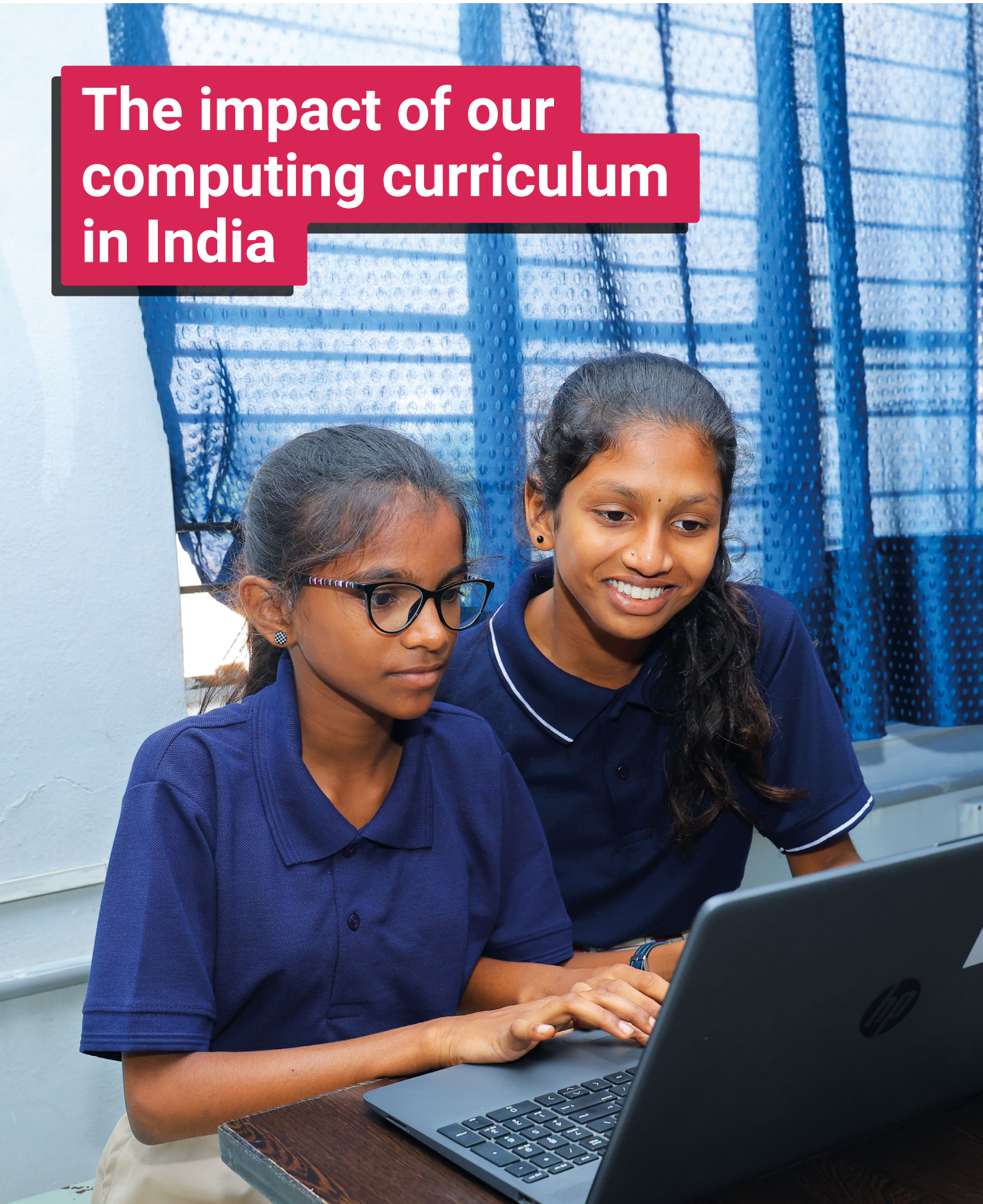
Raspberry Pi Foundation

The impact of our computing curriculum in India



Executive summary

The Raspberry Pi Foundation (RPF) has been working in India since 2018 to enable young people to realise their potential through the power of computing and digital technologies. We have supported Code Clubs, partnered with government organisations, and designed and implemented a fully fledged computing curriculum for students in grades 6 to 12 and undergraduate students.

