



## IT teaching in Ghana: Learning is more fun thanks to a Ghanaian "spiderman"

*When it comes to computer lessons in schools, the gap between urban and rural Ghana is wide. Startup Young At Heart offers solutions for primary school children.*

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**This article appears as part of our series on sustainable development goals and tech-based solutions from Africa, which we are discussing with an African-German community.**

*In many villages in Ghana, there is neither electricity nor internet. But children there need to learn the same material as their peers in the cities. A Ghanaian startup offers solutions.*

Priscilla Asabea is excited. There's a tablet in front of her on the school desk, and she listens as her teacher explains how she can turn it on and then adjust the volume. The 13-year-old has often heard about computers or smartphones, but has never held a digital device in her hands. And even if she had, it's unlikely she would have been allowed to use it. The fact that she has to share the tablet with her classmate Dorothy Takyiwaa doesn't bother her. The two live in the village of Krutiase in southeastern Ghana, a good 90-minute drive from the capital, Accra. The walls of their classroom are only shoulder-high, with the top half open to prevent heat from building up in the tropical West African climate. From outside comes the sound of cicadas singing, mingling with the voice of her teacher, Christian Ayeh--and the sound of 21 tablets turning on.



*Dorothy Takyiwaa and Gloria Amobe work with a tablet for the first time.*



*Teacher John Ayree teaching reading with the Ananse App.*

Ayeh explains how students in the village's 4th grade elementary class can find the app "Ananse the Teacher" on the tablet. "Ananse" is Twi and means "spider." However, Ananse is more than a regular house spider; he is a popular figure in the tales of the Akan people. That's exactly why Martin Bruce and Josephine Marie Godwyll made the "spiderman" of West Africa the hero of their EdTech app in 2017. "Storytelling plays an important role in our culture," says Bruce, 31, explaining the thinking behind the app. Bruce is open, humorous and very focused when talking about the project. The enthusiasm shines from his eyes. "In our country, stories are used to impart advice and knowledge or to pass time in an entertaining way." He and Godwyll saw this cultural practice as a valuable resource to draw on as they developed their educational approach. Their goal was to use the app to convey the topics in the Ghanaian curriculum in a fun, engaging way that would connect to the children's experience. But that was already the third step; it all started a few years earlier - and with more modest goals.



*The elementary school of Krutiase, the village is about one and a half hours away from the capital Accra.*



*The small store opposite the village school of Krutiase.*

In 2013, Bruce and Godwyll were both studying at the University of Kumasi, a city in central Ghana. He was studying Land Economy, and she was studying Geomatic Engineering. Together with other university students, the

two did volunteer work in villages during their semester breaks, helping out in schools, health centers or rural development programs. They often ended up in a completely different world, sometimes only a three-hour drive from Kumasi: There was neither electricity nor internet, and even among the adults hardly anyone had ever seen a computer. During IT lessons in the schools, teachers drew a computer on the blackboard and explained in theory how to work with them. If the schools were particularly well equipped, there were school books and, with a bit of luck, a photo of a computer would be in one of them. "That was as close as the children in many villages got to a computer," Bruce recalls. He and Godwyll had heard that many rural areas lacked internet access and were cut off from technological development. "But when we experienced it ourselves, it just shocked us."

### **The same exam, but unequal opportunities**

The two were especially upset about the situation in the villages because they knew that at the end of primary school, all students write the same national exams: City dwellers who have computers and access to the internet at home as well as those who know both only from theoretical lessons. "We asked ourselves, 'What can we do to end this glaring inequality of opportunity?'" Bruce says. The question continues to drive them to this day, and over the years they've pieced together building block after building block into an increasingly complex answer.



**"What piqued our interest was the curiosity of the kids when they first saw the laptop. When they started touching the computer, you could see the glow in their eyes: a mixture of fear and curiosity."**

**Martin Bruce**, 31, Co-Founder of the EdTech start up Young At Heart.

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The first step: Bruce and Godwyll brought together volunteers, went to villages on weekends with their laptops, and taught students the first steps with the most important programs: word processing, spreadsheets, presentations. Even then, they made sure to connect the lessons with the children's world of experience. And right from the start, they



wanted to encourage the students to find solutions to problems in their own everyday lives. So instead of just teaching the basics of the word processing program, for example, they turned it into a group activity: Each group of students was asked to imagine that they were a company. Then the groups were asked the following question: What problem is there in your everyday lives for which your company has developed a solution? In a Word document, each group had to describe their answer. Then each created a budget in an Excel spreadsheet, and they then presented their company with a PowerPoint presentation to the others, who played potential investors. At the end, everyone voted on which solution they would most like to invest their money in.

