Lefa AI

RAPID RESEARCH · THEME 6 OF 9

AI and Foundational Learning

What we're learning

THE QUESTIONS THIS BRIEF EXPLORES

1. Under what conditions, if any, could AI support foundational literacy and numeracy in Grades R to 3 in South Africa?
2. What risks need to be weighed when considering AI for children this young?

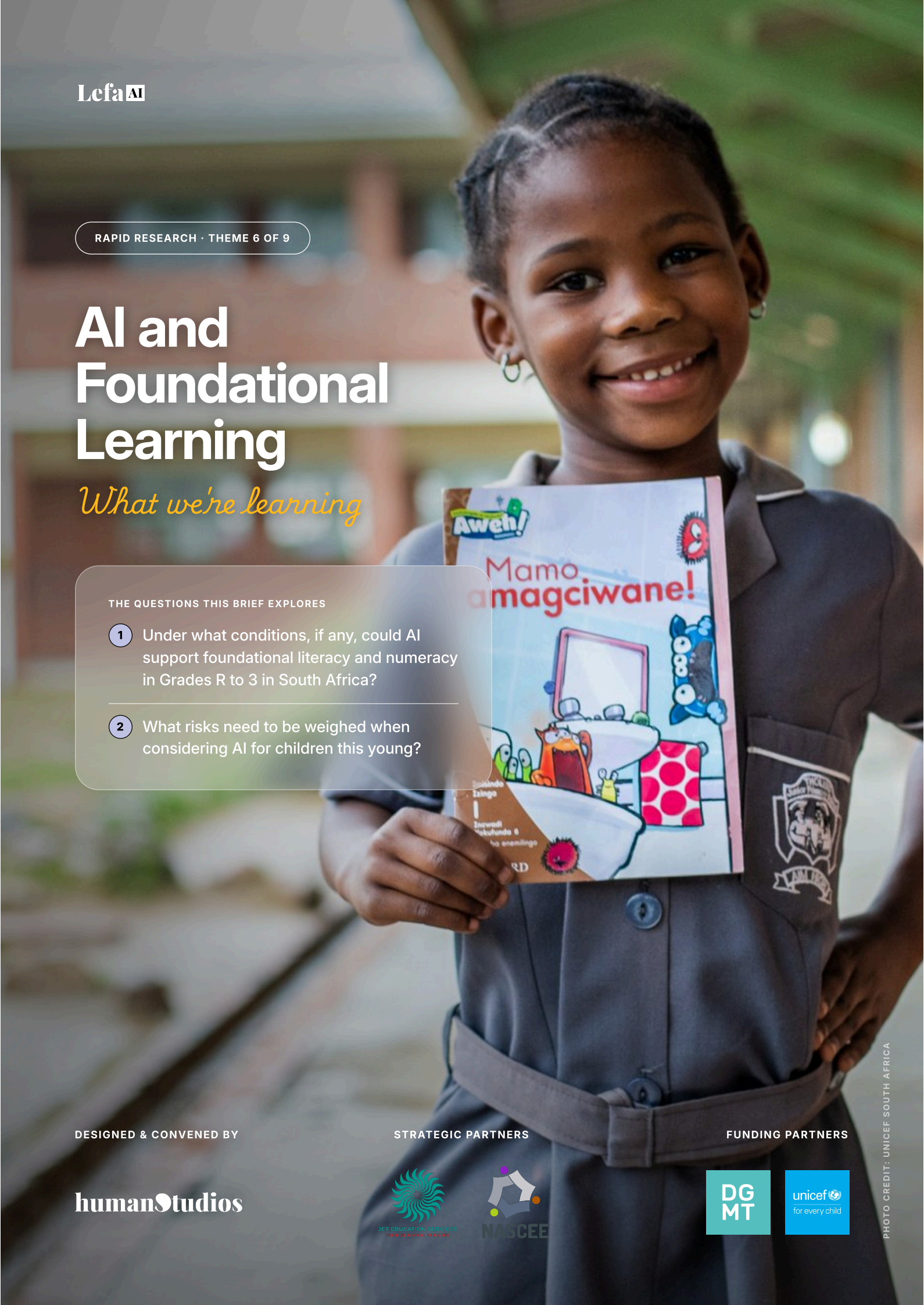


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ABOUT THIS BRIEF

Rapid Research Theme: AI and Foundational Learning

This is one of nine themes in Lefa AI, a rapid research series on what AI means for South African basic education. It has intentionally been produced quickly, to keep up with the rate of change and strengthen decision making around AI in basic education.

That speed came with a trade-off: this series doesn't contribute new research, but draws together existing literature and expert experience into practical insight. Throughout, we've aimed to weigh opportunities and risks fairly, not argue for or against AI in schools.

