Backspace Technologies

Summary Report

August - September 2025

1. Background

The Fourth Industrial Revolution (4IR) demands a fundamental shift in educational focus, necessitating that future generations possess essential digital skills, such as computational thinking and problem-solving. Recognising this global imperative, the Department of Basic Education (DBE) in South Africa has strategically begun integrating Coding and Robotics into the National Curriculum Statement (NCS) for Grades R-9. This curriculum aims to equip learners with essential 21st-century digital literacy skills to prepare them for future careers and to function effectively in a digital-information-driven world.

Coding, in its simplest form, involves providing a computer with a set of instructions to perform a specific task. By learning to code, learners develop computational thinking—the ability to break down complex problems and devise logical, step-by-step solutions.

Backspace Technologies has partnered with SchoolNet South Africa to actively work to introduce basic coding concepts and skills in schools, particularly those in underserved communities.

2. Project Plan

2.1 Project Scope

The project's scope encompassed hands-on coding workshops for three hundred learners in two schools. This included two hundred Grade 5 and 6 learners from Loratong Primary School in Hammanskraal, Gauteng, and one hundred Grade 8 learners from Michael Modisakeng Secondary School, a small school, in the Madibeng Municipality, Northwest Province. The training was a two-day programme conducted on-site at each school by a SchoolNet facilitator.

The curriculum is structured to introduce learners to basic coding concepts, progressing from introductory puzzles using Rangers to block coding using Microsoft Minecraft. Crucially, this initiative

employs a cascading training model: each participating learner is tasked with sharing their newly acquired knowledge with additional learners. This will occur through two methods: direct cascading (teaching others hands-on) and indirect cascading (sharing resources or demonstrating skills). In addition to the learners, the teachers of the participating grades will be invited to attend the training sessions. This crucial component aims to equip teachers with fundamental coding skills and strategies for integrating these digital tools into their own teaching and learning methodologies. Upon completing all required activities, participating learners will be awarded a certificate to acknowledge their mastery of the new skills**.**

2.2 Selection of the Schools

The schools that have been shortlisted are those that reached out to us directly, expressing an interest in collaborating with SchoolNet SA. These schools have either requested support for teacher professional development or sought opportunities for learner development programs. Their proactive engagement highlights their commitment to improving teaching and learning practices, as well as their willingness to embrace partnerships that can enhance the use of ICT and innovative methodologies in education.

SchoolNet SA also takes an additional step of checking whether the schools have the necessary gadgets and digital resources appropriate for the project at hand. This ensures that training sessions are conducted smoothly and that both teachers and learners can fully benefit from the programs without unnecessary barriers. By aligning the school's available resources with the project requirements, we make the training process more effective, practical, and sustainable.

3. Customisation of Training Materials

The training materials were customised to make coding education inclusive, practical, and adaptable across different school contexts. Since many schools lack computer labs or reliable internet, the program begins with unplugged coding before introducing interactive tools like Rangers by Tangible. In schools where tablets are available, learners can progress further with digital coding activities, making the learning process more engaging and impactful. This step-by-step approach ensures that all learners, regardless of their infrastructure, can develop essential 21st-century skills in a meaningful way.

4. Statistics

A total of **308** learners attended the basic coding program at Loratong Primary School and Michael Modisakeng Secondary School. **Eight (8)** teachers were attending and observing the learners.

	#Learners	#Teachers	#Certificates
Loratong Primary School	197	2	197
Michael Modisakeng Secondary School	111	6	111
Total	**308**	**8**	**308**

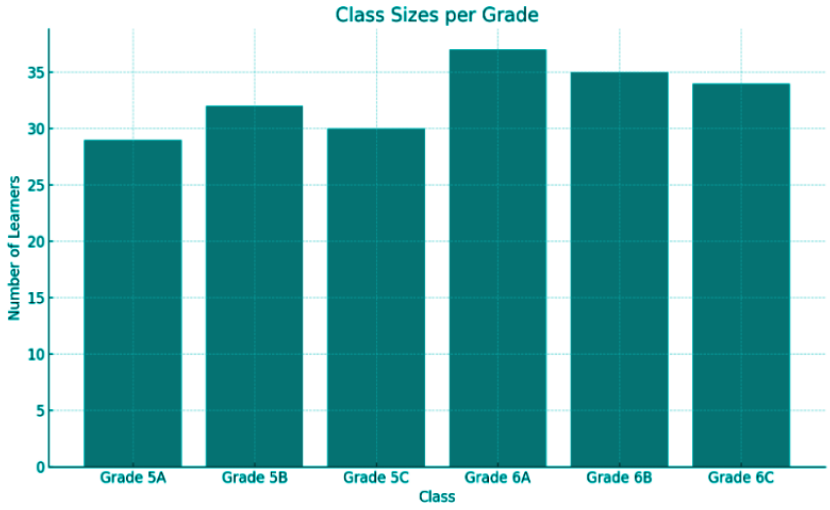
The table below provides an overview of the project beneficiaries.