Our curriculum is tailored to the needs of students in the Indian setting via localised examples, simplified language, and practical applications. To facilitate its implementation, we provide extensive support to teachers, including training, access to resources, and ongoing guidance.

This report presents our evaluations of the curriculum's implementation at a school and undergraduate college in Telangana, and at multiple schools in Odisha. These evaluations reveal that teachers are equipped to deliver the curriculum, that learning experiences are high quality and accessible, and that as a result of the curriculum students are developing their knowledge and skills in computing. Students also reported an improved understanding of how computing and coding are used in the world, and interest in getting jobs in these fields in the future.

Our evaluations highlight the importance of:

- Aligning content with students' learning experience and interests
- Providing extensive support to teachers
- Ensuring sufficient quantity and quality of infrastructure

We are continuing to learn and adapt our approach, and are committed to ensuring that all young people in India have the opportunity to learn about computing.

If you would like to hear more about our mission or are interested in partnering with us, please contact india@raspberrypi.org. For further reading, scan the QR codes below to visit our website or read more about our work in India on our blog.

The RPF website

The RPF blog

Introduction

The Raspberry Pi Foundation's mission is to enable young people to realise their potential through the power of computing and digital technologies.

Our vision is that every young person develops:

- The knowledge, skills, and confidence to use computers and digital technologies effectively in their work, community, and personal life to solve problems and express themselves creatively
- Sufficient understanding of societal and ethical issues to be able to critically evaluate digital technologies and their applications, and to be able to design and use technology for good
- The mindsets that enable them to confidently engage with technological change and continue learning about new and emerging technologies

Our long-term goals are:

1. **Education:** To enable any school to teach students about computing and how to create with digital technologies via our provision of the best possible curriculum, resources, and training for teachers
2. **Non-formal learning:** To engage millions of young people in learning about computing and creating with digital technologies outside of school via our online resources, apps, clubs, competitions, and partnerships with youth organisations
3. **Research:** To deepen our understanding of how young people learn about computing and create with digital technologies, and to use that knowledge to increase the impact of our work and advance the field of computing education

The resources we create are free and used by people all over the world.

We began working in India in 2018. Since then we have supported our partners at Pratham Education Foundation in the organisation and running of more than 2,000 Code Clubs. In addition, in conjunction with another key partner, Panchasakha Sikhya Setu (PSS) (formerly Mo School Abhiyan), which forms part of the Government of Odisha, we have established more than 1,000 Code Clubs at government schools. Learners in these programs developed innovative projects using Scratch from our website's project repository.

To date, we have implemented two versions of our computing curriculum in India. Firstly, we designed and implemented a fully fledged computing curriculum at the Coding Academy, Telangana, for students in grades 6 to 12 and undergraduate students. In conjunction with PSS, Odisha, we then adapted this curriculum to create the IT and Coding Curriculum (Kaushali), which is specifically for grades 9 and 10, and trained 8,000 government high school teachers.

This report examines what we have achieved through the curriculum's implementation in Telangana and Odisha, and the training we have provided to support implementation. It includes the findings from a series of evaluations conducted by our impact team, along with some of the recommendations we are implementing as we continue to increase our positive impact on young people in India.

Context

Technology is reshaping industries across the globe, driving automation and transforming traditional workflows. Recent reports indicate that 19% of the global workforce could see up to 50% of their tasks automated by frontier technologies like artificial intelligence (AI), the Internet of Things (IoT), Big Data, and blockchain[1]. While this shift offers the potential to enhance human productivity, it could also lead to significant job displacement. Roles that were once in demand, such as data entry clerks, assembly line workers, and factory staff, are becoming obsolete, giving way to more specialised roles like data scientists and specialists in AI and machine learning[2].