## **A computer lab for several schools**

However, after a little more than a year, in December 2014, Bruce and Godwyll found they weren't reaching enough kids this way. The next step: They asked acquaintances for used computers, had the equipment repaired if necessary, and set up computer labs at village schools that had electricity and enough space. The condition was that these IT labs were also open to the students of the other schools in the catchment area.

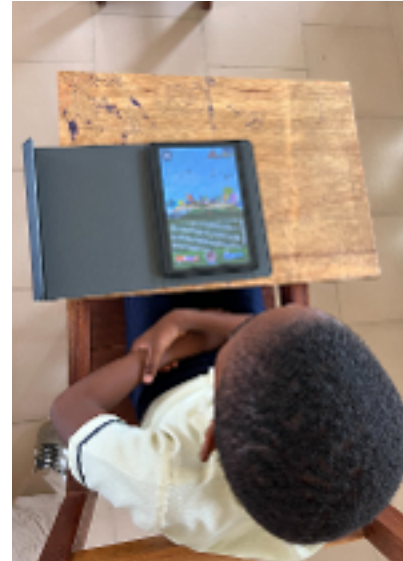


*Young At Heart Co-Founder Martin Bruce with a mobile computer lab his company developed. | Copyright: James Oatway*

Three years later, a second goal was added: "We asked ourselves: How can we revolutionize teaching in STEM subjects so that children love to learn?" (STEM stands for science, technology, engineering and math.) Godwyll and Bruce, meanwhile, had founded the charity Young At Heart. They and their team of volunteers quickly realized that they wanted to couple global, technical knowledge with their own culture in their app to make the curriculum as accessible as



*Since 2019, there are these mobile computer labs: small carts that can transport and charge 50 tablets.*



*Looking over the shoulders of a student who has the Ananse app open on his tablet.*

possible for kids. They decided to focus on STEAM instead of STEM, adding an extra "a" for "art." In 2017, this resulted in the application "Ananse the Teacher," which Priscilla and her bench neighbor Dorothy were using.

Another two years later, the team had the next innovation ready: a "computer lab on wheels"--a small cart that can hold and charge 50 tablets. If a village is connected to the power grid, the mobile lab can be charged via the power socket; otherwise, there is a version equipped with a solar panel. The mobile labs can reach more schools, both because they are easy to transport and because there is no need to set up a separate classroom as an IT lab. A mobile lab delivered the notebooks to the teachers and students in Krutiase.

**"What helped convince us was the concept of this African spiderman "Ananse," which underlies the whole thing. The app doesn't start from an abstract idea developed for a different context, but is really constructed from the stories of Ghanaian culture"**

**Gelgia Fetz** of the Jacob Foundation



*Copyright: Jacobs Foundation*

Meanwhile, in Priscilla and Dorothy's class, the children take turns reading a story from the app out loud. The story is about a turtle that eats from a snail's fields. The students' reading is not yet fluent, so the teacher Ayeh jumps in from time to time to help with the pronunciation of a word. But the children continue to make their way through the text and don't give up. This is followed by an experiment on seed germination led by Felix Adedze Asamoah. The 31-year-old has brought corn,



**"It's about teaching the lessons in a better way. Making them more practical, engaging and fun. We want kids to see that education is a part of life."**

**Martin Bruce**, 31, Co-Founder of the EdTech start up Young At Heart.

small plastic cups, absorbent cotton and water with which the children in small groups now start their experiment: They pry corn kernels from the cob, place them carefully on the absorbent cotton pad, drip a little water on them, and then push both into the small plastic container. Over the next few days, they will observe whether their corn kernel sprouts on its cotton bed. Asamoah got the inspiration for this from the Ananse app for teachers, which offers project suggestions for each story. He is enthusiastic about the app; he has been teaching with it for a year in a parallel class at the same school. "The kids like the stories, and because they read with more interest, they improve quickly."

### **"Spiderman" makes learning more fun**

The accompanying experiments are also helpful, Asamoah says, especially because they take into account that village schools have neither physics nor chemistry labs. "Children can easily find the materials for the experiments, and they are not expensive," he says. School principal Timothy Buabeng is pleasantly surprised by another effect: "In the class where we teach with the tablets and the app, the children are absent less often," he has observed. Overall, absenteeism in rural schools is high, Buabeng says. Many children have to walk many kilometers to get to school, he notes, and if they lack the strength or motivation to do so, their parents usually let them get away with it because they don't think the lessons are that important. Or the children escape on market days to earn a few cedis by running errands or working as porters instead of going to school. The prospect of stories and experiments with the Ghanaian spiderman seems to encourage interest in the lessons.