Metric	**Number**	**Males**	**Females**
Direct Learners Impact	308	150	158
Teachers Trained	8	1	7

4.1 Loratong Primary School

The graph below illustrates a two-day coding workshop using Rangers powered by Tangible, which included 197 learners across six classes, with class sizes ranging from 29 to 37 learners. The

participants included 109 males and eighty-seven females. Each session accommodated a full class, with learners collaborating in pairs or small groups on shared tablets.

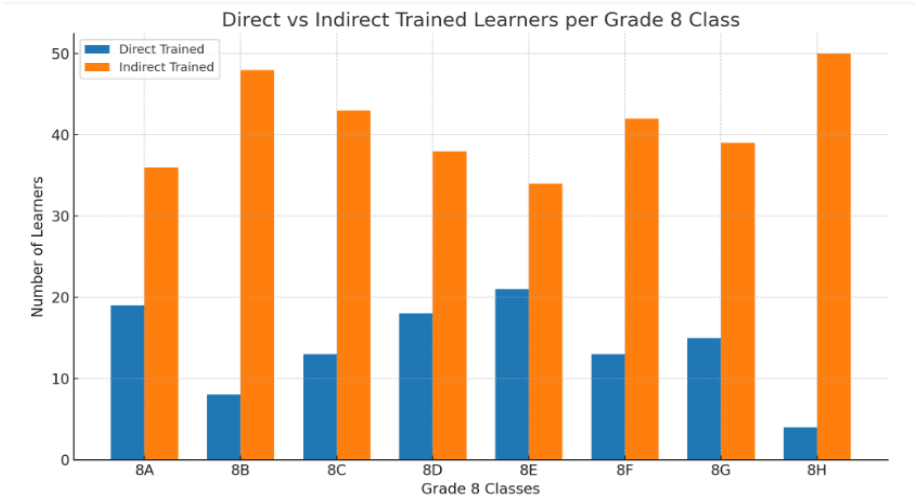


4.2 Michael Modisakeng Secondary School

Michael Modisakeng Secondary School has a total of four hundred and forty-five (445) grade 8 learners registered. Due to the limited numbers required for the coding session, only one hundred and eleven (111) learners were selected to potentially be master trainers and pass on the knowledge to fellow learners. Selected learners received direct instruction during the session and subsequently shared their knowledge with classmates through peer-led, indirect training. This approach ensured that all learners had the opportunity to engage with the digital tools despite limited resources.

The graph shows the number of beneficiaries with direct and estimated indirect impact for each Grade 8 class**.**

Impact								
Grade	8A	8B	8C	8D	8E	8F	8G	8H
# Learners	19	8	13	18	21	13	15	4
# Indirect	36	48	43	38	34	42	39	50



5. Training Implementation

5.1 Loratong Primary School

School Background

Loratong Primary School, established in 1985, is based in Gauteng Province in the Tshwane North District, located in Block Mthetwa, Stinkwater, Hammanskraal. Under the leadership of Principal Mr. J.R. Rakoma, the school supports 745 learners along with a staff complement of twenty-five teachers and two administrative staff members. The school serves learners from Stinkwater, New Esterus, and Trust Farm communities.

Loratong has a computer lab with six functional learner computers and four admin devices. Although

the lab is not networked and lacks interactive boards and a data projector, the school is connected to the internet, and Microsoft Office is installed on all devices.

The school encourages the use of ICT in lesson planning, educator workshops, and research. Teachers are developing proficiency in Excel, Access, and Developer tools, and require additional support with basic end-user computing skills. A teacher development plan is in place, with a strong emphasis on integrating technology into teaching and learning. Learners at Loratong enjoy a rich variety of extracurricular activities, including netball, boys' and girls' soccer, volleyball, basketball, chess, khokho, and Morabaraba.

Training Overview

Participation in the workshops over the two days was consistently high. From the very beginning of each session, learners displayed enthusiasm, curiosity, and a willingness to participate in both physical and digital activities.

The role-play activity, where one learner functioned as a robot and others gave directional commands, was particularly effective in drawing learners in. They were actively involved, eager to take turns, and quick to correct or support each other when the "robot" made a wrong move. The facilitation was filled with laughter, excitement, and focused energy. This playful interaction created a solid foundation for the more technical coding tasks that followed.

Once the learners transitioned to using tablets and Ranger Puzzles, their motivation only increased. They worked in small groups and engaged deeply in the coding challenges. There was constant collaboration as they helped one another build code sequences and troubleshoot errors. When their

robots responded correctly to the commands, learners expressed visible joy and a sense of accomplishment.


Some of their reactions included:

- *"It's listening to me like I'm the boss!"*
- *"I like this more than a game!"*
- *"Can we do this every day?"*

Even when faced with coding challenges, learners demonstrate resilience and problem-solving skills. Instead of giving up, they were motivated to fix their code and try again. The immediate feedback from the robot's movements helped them understand the cause-and-effect relationship in coding.

The overall atmosphere was lively and empowering. Many learners expressed interest in continuing to learn coding and robotics beyond the session.