To thrive in this evolving landscape, young people will need to develop a new set of core competencies. Key skills for the future will include analytical thinking, creativity, curiosity, and technological proficiency, among others[3]. This presents a pressing challenge, particularly for young people from under-resourced and marginalised communities who face obstacles such as a lack of internet access, a lack of computers, the absence of a proper computing curriculum, and insufficient numbers of trained teachers. These issues require creative and inclusive solutions to make computing education accessible to everyone. Equipping young people with the skills necessary to flourish in the modern world and to compete for the jobs of tomorrow should be a priority for all stakeholders.

In India, many of these issues have been exacerbated by the COVID-19 pandemic and therefore require urgent attention. While some progress has been made — for example, rural smartphone ownership doubled between 2018 and 2022 and India has become the world's second-largest mobile broadband market with over 820 million users — it will not be enough for India to realise its ambitious goal of becoming a trillion-dollar digital economy[4].

A report by the National Sample Survey Office (NSSO) in 2023 highlighted the gap in digital skills among young people in India, revealing that the majority of young people aged 15 to 29 lack basic digital skills such as the ability to send email attachments and perform simple computer functions. Alarmingly, only 2.4% of this demographic can write a computer program using a specialised programming language. Despite India's stature as the world's third-largest digital economy by some measures[5], its young people are not adequately prepared to leverage their opportunities. Without urgent action, India risks missing out on fully capitalising on its digital dividend.

[1] https://www.coursera.org/articles/frontier-technology

[2] https://www3.weforum.org/docs/WEF_Future_of_Jobs_2023.pdf

[3] Ibid

[4] https://asercentre.org/wp-content/uploads/2022/12/EB_Digital-Readiness-of-Indias-Youth_11.03.2024.pdf
https://mospi.gov.in/sites/default/files/publication_reports/MultipleIndicatorSurveyinIndiaf.pdf
https://theprint.in/india/india-has-1-trillion-digital-dream-but-73-youth-lack-basic-email-skills-shows-nsso-survey/1467605/

[5] https://icrier.org/pdf/State_of_India_Digital_Economy_Report_2024.pdf

To bridge the gap, targeted investments in strategic areas are essential. The Indian Government has recognised this need and launched several initiatives aimed at building a digitally skilled workforce. Programmes such as Skill India Mission and the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) focus on training and certifying millions of young people in IT and digital skills, with particular emphasis on emerging technologies like AI and robotics[6].

While these are positive developments, greater focus on developing young people's digital skills from an early age is crucial to adequately prepare them for the future. Launched in 2020, the National Education Policy (NEP) has brought some optimism with its recommendation to introduce coding from grade 6 onwards. The policy promotes the development of digital literacy and computational thinking, aiming to equip students with essential skills from an early age. It envisions the creation of a curriculum that integrates digital literacy at the foundational level for all learners, that is supported by hands-on assessments, and that considers the limitations of digital infrastructure across regions.

States such as Odisha[7], Goa[8], and more recently Uttar Pradesh[9] have proactively embraced these recommendations by integrating coding and computing into their school curricula. Furthermore, states like Delhi, Punjab, and Pondicherry now claim to have computers and internet in more than 90% of their schools and have the potential to introduce a comprehensive coding and computing curriculum when ready. However, the lack of unified guidance on the curriculum, pedagogy, and expected number of contact hours for coding instruction has resulted in uneven implementation across the country.

Broad challenges persist in ensuring equitable access and participation in coding and computing education. Key obstacles include inadequate technological infrastructure, a shortage of qualified teachers, ambiguity around what content should be taught in computing education and how it should be taught, and difficulties in cultivating interest in coding and computing among students. Without these underlying issues being addressed, India's efforts to build a trillion-dollar digital economy will remain incomplete, and the marginalised communities who would stand to benefit the most will remain underserved.

