WEHUBIT

Learning from the Scratc²h 2050 Project: Supporting Coding among Rwandan Adolescents & Teachers through the Curriculum & Clubs Heading for Rwanda 2050

Can digital social innovation contribute to closing the digital divide for vulnerable groups (youth, women, unemployed, refugees and migrants) by improving digital literacy and skills through D4D initiatives in education, training and the world of work?

Pays

Rwanda

Mis en œuvre par

vvob education for development

REB RWANDA BASIC EDUCATION BOARD

Budget

348.000 €

Duration

07/2020 - 06/2022

ODD

4 QUALITY EDUCATION · 5 GENDER EQUALITY · 10 REDUCED INEQUALITIES

Mis en œuvre par

Enabel

Financé par

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PROJECT OVERVIEW

- Scratc²h 2050 resource library
- Scratc²h 2050 booklet
- Scratc²h 2050 pedagogical guide

Reason

Rwanda aims to move from an economy heavily dependent on agriculture to a **service-driven economy** by 2050. To achieve this, the **ICT sector** will have a **central role** and **digital skills** among the population are crucial.

Recently, Rwanda has made progress in increasing access to education. However, challenges remain to improve the quality of education and **ensure equity**. Although more girls are enrolled in secondary education than boys, many neither choose ICT nor science, technology, engineering or mathematics (STEM) because girls tend to believe that these are subjects for boys.

Rwanda specifically introduced a **new competence-based curriculum** in 2016, spearheading **ICT** and **21st-century skills**, such as creativity and problem-solving skills. To develop these skills, the Rwanda Basic Education Board (REB) integrated **Scratch** in the upper primary school curriculum of Science and Elementary

Technology (SET) and in the lower secondary school curriculum of ICT. In addition, Rwanda's Ministry of ICT and Innovation announced plans to further **integrate coding in the secondary school curriculum** and to encourage schools to form **coding clubs** to promote coding skills.

Yet, many teachers lack the required competencies and skills to teach coding, nor do they have **digital learning materials** or technical and **pedagogical support available**. Hence, most teachers are reluctant to effectively integrate Scratch in their lessons[•].

Scratch : Learn to Code, Code to Learn

Scratch is a **coding language** with an intuitive visual interface that allows young people (target ages 8 to 16) to **create** digital stories, games, and animations using codes. Scratch promotes **computational thinking** and **problem-solving skills**; **creative** teaching and learning; self-expression and collaboration; and equity in computing.

Scratch is designed, developed and moderated by the Scratch Foundation, a nonprofit organisation. It is **free** and can be used both **online** and **offline**. It is available in 70 languages (only a few African languages, including Kiswahili).

Digital social innovation

The Scratc²h 2050 project intended to specifically equip ICT and STEM teachers from all secondary schools in Kayonza district with the **competences needed to initiate** and facilitate **after-school Scratch coding clubs** for secondary school learners, and to integrate Scratch into ICT and STEM lesson plans.

The logic of the project was the following: learners' digital journey starts in the classroom as teachers **integrate Scratch in STEM** and **ICT courses**, triggering learners' interest. As a next step, coding clubs provide learners with the opportunity to **truly develop digital skills**, combining fun with learning through the **programming language**. With Scratch, learners gain **digital fluency** and become part of a **vibrant online community**.

The project went through various phases:

1. **Comprehensive needs assessment with stakeholders** – that is to say schools in Kayonza, teachers, Rwanda Basic Education Board (REB), Rwanda Coding Academy (RCA), Rwanda TVET Board (RTB), Scratch trainers, Rwandan Association for Women in STEM (RAWISE), Rwandan tech companies.

2. **Development & design of SCRATC²H 2050 pedagogical guide and open educational resources**

Diverse stakeholders were involved in writing workshops: experts from REB, RCA, RAWISE, and four STEM teachers.

[•] VVOB Needs assessment report, 2021

The pedagogical guide was based on existing resources. The workshops focused on the **contextualisation of materials**.

3. Scratch training of teachers through a blended training trajectory (3 months duration)

164 teachers participated in a blended learning trajectory to become familiar with Scratch. The trajectory consisted of 5 sessions: 3 online and 2 face-to-face. The online learning took place on a Moodle Learning Management System (LMS). Each teacher received a laptop.

