies or information for managing menstrual hygiene in school settings.

Further, a considerable number of schools do not meet the minimum standards for quality education. For example, only 16 per cent of secondary schools have adequate pupil-textbook ratios. Even in schools where resources have been mobilised to provide quality learning environments, students are still performing poorly because of a host of reasons, including the lack of highly qualified teachers, teachers' low motivation levels, and their involvement in other income generating activities, among many others.

In this context particularly unfavourable for adolescent girls, their ability to learn and excel in scientific endeavours has further been restricted not only because scientific subjects are perceived as difficult for young girls to pursue, but also because the instructional strategies used in classrooms do not provide students in general --and especially those who are inclined toward Science, Technology, Engineering, and Mathematics (STEM)-- with an incentive to pursue any subject in the realm of STEM. For example, rote memorisation of abstract concepts and formulas, coupled with complete absence of practical and hands-on experience, constitute only some of the factors that act as a barrier for adolescents to learn scientific subjects.

Girls' education in Mali

Girls' education is one of the most transformative development strategies to invest in. In many cultures, a girl reaching puberty is a signal to constrain her movements, schooling, friendships, sexuality, and life exposure, while the opposite is often true for boys.

In Mali, as is the case in most developing counties, improving the enrolment rate for girls' education remains a concern. This rate, which varies between 44 to 48%, continues to lag

behind that of boys which varies between 49 and 54%. Similarly, the completion rate for adolescent girls of secondary school varies between 29 and 33%, versus between 35 and 39% for boys. In addition to poverty and cultural considerations, which continue to be a serious impediment to girls' ability to study, prevailing perceptions and the lack of adequate instructional strategies do not make the learning of sciences readily accessible to young adolescents, and girls in particular. In fact, scientific subjects are perceived to be too difficult to study and thus dash young girls' enthusiasm and their hope to ever contemplate a career in a science related field.

The purpose of the project *"Budding scientists: Quality education through science in Mali,"* financed through funding from the Netherlands National Committee, is to dispel this myth through activities that are aimed at giving youngsters, especially young girls, the means and the platform where they can take intellectual risks, while giving life to their inner creativity.

2. Overview of activities and results achieved, including targeted beneficiaries

The project activities are summarised under two main results:

1. Obstacles to adolescent boys and girls school attendance are lifted, and
2. Quality of science education and learning outcomes in science is improved for adolescent girls and boys.

Each of these main results encompasses two activities. The results achieved over the course of this project are encouraging.

Result 1: Obstacles to adolescent boys and girls school attendance are lifted

The activities conducted under this result were intended to improve retention and reduce the dropout rate. Efforts were made to provide students and teachers with learning materials and psychosocial support-especially for vulnerable adolescents who are at risk of dropping out- to create an environment that is conducive to learning.

Activity 1.1: Provision of Learning materials

Quality teaching and learning are contingent upon the availability of quality instructional materials both for students and teachers. To address the needs for quality materials, the lack of which often has an adverse impact on the quality of teaching and learning, the project provided 5,000 school kits to vulnerable beneficiaries, which represented 100% of the original target. By the same token, 1,125 science manuals approved by the Malian Ministry of Education (representing 100% of the target) were distributed in participating schools to help teachers improve the quality of their instruction. To ensure that adolescent girls' school attendance is not impeded by their menstrual cycle, the project provided dignity kits to 4,500 adolescent girls in participating schools, which represents 100% of the initial target.

The project reached all the targets planned for this activity, and the preliminary results compiled from the end of project survey indicated that the learning materials as well as the psycho-social support have had a positive impact on teachers' and students' enthusiasm for science instruction. While teachers indicated that the instructional materials they received made it easier for them to plan instructional activities and deliver better lessons, students reported that

the school kits they received were “like a life saver” for many of them, especially for students whose parents could not afford these basic school materials, and their failure to have these materials could have contributed to their decision not to attend school since they would not want to feel left out. As for the portion of adolescent girls who received dignity kits, they shared positive feedback about the use of these kits as they contended that by using these kits, they did not miss school because of their menstrual cycle.