[6] https://www.ncaer.org/news/a-digitally-unprepared-workforce

[7] https://www.raspberrypi.org/blog/introducing-a-computing-curriculum-in-odisha/

[8] https://cares.goa.gov.in/?pageid=2

[9] https://www.indiatoday.in/education-today/news/story/coding-and-ai-to-be-introduced-in-up-schools-from-2024-2434661-2023-09-12

Our approach

The Raspberry Pi Foundation is ideally placed to address many of these challenges. We focus on providing young people with meaningful opportunities to understand how computers work and how to create with them. A key aspect of our mission is supporting young people from demographics traditionally underrepresented in the computing field, as well as those facing educational disadvantages, to ensure that they develop the skills and opportunities to succeed in a digital world.

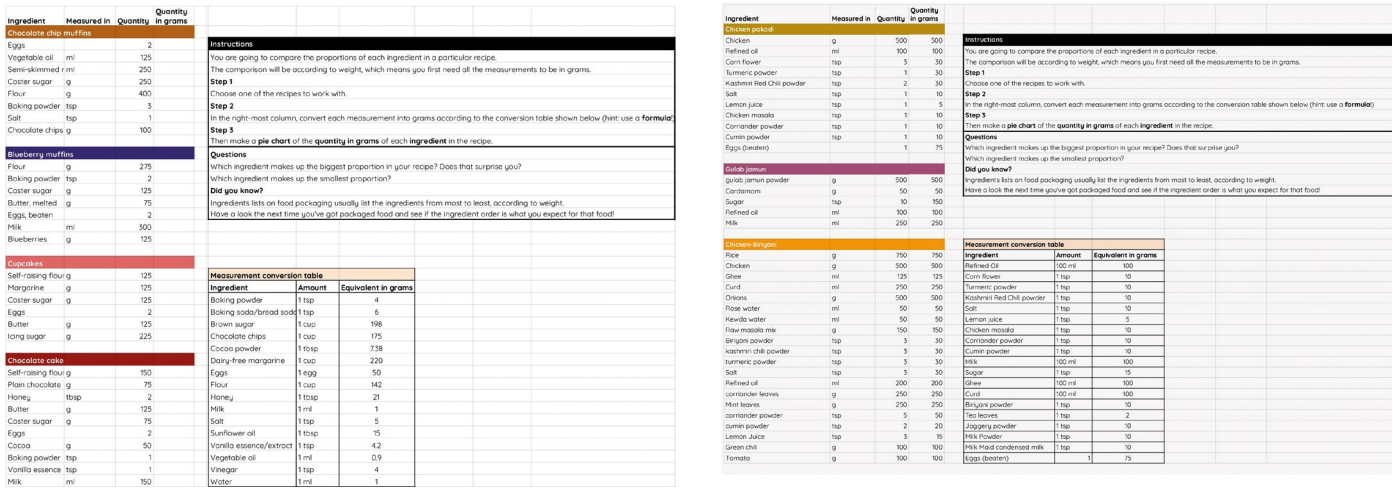
In India, as part of our collaboration with Telangana Social Welfare Residential Educational Institutions Society (TGSWREIS), we have created a fully fledged computing curriculum tailored to the Indian setting. This curriculum is designed to be taught over 70 hours and is specifically suited to the context of government school students with limited infrastructure and resources. A version of this curriculum was then adapted to develop the IT and Coding Curriculum (Kaushali) for grades 9 and 10 for more than 8,000 government schools across Odisha.

Our computing curriculum for India covers the full breadth of computing, including computing systems; programming; the creation of media, data, and information; and the societal impacts of digital technology. Spanning from grades 6 to 12, our curriculum follows a spiral approach, meaning that students encounter computing concepts multiple times and build on previous knowledge as they keep learning.

To establish computing as a core subject in schools — on a par with science and mathematics — a multi-layered approach is essential. We focus on creating resources and providing support to all levels of the education system from students to teacher trainers to drive meaningful and sustainable adoption of computing.

The computing curriculum we have implemented in India includes the following features:

- **Tailored content:** We customise learning materials to align with the proficiency levels of Indian students, taking into account their diverse backgrounds and specific realities. Recognising that students in government schools often have inconsistent access to coding and computing education, we ensure that our resources are adaptable to account for students' existing knowledge, whatever age they are.