### **Evaluation of EdTech**

The fact that some children at Krutiase Primary School have already been allowed to work with the tablets for a year and others are complete beginners has to do with the fact that an evaluation of the "Ananse the Teacher" app is currently underway at this and four other schools in Ghana. Funded by



the Swiss Jacobs Foundation, the three-year study is investigating whether learning outcomes using the mobile computer lab and the Ananse app are measurably better than with conventional teaching. To support the data-based study of technology in education, Young At Heart in 2017 shifted from being a charity to a "social enterprise." It has since received about 102,500 euros in funding from the Jacobs Foundation.

In 2020, Young At Heart participated in an international call for proposals from the Jacobs Foundation. The aim was to find solutions that could help students, teachers and parents catch up on the knowledge lost due to school closures during the Corona pandemic. "What convinced us about Young At Heart was that the developers had worked with educators and scientists," recalls Gelgia Fetz of the Jacobs Foundation. "Moreover, they had already conducted initial tests to verify the effectiveness of their app." In contrast, she says, there are many companies in the booming market of tech-based educational offerings that developed their products without incorporating any scientific data—and haven't tested their products' effectiveness.

### **How does the social enterprise Young At Heart finance its work?**

Through donations and grants, which are usually won through competitive bidding. Young At Heart's two founders, Josephine Godwyll and Martin Bruce, are not on the company payroll, according to Bruce, but earn their living in other ways. Bruce is a business analyst; Godwyll teaches at the University of Alberta in Canada. Judith Edem Foli, who has a PhD in pharmacology and is head of administration at Young At Heart, also works for the social enterprise without pay. Technical director Makafui Quashigah works as a telecommunications engineer and also volunteers his time as Young at Heart's technical lead. Employed by Young At Heart are program manager Cynthia Kaminta and "project officer" Esther Adzo Apreku. Apreku has a bachelor's degree in education and is currently pursuing her master's degree. This gives her important expertise to guide the development of the teaching materials. The team also includes several other volunteers.

### **How many people have access to the internet in Ghana?**

According to the latest figures released by Dataportal in early 2023, 23.05 million people use the internet in Ghana. With a population of just under 34 million in January 2023, that's about 68%. Conversely, this means that one-third of the population has no access to the internet. In the previous year, this proportion was significantly higher at 47%. So this is a positive development, and the gap is narrowing. The high proportion of young people in the West African country is also interesting: the average age is 20.7 years. 41% of the population lives in rural areas, where there is often no access to the internet.

By comparison, 93% of the population in Germany could use the internet at the beginning of 2023. The average age of the population is more than twice

as high as in Ghana, namely 40.7 years. In Germany, 77% of the population lives in cities, 23% in rural areas. According to a report in the *Süddeutsche Zeitung*, there were still around 500 "white spots" in Germany at the end of 2022--areas without an internet connection via the mobile network. According to the Federal Network Agency, the mobile network providers were supposed to eliminate these areas by the end of 2022, but according to the report many still remain.

## **EdTech must be particularly convincing**

The project is also interesting from a German perspective. Nik Riesmeier from the Founders Foundation in the federal state of North Rhine-Westphalia finds it remarkable that the education startup offers solutions for two problems at the same time: "The basic step is to get tablets into remote regions--to bring digital education to places where the infrastructure is lacking," Riesmeier says. "I think it's also very exciting that they then developed the app. So not only did they solve this infrastructure problem, but they also offer a product for it, which is fun for the local students and thus encourages them to engage with the subject matter for longer." Riesmeier leads the EdTech Next project at Founders Foundation, which focuses on educational technologies. He and his team advise and support entrepreneurs who want to set up education-related startups. In North Rhine-Westphalia alone, he says, there are 140 of them, although not all of them offer an app; others offer solutions to the infrastructure problems that also exist in German schools.