Activity 1.2: Psychosocial support

As part of the efforts to increase the retention rate, especially for vulnerable students, the project has made possible to create an environment where students feel safe to share their concerns and possibly receive the support they need. To that end, a total of 125 Listening Centres (LCs) have been set up (one in every participating school). These LCs are a safe haven where students receive one-on-one counselling services from trained professionals. They were able to privately discuss issues related to their emotional and psychological wellbeing, some of which pertain to their ability to maintain consistent school attendance. To ensure the effective functioning of these centres, a total of 400 teachers and administrators received specialised training in psychosocial support. While some of these trained personnel are assigned to the LCs, others used their skills to provide students with the necessary support, so they feel that they are learning in an environment that accords them psychological and emotional safety. These LCs have provided psychosocial support to 469 students identified as at risk of dropping out, representing 117% of the initial target of 400; 316 (67%) of the beneficiaries of these psychological support were young girls. Students who received psychosocial support via these LCs indicated that the fact that they were able to share their concerns with trusted individuals was a recomforting experience since they were able to discuss issues they could not have discussed at home. Many of the students who received support in LCs reported that the discussions have helped them dispel their anxiety about schooling.

Further, the project also promoted activities conducted by youth clubs at participating schools. A total of 375 youth clubs were created and students participating in these clubs engaged in themes-based activities, including sport, debates, gender-based violence, traditional arts and intergenerational dialogue. An average of 27 of such debates was conducted per youth club over the course of the project. These discussions highly contributed to raising awareness about critical issues (i.e. gender-based violence, poverty, child abuse, insecurity, schooling etc.) that adolescents face and these discussions were, in some instances, triggering factors for referring some of the participants for psychosocial support. A total of 73 adolescents were referred to LCs for psychosocial support, subsequent to their participation in the youth clubs.

Result 2: Quality of science education and learning outcomes in science is improved for adolescent girls and boys

The activities under this result are mainly intended to boost the quality of science education and to entice students’ involvement in scientific subjects they once deemed too difficult to pursue. The creation of science clubs, the organisation of a science fair, as well as teacher training opportunities, are the main activities to achieve this result.

Activity 2.1: Science clubs and annual science fair

As part of the strategy to enhance the teaching and learning of science and technology, the project prides itself in finding a way to make the teaching and learning of science more interactive and practical. In fact, the creation of science clubs, as part of this project, proved to be an invaluable strategy, for it created a platform for students to engage in scientific activities without fear. To that effect, 3 science clubs (one per grade level, i.e. 7th, 8th and 9th grade) were created in each of the 125 target schools, bringing to a total to 375 fully functional science clubs. Under the tutelage of science club advisors, participants in each club conducted a variety of scientific experiments with a culminating goal, which consisted in designing and completing an original scientific project that demonstrated participants' creativity and sense of research. Students' projects were showcased during a 3-day annual science fair, the culminating activity of the project, which was a national success. It gave science-prone adolescents the perfect platform to exhibit their creative talents while it created enthusiasm and confidence among students who would previously shun scientific subjects because of the perceived difficulty attributed to their learning. Of the 45 science projects showcased during the fair, 25 of them were prized for their creativity and originality. The celebration of the science fair was such a success that it was broadcast twice on national television for its merits in encouraging adolescents, especially girls in pursuing science and technology.

The science clubs directly benefited 7,500 students which represents 133% of the initial target of 5,600) and indirectly a minimum of 22,500 students. A total of 54.04% (4,053 students) of the direct beneficiaries were girls, which is a good indication of the project success in reaching a majority of girls and in getting them interested in the sciences. As to the indirect beneficiaries, 41% (9,226) of them were adolescent girls, which is a feat considering the usual higher ratio of young boys in schools.

The results of the exit survey (end of project survey) administered to the participants (students) of the science clubs indicated that over 95% of participants expressed satisfaction with the activities of this project and reported that the activities and the various project have given them confidence in studying sciences. This result is a significant jump compared to the results of the initial survey which showed only 38% of science enthusiasts.

Activity 2.2: Teacher trainings

Capacity building for teachers was one of the core activities of this project, for it takes quality teaching to promote learning of science and to draw more science-reluctant adolescents to the scientific subjects. In that regard, several training activities were conducted to help science teachers hone their instructional strategies in hopes to make science more attractive to adolescent girls and boys. The first training activities were related to the training of 47 National Science Teacher trainers (11 women and 36 men) in life skills and instructional strategies relevant to the teaching of scientific subjects to make these subjects more appealing to young girls and boys. Subsequently, these national trainers trained 600 Science teachers and science club mentors (112 women and 488 men) in methodology and instructional approaches to better teach life skills (leadership, community management, living together / notion of solidarity, citizenship and human rights) and sciences, including physics, chemistry, biology, and mathematics. A combined total of 647 educators (172% of the initial target of 375 target)

benefited directly from this project. The higher rate of participation speaks to teachers' enthusiasm to improve the quality of their instruction and to get their students more involved in these scientific subjects that they once deemed too difficult to tackle.