Ingredient	Measured in	Quantity	Quantity in grams
Chocolate chip muffins			
Eggs		2	
Vegetable oil	ml	125	
Semi-skimmed r	ml	250	
Coster sugar	g	250	
Flour	g	400	
Boking powder	tsp	3	
Salt	tsp	1	
Chocolate chips	g	100	
Blueberry muffins			
Flour	g	275	
Boking powder	tsp	2	
Coster sugar	g	125	
Butter, melted	g	75	
Eggs, beaten		2	
Milk	ml	300	
Blueberries	g	125	
Cupcakes			
Self-raising flour	g	125	
Margarine	g	125	
Coster sugar	g	125	
Eggs		2	
Butter	g	125	
Icing sugar	g	225	
Chocolate cake			
Self-raising flour	g	150	
Plain chocolate	g	75	
Honey	tbsp	2	
Butter	g	125	
Coster sugar	g	75	
Eggs		2	
Cocoa	g	50	
Boking powder	tsp	1	
Vanilla essence	tsp	1	
Milk	ml	150	

Instructions

You are going to compare the proportions of each ingredient in a particular recipe.
The comparison will be according to weight, which means you first need all the measurements to be in grams.

Step 1
Choose one of the recipes to work with.

Step 2
In the right-most column, convert each measurement into grams according to the conversion table shown below (hint: use a **formula**)

Step 3
Then make a **pie chart** of the **quantity in grams** of each **ingredient** in the recipe.

Questions
Which ingredient makes up the biggest proportion in your recipe? Does that surprise you?
Which ingredient makes up the smallest proportion?

Did you know?
Ingredients lists on food packaging usually list the ingredients from most to least, according to weight.
Have a look the next time you've got packaged food and see if the ingredient order is what you expect for that food!

Measurement conversion table

Ingredient	Amount	Equivalent in grams
Baking powder	1 tsp	4
Baking soda/bread soda	1 tsp	6
Brown sugar	1 cup	198
Chocolate chips	1 cup	175
Cocoa powder	1 tbsp	7.38
Dairy-free margarine	1 cup	220
Eggs	1 egg	50
Flour	1 cup	142
Honey	1 tbsp	21
Milk	1 ml	1
Salt	1 tsp	5
Sunflower oil	1 tbsp	15
Vanilla essence/extract	1 tsp	4.2
Vegetable oil	1 ml	0.9
Vinegar	1 tsp	4
Water	1 ml	1

Ingredient	Measured in	Quantity	Quantity in grams
Chicken pakodi			
Chicken	g	500	500
Refined oil	ml	100	100
Corn flower	tsp	3	30
Turmeric powder	tsp	1	30
Kashmiri Red Chili powder	tsp	2	30
Salt	tsp	1	10
Lemon juice	tsp	1	5
Chicken masala	tsp	1	10
Corriander powder	tsp	1	10
Cumin powder	tsp	1	10
Eggs (beaten)		1	75
Gulab jamun			
gulab jamun powder	g	500	500
Cardamom	g	50	50
Sugar	tsp	10	150
Refined oil	ml	100	100
Milk	ml	250	250
Chicken Biriyani			
Rice	g	750	750
Chicken	g	500	500
Ghee	ml	125	125
Curd	ml	250	250
Onions	g	500	500
Rose water	ml	50	50
Kewda water	ml	50	50
Raw masala mix	g	150	150
Biriyani powder	tsp	3	30
kashmiri chili powder	tsp	3	30
turmeric powder	tsp	3	30
Salt	tsp	3	30
Refined oil	ml	200	200
corriander leaves	g	250	250
Mint leaves	g	250	250
corriander powder	tsp	5	50
cumin powder	tsp	2	20
Lemon Juice	tsp	3	15
Green chili	g	100	100
Tomato	g	100	100