This brief is written to support decisions about AI in the Foundation Phase for the Department of Basic Education and its partners. It is not a guide to classroom practice, though Foundation Phase teachers, school leaders and parents may find the context useful.

1 rapid review

of existing South African and global research on AI in foundational literacy and numeracy, and the risks for young learners

18 expert interviews

with South African stakeholders, including Foundation Phase teachers, school principals, psychologists, curriculum and assessment specialists, community activists and sector leaders.

We are grateful to Dr Sharon Grussendorff, whose research paper on AI and foundational learning, including interviews with 18 South African specialists and teachers, underpins this brief.

Where this conversation starts

The early grades are where children learn to read for meaning and work with numbers, and where the foundations for all later learning are laid. In PIRLS 2021, 81% of Grade 4 learners in South Africa did not reach the lowest international benchmark in reading. They could not reliably find information stated directly in a simple text, or make a straightforward inference from it. In mathematics, Grade 5 learners averaged 362 points in TIMSS 2023, slightly down from 2019, and only 28% reached the lowest international benchmark.

AI is now arriving in these classrooms. It could give children more individual support and help teachers with large classes. It could equally replace the thinking for children whose foundations in reading, writing and number are not yet secure, and widen the gaps it is meant to close. Access is uneven: some young children already use AI, while some have little access. The evidence on what AI does for children this young is still thin, and there are no long-term studies yet.

Sources: Mullis et al., 2023; Department of Basic Education, 2024; Asghar & Dintilhac, 2025; Borole et al., 2025.

CONTEXT

Learning in the Foundation Phase

Any question about AI in the early grades has to start with how young children learn. This section draws on the Department of Basic Education's Foundation Phase curriculum, alongside South African and international research.

In Grades R to 3, children learn through their bodies, their home language and the people around them. South Africa's Foundation Phase curriculum treats motor and perceptual development as fundamental, and builds free play, movement and teacher-guided activity into every school day. Seeing, hearing, touching and moving lay the foundation for reading, writing and mathematics. Colouring, cutting and climbing build the fine motor control that writing depends on. Children learn by doing and then explaining their thinking, moving from the concrete to the abstract. Through play, they learn to solve problems, communicate, take turns and manage their feelings. Language grows through talk, stories and play, and reading comes most easily in the child's strongest language. All of this happens during a sensitive window, when the brain is especially responsive to experience, so how children spend their time matters.

Sources: Department of Basic Education, 2011;Lunga et al., 2022,; Cekiso, 2026; Wu et al., 2024,.



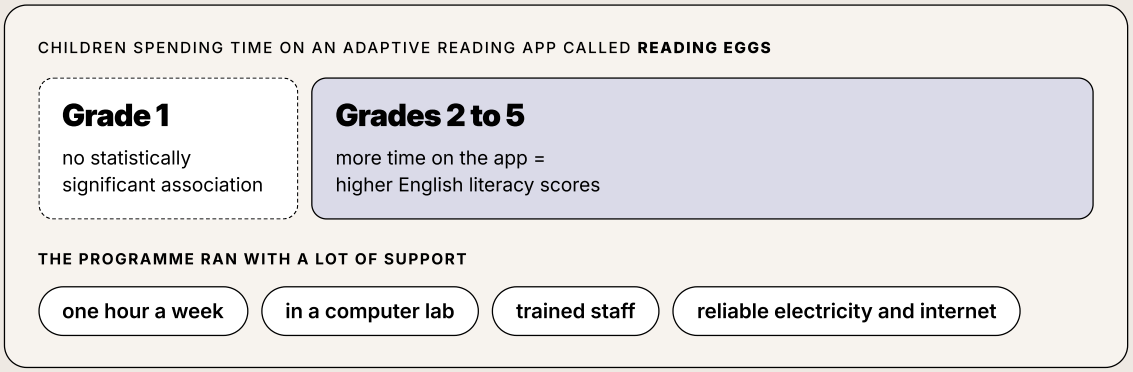
WHAT WE FOUND

Key findings

There are a number of cross cutting key findings that run across different insight briefs. For example unequal access to devices and connectivity (briefs 3 and 9), AI tools that work best in English (brief 7), the risk of AI doing children's thinking for them (briefs 4b and 5), AI-assisted reading assessment (briefs 4c and 7), teachers' need for ongoing support (briefs 4b and 9), the protection of children's data (brief 2), and assistive AI for learners with barriers to learning (brief 5). These all also apply to AI and Foundational Learning, but will not be repeated here. The findings below focus on what is particular to Foundation Phase Learners.