It is important to point out that the relatively low percentage of female teachers-123 out of 647, which represents 19 per cent of female participants- speaks to the reality that not only the percentage of women is generally low in the teaching profession, but it is even more so in the teaching of scientific subjects. In that regard, the objective of this project which seeks to spark girls' interest in science, is so fitting.

The results of the exit survey (end of project survey) administered to participating teachers indicated 100% of the teachers and administrators acknowledged that these training opportunities have helped them hone their instructional skills in an effort to make the teaching of science more appealing to students. In fact, participating science instructors report that they now have a variety of strategies that they can use to make science instruction more practical based on hand-on experience as opposed to the traditional theory-oriented instruction and rote memorization. Participating teachers expressed appreciation for the in-service training they received because many of these teachers have not received any in-service training for the last 10-15 years. This result of the end of project survey is indeed far from the initial result of 62% of teachers who expressed confidence in their instructional practice.

3. Challenges faced during implementation

Even though insecurity remains a major concern in the country, the city of Bamako where this project took place is relatively calm. For that reason, there was no major disruption during the implementation of this project. The only challenge, however, had to do with school closure which was the result of teacher strikes. This situation, which has led to the rearrangement of the school year caused a slight delay in the start of the project. In essence, the project followed its course as it was planned.

4. Future plans and activities

Given the success of this project, especially the positive feedback it has garnered from all stakeholders, it is fitting to ensure its sustainability not only within the schools which participated in this first edition, but also to extend this experience to other regions besides Bamako. To that end, future plans include:

- 1- securing funding to ensure the continuity of the activities of existing science clubs
- 2- extending this project to other schools
- 3- providing more training opportunities for teachers to ensure that they have recency in their instructional strategies
- 4- providing more instructional materials for both teachers and students
- 5- multiplying opportunities for students to showcase their sense of creativity and invention by facilitating their participation in local and regional science exhibits, fairs, or competitions.

5. Human Interest Story

Moving from theories to hands-on experience: Diarra has developed passion for science after her participation in a science club and in the science fair

“My name is Diarra Maiga and I am 14 years old. I am in 9th grade, and I attend the Aminata Diop Secondary School in Bamako. I feel it as a blessing to have participated in this project, *Scientifiques en Herbe* (Budding scientists) which I think was very beneficial for us students because it has allowed us to express our creative side. Not only has this project allowed us to master ways to navigate scientific subjects, it has also prepared us for the future so we can pursue careers that are related to science and technology. Before this project, I used to be so afraid of anything dealing with science. I thought scientific subjects were too difficult to deal with. Now, however, it is no longer the case. I feel comfortable dealing with scientific subjects. For example, in the science club, I have learned so much that now I can design and install an electric circuit; I have also how to make bleach through water electrolysis.”



Diarra Maiga, 9th grader at Aminata Diop secondary school. Credit DNEF@2022

Diarra demonstrated such enthusiasm about her participation in the science club and was the lead in her club. She said she challenged the peers in her science club to go above their usual fear for scientific subjects. More especially, Diarra values the practical experience she gained from her participation in the science club, which enabled her school to win a prize for the quality of the final product. She was so proud of her club's performance and the knowledge she gained from the club when she stated:

“I must say that this project has allowed us students to move away from theories because there are so many things we have learned in books and through lessons that we just memorized. But in the science clubs, we have the opportunity to have hands-on and practical experience. We also have the opportunity to make real application of this theory in real life. Honestly, the fact of being able to blend theory with practice makes learning more meaning for us. What I like the

most about the science club was the collaborative aspect of the activities we conducted. In the club, I could work with my friends and added our ideas together, we discussed, we debated, and we came to a conclusion in order to have a very competitive final project.”

Diarra Maiga’s school was one of the schools whose project was prized during the science fair for the creativity and originality the project demonstrated. For Diarra, this project should be extended to other schools to accord other adolescents the opportunity to showcase their creativity.

“I really want to thank UNICEF and its partners especially the Dutch National Committee for funding this project because it has helped us tremendously. Therefore, we want UNICEF to continue with this project and not to stop just in Bamako but to extend it to all the regions so our other brothers and sisters could be exposed to the same experience. If the project can be extended and sustain, it will help us intellectually and personally because it forces us to think critically; it forces us not to just recite lessons, but to use what we learn from books to come up with some projects which have practical applications.”