To support the learning, several additional activities were organised

- To ensure constant communication and easy exchange of knowledge and experience between teachers, a **ScratchEd Community** was developed on Moodle (forums) and on WhatsApp.
- 2 in-person **ScratchEd Meetups** (1 per coding club cycle) were planned to help all trained teachers from different schools share their experiences and challenges but also find solutions together. Meetup sessions were facilitated by Sector Education Inspectors.
- **Support** and **monitoring visits** were organised by VVOB and trainers to assess and coach teachers to further integrate Scratch in their subjects and to facilitate effective coding clubs.

4. Establishment of after-school Scratc²h 2050 coding clubs

Trained teachers (three teachers per school) initiated two coding club cycles per school, consisting of 10 to 15 learners of which at least 50% were girls to ensure gender inclusion.

In schools that had no more than the three given laptops available for the coding clubs, either teachers decided to reduce the number of learners per club or they came up with other original solutions. Some of these solutions included a rotation system, where groups of students took turns

on different days of the week to use the available laptops based on the time slots allocated by the teachers; or using Scratch logic, but with real building blocks and no computers.

At the end of each coding club cycle, learners competed in a **Scratch competition through a hackathon**. The competition started at the school level, continued at the sector level and finished at the district level, through a Scratch Day celebration. During this Scratch Day, each winner at the sector level had the opportunity to present their Scratch project.

5. Link with the world of work

Exposure **visits (2) to leading tech companies** in Kigali demonstrated the **potential of coding skills in the world of work** and triggered students' curiosity for a career in ICT. These exposure visits offered an opportunity for selected learners and teachers (the most performant) to understand why coding skills are important in professional life and how such skills can be used.

164 teachers were trained. Among them, 91% reported having achieved, at the very least, a minimum level of proficiency in digital literacy skills.

The coding clubs successfully reached a total of **3,724 learners**. 50 to 55% were girls.

274 coding clubs were established in secondary schools.

10 STEM subject **lesson plans**, 5 coding **session plans**, 27 **instructional videos** and 2 unplugged **coding videos** were (and are) made available via the VVOB Scratch Resources library and REB's E-learning platform.

The way that I view opportunities for my future has also changed, as I have decided to never take any opportunity for granted or judge it, regardless of how simple it may look. This is because, you never know what it may bring afterward, and where the chances come from.

Angel Ingabire, learner at New Life Christian Academy

Our teacher shows us that coding is for boys as well as for girls. Now whenever there are new members – boys or girls - I help them because I love to help. I also persuade other girls to join the coding club and that works.

Emerance Umutoni, learner in a coding club

Scratch was something new to me and I see it as an advantage because now, there are schools which can employ me because of my skills in Scratch. I see that the skills I got will help me a lot in my career and also, I can use it to impact the society as we know the government is encouraging to use ICT in teaching and learning.

Nzabarankize J. Damascene, teacher at GS Juru

For more stories, just visit our website (www.wehubit.be/storie)
Or if you want to discover their different aftermovies:

- Aftermovie Exposure visit at Zorabots Africa
- Aftermovie Scratch day from the Scratc²h Competition Hackathon
- Aftermovie Exposure visit at Norrsken House Kigali, Rwanda
- Aftermovie of the dissemination event

KEY MESSAGES

- The blended learning trajectory, continuous peer sharing and e-learning platform (including lesson plans on STEM subjects and detailed instructions) **gave teachers the skills** and **confidence to initiate and facilitate after-school coding clubs** and to integrate Scratch into ICT and STEM subjects.

- Learning digital and programming skills through Scratch – a simple, fun, creative, hands-on programme – has **demystified ICT for learners and teachers**. Young people, including girls, are considering pursuing their **career in ICT**.

- In addition to "hard" coding skills, Scratch has taught teachers and learners a variety of **21st-century skills** such as **collaboration**, **creativity** and **problem solving**. For example, working on training assignments and participation in the hackathon in mixed teams boosted teamwork.

- The training trajectory – for teachers – and the coding clubs – for learners – have also boosted **general confidence in taking initiative** and **using digital skills**. For example, in most schools, learners from the first coding club co-facilitated the coding clubs in the second cycle, when teachers were too busy. They started to research themselves and figured things out on their own.

- The project triggered a **virtuous learning circle** among Scratch trainers, teachers and learners. As one shows growing interest and asks questions, the other has to dive deeper into the content and understanding of the programming logic.