Instructions

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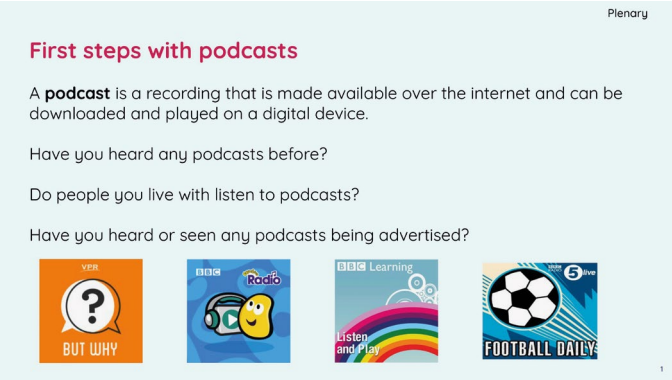
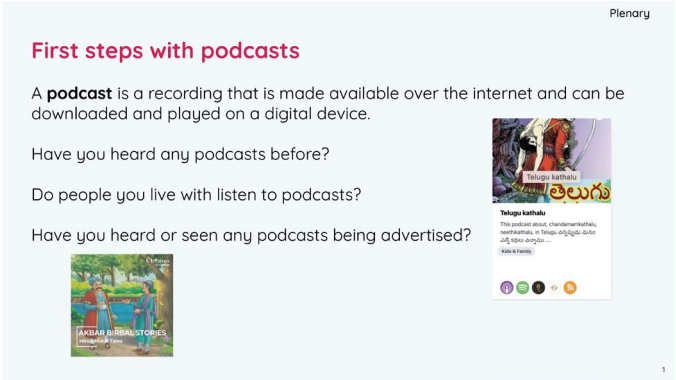
Measurement conversion table

Ingredient	Amount	Equivalent in grams
Refined Oil	100 ml	100
Corn flower	1 tsp	10
Turmeric powder	1 tsp	10
Kashmiri Red Chili powder	1 tsp	10
Salt	1 tsp	10
Lemon juice	1 tsp	5
Chicken masala	1 tsp	10
Corriander powder	1 tsp	10
Cumin powder	1 tsp	10
Milk	100 ml	100
Sugar	1 tsp	15
Ghee	100 ml	100
Curd	100 ml	100
Biriyani powder	1 tsp	10
Tea leaves	1 tsp	2
Jaggery powder	1 tsp	10
Milk Powder	1 tsp	10
Milk Maid condensed milk	1 tsp	10
Eggs (beaten)	1	75

Modelling data using a spreadsheet (grade 9)

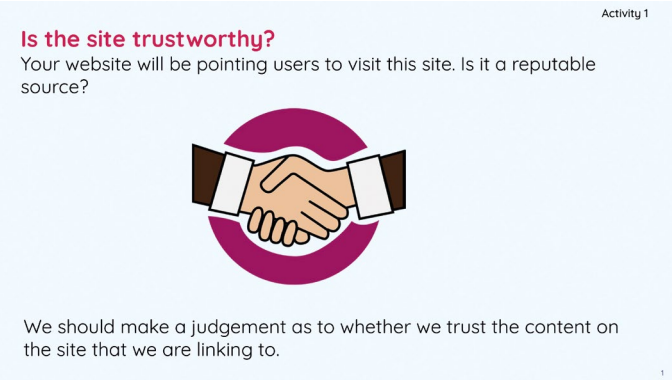
- **Localised examples:** Our content incorporates culturally relevant and relatable examples. This helps students connect more deeply with computing concepts, making technology feel more accessible and meaningful in their everyday lives.

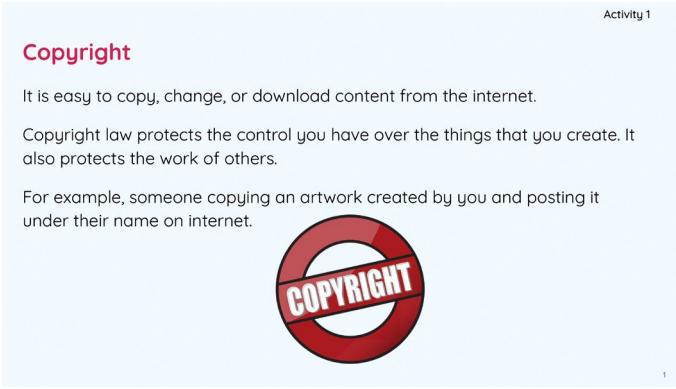




Creating media — audio production (grade 7)

- **Simplified language:** To cater for students who may have limited English language proficiency, we use simplified language to ensure better comprehension and retention. Where appropriate, we also offer translations in local Indian languages, making the content more inclusive and accessible.