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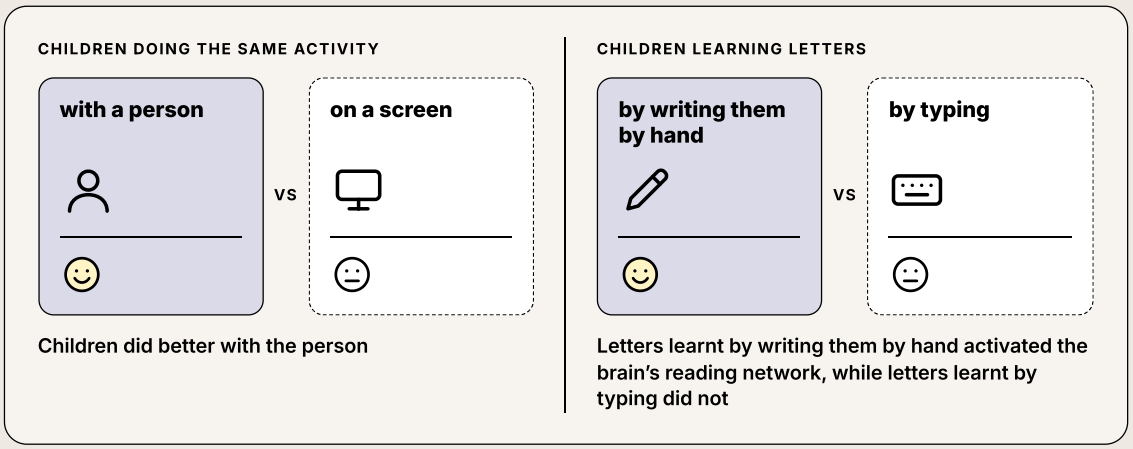
01 Learning software may not help children who are just beginning to read.



Stellenbosch University study of Click Learning's programme, which uses the adaptive reading app Reading Eggs, linked more time on the app with higher English literacy scores in Grades 2 to 5. The programme ran with a lot of support: learners used it for one hour a week in a computer lab, with trained staff to help them, in schools with reliable electricity and internet. Many South African schools do not yet have these conditions (see briefs 5 and 7). Yet even with this support, the study found no statistically significant association between time on the app and literacy scores in Grade 1.

Sources: Borole et al., 2025; Lefa AI brief 5; brief 7.

02 Young children's brains respond differently to screens than to adults.



A review of **33 brain-imaging studies of children up to age 12** found that digital experience has both positive and negative effects on the developing brain. The area most vulnerable is the one that supports attention, memory, planning and self-control, which children rely on to learn to read and count. Where the same activity was done with a person and on a screen, children did better with the person: conversational reading with a parent strengthened attention more than screen media did.

In relation to handwriting research shows that writing by hand draws on a wider network of the brain than typing. In a small study of four- and five-year-olds, letters learnt by writing them by hand activated the brain's reading network, while letters learnt by typing did not. These are mostly small studies about screens rather than AI specifically, but they are relevant because most AI that children use directly will reach them through a screen and keyboard.

Sources: Wu et al., 2024; Marano et al., 2025; James & Engelhardt, 2012.

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03 South African education specialists agree: the younger the child, the more learning depends on people.

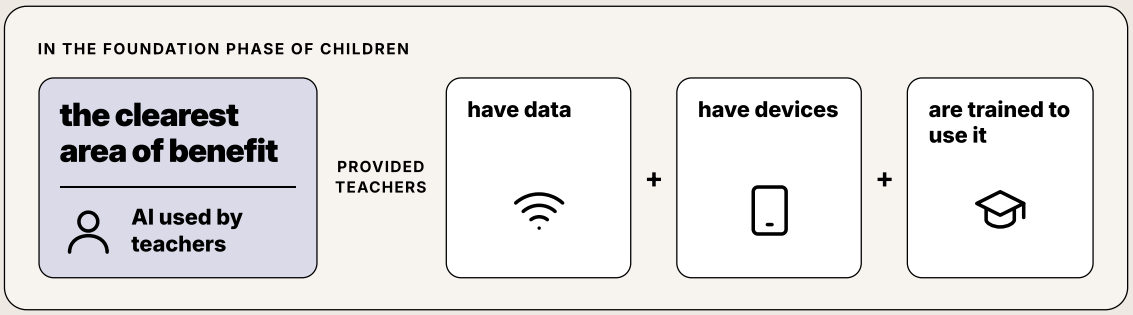
Specialists in psychology, curriculum, assessment, inclusive education, teacher development and school leadership interviewed for this brief shared one concern. Young children need to build reading, numeracy and attention themselves, through play, talk and relationships, before being introduced to AI.

> ***"The younger you go, the more you need a human in the loop.***

Views on timing varied widely. Where specialists saw a direct role for AI with young learners, it was mostly in supporting children with barriers to learning.