5.2. Michael Modisakeng Secondary School

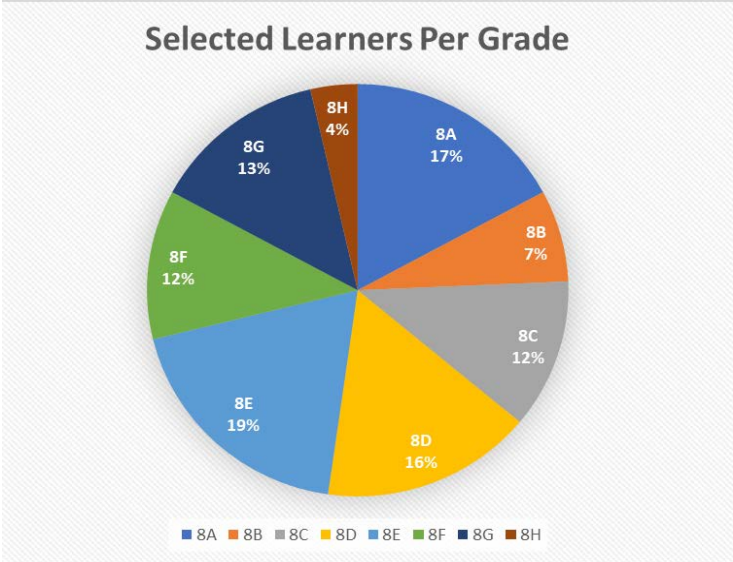
School Background

Michael Modisakeng Secondary School, located in Bapong, Brits, within the Northwest Province, is a Quintile 1 public secondary school under the Bojanala District. Established in 2003, the school serves learners from surrounding communities, including Majakaneng, Sunnyway, and Bokfontein. With an enrollment of 1,587 learners supported by fifty-six teachers and two administrative staff, the school plays a significant role in providing education in the area. The school does not currently have a computer lab, but it has fifty tablets and ten laptops available for learning, although these devices are not networked. While the school has access to the internet and Microsoft Office software, it does not have interactive boards, but it does make use of a working data projector to support teaching and learning.

The school offers a variety of extramural activities such as soccer, netball, chess, athletics, culture, and choir, providing learners with opportunities for holistic development. Although Computer Applications Technology (CAT) is not offered as a subject, the school actively encourages the use of ICT in teaching and learning, with at least nine teachers already integrating technology into their lessons. The leadership team and teachers have identified ICT usage training as a pressing need, as the school does not yet have a formal teacher development plan in place. By strengthening ICT skills among staff and aligning future teacher development initiatives with technology integration, the school aims to enhance digital learning opportunities for its learners.

Training Overview

The training was conducted for a selected group of learners from each Grade 8 class to be trained as master trainers. These master trainers would then be responsible for transferring their newly acquired skills to the rest of the learners in their respective classrooms. This approach was necessary due to the substantial number of learners in the school and the limited availability of devices.



Learners were nominated by their class teachers based on their academic capability, leadership potential, and willingness to assist others. The number of selected master trainers per class was as per the graph alongside.

This targeted selection ensured that the training would have a ripple effect across all Grade 8 classes, maximising the impact despite the resource constraints.

Although the learners were selected based on their academic and leadership abilities, it was evident that some of them had never been exposed to coding before and were unfamiliar with what it meant. To bridge this gap, the facilitator used simple, relatable examples to help learners quickly grasp the fundamental concepts of coding.

In the lively “human robot” activity, learners guided a “robot” through obstacles using commands like *turn left*, *turn right*, and precise angles of 90° or 180°. This fun, hands-on challenge made coding logic easy to understand and directly prepared them for programming the Ranger powered by Tangible to complete real-world missions like catching poachers.

In each session, learners worked in pairs or small groups on shared tablets, participating in both physical role-play and hands-on robot programming. With enough tablets for group work, learners were actively engaged, completing the guided coding challenges and demonstrating a strong understanding of sequencing, direction, and logic.

6. Challenges

- **Digital Literacy Gaps** - Some learners had trouble navigating the Tangible platform on tablets. This was primarily due to their limited prior exposure to digital devices. Additional time and support are needed for these learners to feel confident using technology.
- **Time Constraints** - The duration allocated for each session was restricted due to the regular school timetable, which provided limited time for training.

7. Recommendation

To build on the success of the Ranger coding sessions, it is recommended to expand the program to include progressively more advanced coding topics and project-based challenges. This will foster learners’ critical thinking, problem-solving, and computational skills while maintaining elevated levels of engagement. Teachers should participate in structured, ongoing professional development

that equips them with the knowledge, tools, and confidence to lead coding activities effectively and adapt lessons to diverse classroom needs.

8. Conclusion

The unplugged coding sessions were highly successful, generating enthusiasm, curiosity, and active involvement from learners. Through interactive role-playing and hands-on exercises, learners were able to grasp fundamental programming concepts engagingly. With 308 learners participating in this initiative, the sessions proved that coding can be engaging and approachable when presented in a well-structured, learner-centred format. The overwhelmingly positive response underscores the value of expanding these programs and highlights the value that Backspace brings to the sector, as many of these learners would not have experienced this opportunity without your support. We thank you!

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