Creating media — webpage creation (grade 7)

- **Practical application:** We emphasise hands-on learning with practical activities that reinforce key concepts. At the end of each grade, students have the opportunity to create projects and models, showcasing their understanding and applying what they have learnt.

- **Ready-to-use resources:** Our comprehensive set of teaching materials — which include lesson plans, slides, worksheets, and activity sheets — are designed to help teachers deliver effective coding and computing lessons regardless of their level of computing expertise.

Your program should stop when the length of the `trip` list reaches five items.

At the end, the program should display the itinerary, i.e. the `trip` list.

Tip: You must indent the lines that will form the while-block and will be repeated.

```
+ print("City hopping random planner")
+ print("Itinerary:", trip)
+ trip = []
+ trip.append(city)
+ while len(trip) < 5:
```

Example

Note: Use this example to check your program. The actual cities contained in the itinerary are randomly selected and will be different every time the program is executed.

The program displays an initial message.	`City hopping random planner`
After compiling a list of five random cities, the program displays the itinerary:	`Itinerary: ['Puducherry', 'Lucknow', 'Patna', 'Jammu', 'Delhi']`

Task 2 - No duplicates please

Extend the program so that every `city` selected is promptly **removed** from the list of **cities**. This way, no city can be selected twice for your trip.

Task 3 - Last stop: Delhi

Modify the program so that the process of random city selection continues until Delhi is selected and added to the `trip`.

Before displaying the itinerary, consider also inserting Delhi at the *beginning* of the trip list, so that the trip appears to be circular.

Python programming with sequences of data (grade 9)


IoT
DIAGRAM

Coding Academy (Telangana)

The project

The Raspberry Pi Foundation has embarked on a five-year partnership with Telangana Social Welfare Residential Educational Institutions Society (TGSWREIS) to enable students in a government school and undergraduate college in Telangana to learn about coding and computing. We are working to provide the best possible curriculum, resources, and training for teachers.

The school and the undergraduate college are called 'Coding Academy School' and 'Coding Academy College', respectively. Education is provided for free at both institutions for high-performing students from disadvantaged backgrounds across the state. The school is co-educational up to grade 10 and the college is for female undergraduate students only.

Since our partnership began in 2023, we've developed curriculum content for students in grades 6 to 12 in the school, which is in line with India's national education policy requiring coding to be introduced from grade 6. In these first two years of the partnership, the curriculum is being delivered by expert educators trained by RPF, all of whom have backgrounds and expertise in computer science.

The training for these teachers was conducted in a hybrid format by members of RPF's UK-based educator development team and India-based learning team. This was followed by refresher sessions to ensure a thorough understanding of the pedagogical principles of the curriculum. From the third year onwards, RPF will identify teachers from TGSWREIS who will be trained and supported over the subsequent three years so that they feel confident to deliver the curriculum by the end of the formal partnership.

Our evaluation

We conducted a mixed-methods evaluation that aimed to address the following questions:

- Are the intended outcomes for teachers and students being achieved?
- What is leading to or preventing the achievement of the intended outcomes?

Method	Volume of data (school)	Volume of data (college)
Assessment data sheet completed by teachers	3,499 assessment marks for 459 students	2,129 assessment marks for 451 students
Teacher interviews	4 interviews	4 interviews
Lesson observations against rubric	9 observations	13 observations
Learner focus groups	9 focus groups	2 focus groups
Teacher workshop feedback form	4 teachers	3 teachers
Student survey	324 student survey responses from students in grades 6 to 9	246 student survey responses

Findings

Teachers are equipped to deliver the curriculum

Most school and college teachers who attended the initial training rated this highly and said it helped them feel prepared to teach the content provided.