Sources: Interviews with Ms Meintjes, Prof. Hugo, Prof. Bertram, Dr Sidiropoulos, Ms Botha, Mr Croucamp, Dr Philpott, Mr Mokwele and Ms Meerholz

04 In the Foundation Phase, AI may do most good in the hands of trained teachers.

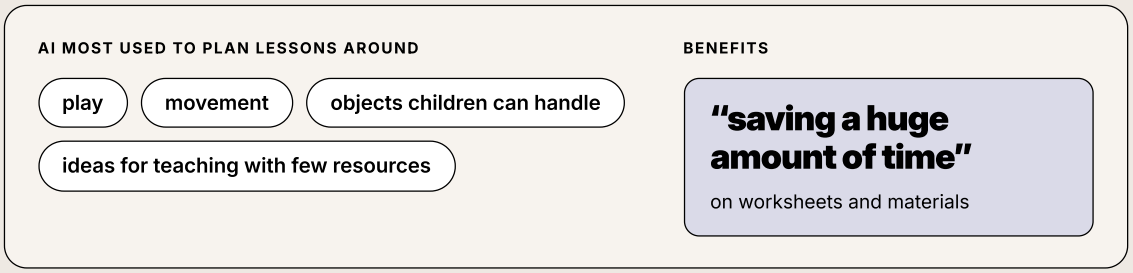


The research behind this brief found AI used by teachers to be the clearest area of benefit in the Foundation Phase, provided teachers that have data and devices **are trained to use it in a way that supports good teaching and learning.** A background paper for UNESCO's Global Education Monitoring Report supports this by agreeing that AI works best when it strengthens proven teaching, with teachers making the final decisions.

Sources: Asghar & Dintilhac, 2025; Lefa AI brief 4b.

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05 Foundation Phase teachers interviewed for this research describe using AI to make lessons more playful and hands-on.



Foundation Phase teachers interviewed for this research, all trained in using AI, described using it to plan lessons around play, movement and objects children can handle and ideas for teaching with few resources. One found that it prompted her to ask more challenging questions than she usually would, and that her learners rose to them. **A primary school principal described teachers saving "a huge amount of time" on worksheets and materials.**

Sources: Interviews with Ms Hlongwane, Ms Msane, Ms Thembane and Ms Meerholz; Pratham International and Rising Academies, FLN Hub webinar, June 2026.

WHAT THIS MEANS

Decisions for South African basic education

The research behind this brief recommends a cautious, staged approach to AI in the Foundation Phase, with equity at the centre. We offer the questions below to support decision makers in thinking about what that could look like.

01

What should guidance say about who uses AI in the Foundation Phase, and under what conditions?

Clear guidance could set out whether AI has a place in the Foundation Phase, who uses it and from which grade, and how to make sure it strengthens early learning rather than undermining it.

02

What would Foundation Phase teachers need in order to use AI well?

The teachers in this research who found AI useful had all been trained. Training, affordable data and access to devices matter as much as the tools themselves, what else might be needed?

03

What should an AI tool show before it is used with Foundation Phase children?

This could include working offline and on low-cost devices, supporting African languages, and protecting children's data. UNICEF's EdTech for Good Framework offers one starting point.

04

How will the long-term effects of early AI use be tracked, and how often will guidance be revisited?

There are no long-term studies yet of what AI use does to young children's development. Guidance written now may need regular review as evidence grows and the technology changes.





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LOOKING AHEAD

Areas for further *research*

There is very little research anywhere on AI with children aged five to nine, and almost none in South Africa. Areas for further research could include:

01 **The earliest grades.** How do learning tools affect children in Grades R to 2?

02 **From teacher to learner.** When Foundation Phase teachers use AI to plan and assess, does it improve what children actually learn, and not only how lessons are prepared?

03 **Inclusion.** How can AI support young learners with barriers to learning, and what does it take for that support to be genuinely inclusive, especially within the South African context.

Lefa AI

In the early grades, children learn to read and count through *play*, talk and the people around them.

AI is most useful when it supports the adults who make that learning possible.

NOTES

SCOPE

1 rapid review of existing South African and global research on AI in foundational literacy and numeracy, and the risks for young learners

18 expert interviews with South African stakeholders, including Foundation Phase teachers, school principals, psychologists, curriculum and assessment specialists, community activists and sector leaders.

LIMITATIONS

What this research covered, and what it did not

This research did not observe or test AI tools in South African Foundation Phase classrooms, and it makes no claims about their impact in this context.

The interviews did not include learners or parents, so this brief does not reflect how young children or their families experience AI.

Expert interviews reflect the views of a small number of South African specialists and teachers. They are included to add local perspective, not as representative findings. The Foundation Phase teachers interviewed had all been trained in using AI, and several specialists work mainly with older learners.

Very little research looks specifically at AI with children aged five to nine. Much of the available evidence is about learning software or screens in general rather than generative AI, and the largest South African study shows an association, not cause and effect.

This was a rapid review, not an exhaustive one. AI in education is moving quickly, and relevant research may have been published after this brief was finalised.

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For corrections or to request the underlying source list, contact the Lefa AI programme team at connect@humanstudios.org.

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