## **Bureaucracy a high hurdle**

The market in the education sector is particularly challenging for young companies, Riesmeier says, because so many players have to be convinced. "The bottom line is that the end users--the pupils or students--are probably not the ones paying for it," he says, but they are the primary ones who have to be persuaded by the product, or else it won't be used. "At the same time, however, various requirements such as the curriculum have to be met, which are imposed by institutions such as the school or the government." Approval paths are often very bureaucratic, and decisions take a long time, he says, which makes it difficult for young companies to get through their crucial first phase. "Before they have convinced the institutions of their solution, many have already run out of startup capital," Riesmeier says. In addition, he says, the task the Ghanaian startup set itself was particularly challenging because Young At Heart's tablet infrastructure and associated app try to solve two issues at once. "In Germany, most startups tend to focus on developing a single solution," Riesmeier says. "They either focus on infrastructure, for example by offering to install and maintain fast WLAN systems at schools, or they develop an app for the end user--rarely both."



## Hope for benefits in the future as well

In the village of Krutiase, the students have a break and time to talk. "Not difficult," says Priscilla when asked how she found using the tablet. The 13-year-old wants to be a hairdresser, and the computer will come in handy for that. "I can go on the internet and see how other people do hairstyles," she says. Her classmate Dorothy is also happy that she finally got to use a tablet. And she liked the "Ananse the Teacher" app "because there are more pictures and games in it than in a textbook." She is the oldest of five children and now the first in the family to touch a digital device. "My parents told me to pay close attention in class so I can teach them how to use the computer, too," the 12-year-old says with a mixture of embarrassment and pride.



**"I want to be a fashion designer when I grow up. If I learn how to use computers and the internet, I can discover new styles there."**

**Dorothy Takyiwaa**, student, 12 years

The Young At Heart evaluation project is halfway through, and now the students who were previously in the control group at the five participating schools are being allowed to work with the laptops. "From the preliminary results, it looks like the kids learning with the app did better on the tests than the others," says teacher Asamoah. However, some problems remained. "Often the power goes out for so long that we can't charge the laptops," he says. Although the mobile labs are also available with solar panels, that is about \$2,500 more expensive than the basic version, according to Bruce. Even the basic version, at \$15,000, costs so much that many rural

**"I can use my mother's smartphone at home. This gives me an advantage over many other children in Ghana, which is unfair. The app helps us a lot, it makes it fairer. I want to be a doctor later, the internet will be very useful for me to study."**

**Daniella Churchson** (13), student at Little Flower Primary School in Koforidua



schools can't afford it. "If a village is connected to the public power grid, we generally only offer the basic version," Bruce says, though he is familiar with the problem of power outages. So far, Young At Heart has relied on donors to fund most of its mobile labs. So even \$2,500, the equivalent of about 2,300 euros, makes a huge difference. In the long run, the organization would like to help finance the mobile labs in poorer neighborhoods or rural areas by having schools with middle-class or wealthy parents pay a little more, thereby subsidizing the others.



**"I was just curious about what the Ananse project could do, so I'm happy to be part of the evaluation. I enjoyed using the app in the classroom - in addition to books."**

**Marian Ofose-Dankyi** (29), vocational teacher at Little Flower Primary School in Koforidua.

John Aryee, one of the teachers at the school in Krutiase, also finds the Ananse app helpful in shaping his lessons. However, he feels that the fact that the students still do not have access to the internet despite the project is a major shortcoming. "I think the experiments described in the app are great," he says. "But sometimes I'd like to show my students videos of other experiments, which unfortunately I can't do without internet access." Maybe twice a year, Aryee, 33, pays out of his own pocket for a data package for his cell phone and lets the students access the web through a hotspot. But he can't afford to do that more often, and besides, network coverage is so poor that access is only possible in certain places in town. On "internet days," Aryee has to wander around the town with the class in search of the best reception, carrying his cell phone in front of him like a divining rod.

### **The next solution is already being developed**

Bruce is aware of the problem. "Because of the poor infrastructure, we make sure our solution works offline every step of the way," he says. In the long run, however, he and the rest of the Young At Heart team don't want to accept this state of affairs: They have already developed the "Ananse Hub," a platform through which teachers, parents and students can communicate with each other. A team of programmers is already working on the next step: a local network that is connected to the internet via a device and

allows data to be shared within the network offline. This further development is already in its second phase of testing, according to Bruce. He hopes the new product will make it much cheaper for schools to access the internet: Instead of paying 50 times to download data to 50 tablets, one download would then suffice, and data would be transferred offline to the remaining tablets.

Presumably, the next problem will soon become apparent, which will require further development of the solution, Bruce predicts. And he is sure that his team will find an answer. As different as the Ghanaian and German education systems are, Bruce is nevertheless convinced that German developers could learn something from the Young At Heart team: "The practicability of solutions," says Bruce. In other words, finding answers that are as cost-effective as possible and easy to implement. But above all, he says "resilience"--not letting difficulties get you down.

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