LESSONS LEARNED

Inclusion and equity

- The pedagogical guide was designed with many **visual instructions**. Yet, the project acknowledges the **need for more concrete examples of Scratch projects** in the guide.
- To ensure that all teachers would have the necessary basic digital literacy skills to participate in a blended learning trajectory, a **digital literacy for online learning preparation course** was organised before starting with the Scratch learning trajectory.
- Teachers creating coding clubs have to be intentional in the **selection of girls**. When coding club participation is random, boys are the ones to rush in to register. It is therefore suggested to use various strategies to increase the number of girls. For instance, first select and invite girls (i.e. 67% of learners), then ask boys.
- **Child protection** (protected search engine for instance) should be used in coding clubs to avoid inappropriate content while browsing the web.

Users and stakeholders responsiveness

- Following the writing workshops, a **pilot workshop** was organised in Kayonza to assess whether teachers could understand the content of the pedagogical guide with no or limited assistance, and adaptations were made.
- Teachers started coding clubs at their schools after the third session of the learning trajectory, and not at the end, to give them a chance to **collect questions** and **challenges that came up during the clubs** and bring them to the consecutive training sessions.
- Schools and teachers had to work with **limited resources** and **show creativity**. To avoid high internet costs at school level, **offline Scratch functions** can be used as much as possible. For example, physical instead of on-screen blocks can be used to grasp the logic of programming (unplugged coding).

- The success of the project (creation of coding clubs) depends **mainly on teachers**. Teachers face limited resources and recognition and they sometimes are involved in many training initiatives and projects on top of their daily jobs. Hence the **low motivation in some cases**, and the need to **trigger their interest**.

- **Exposure visits** were very motivational for teachers as they emphasise the important role and relevance of learning and teaching ICT skills.

- VVOB closely **partnered with RCA** and **RAWISE throughout the project**. Their technical expertise was crucial in the development of the learning materials, the **inclusion of gender-sensitive activities and approaches** (RAWISE), **connections with Rwandan tech companies** and even selection of winners in the two hackathon events. Having women from RAWISE as role models also boosted young girls' confidence in being professionals in ICT and tech.

- **Rwandan tech companies** were open and **willing to collaborate** with VVOB and its partners as finding the right profiles is crucial for them, now and in the future. In the future, tech companies could also be more involved in the creation of the learning trajectory as to tailor it to the real need of the job market.

Post learning trajectory surveys identified **four areas of improvement**:

1. **Flipped learning approach**: increase the number of face-to-face training sessions. Face-to-face sessions would be used to give a summary of the theory they covered online and do guided exercises together.

2. A **longer learning trajectory**. Teachers mostly struggled with integrating Scratch into their daily teaching activities, creating Scratch projects linked to their subject.

3. To **improve the visibility** and **ensure easy navigation**, the instructional videos could be improved.

4. Lastly, a **platform whereby teachers can share their Scratch projects** would be an innovative addition to the project design.

Use of digital tools beyond project's end

School leaders from secondary schools in Kayonza and the **sector officials** were involved in the running, monitoring and supervision of the coding clubs and organisation of hackathon competitions, which facilitated their support but also made it easier for the project to smoothly run the activities (adapted timetable, materials, inclusion...). **Scratch committees** were formed in schools.

Scratch committees swiftly i**dentified the solutions** that hindered the smooth running of the clubs. They did not have to wait for VVOB and REB officials to come and intervene. For example, some schools realised that they needed a proper computer lab/space and the project served as a wake-up call for the school administration to set up such infrastructure. **The involvement and ownership of school leaders will drive the sustainability of Scratch coding clubs and other outcomes from the Scratc²h 2050 project.**

REB adopted the Scratch modules on their e-learning platform. They are now available for all teachers in Rwanda.

The **local government**, through sector education inspectors, **was involved** and participated in most of the project's activities: kick-off of the teacher's learning trajectory, visits of coding clubs, Meet-Ups, hackathon competition and exposures. Thanks to the Wehubit project, they were convinced of the importance of integrating Scratch and creating coding clubs (which was already included in the curriculum), and they got to know good practices regarding approaches and methodology. The local government is **willing to scale the project**.

PERSPECTIVES

- VVOB is looking for extra funding and partners to **scale the Scratc²h 2050 Project beyond Kayonza**. For now, the learning trajectory that was used for the Wehubit-funded project is available for all on the Rwanda Basic Education Board platform.
- In the future, VVOB could use Scratch as a **'stepping stone' to other programming languages** (like Python). It could develop a sequel to the learning trajectory and open educational resources to make the transition from Scratch to another programming language.

This learning sheet has been developed in the framework of the Wehubit Knowledge Exchange Network in collaboration with
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