All attending school and college teachers agreed that they felt confident to teach students using the resources provided after the second teacher workshop in October 2023. Most also agreed that they felt confident adapting the lesson plans based on student responses if needed and agreed that they felt confident using the software packages required in the curriculum.

However, the school teachers we interviewed requested additional training on classroom management. Some concerns raised were linked to equipment and infrastructure (explored later).

We received lots of positive feedback on the curriculum resources from school and college teachers and observers. Teachers were happy with the content format, and the lesson observers noted that students also enjoyed learning and completing the activities.

> **"[...] this content is more than what we are expecting for the school years[...] this time they [are] having [a] practical session. So they are very happy to do it and whenever they are free[,] they will come and ask us. '[C]an you take [an] extra class for us?'"**
>
> (Teacher)

Learning experiences are high quality and accessible

Our lesson observations found that teachers were delivering high-quality learning experiences to students. Teachers in both the school and college were prepared to teach their classes and felt confident about doing so. We saw them recap previous content and incorporate locally relevant examples. Though one teacher had internet issues, she was able to improvise by letting groups of students take it in turns to work on a staff laptop with a stable connection.

"The session was quite engaging and interactive, students were very attentive and spontaneously answering the questions asked by the facilitator."

(Observer)

"The facilitator took rounds to view and support the students while they were doing the practicals[.]"

(Observer)

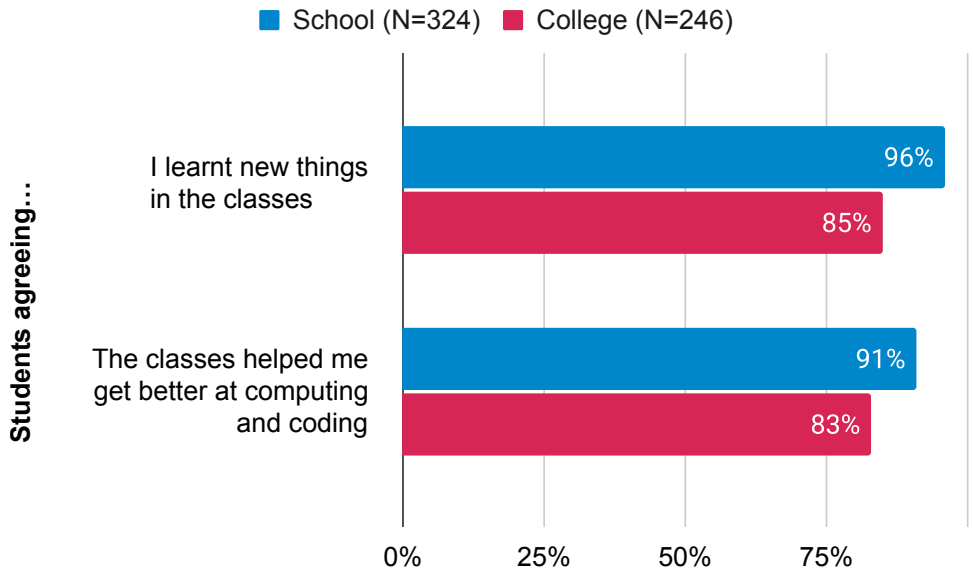
"[...] the facilitator appeared quite equipped and confident to [deliver] the lesson. He used the examples from the plan, but at the same time, he was prepared with some in their local language too. He had installed the VSC editor on all the systems beforehand[.]"

(Observer)

Students are learning about computing

Students believe they are developing their knowledge and skills, especially in the school, where over 9 in 10 students agreed that they had learnt new things and that the classes had helped them get better at computing and coding. This finding was also reflected in the assessment scores, almost all of which exceeded the 40% pass mark.

However, we also found some variation in outcomes for different groups of students and identified some improvements that are needed to ensure that the content is appropriate for all. For example, teachers and students felt improvements were needed to the content for undergraduates specialising in data science — there was a wish for the content to be more challenging and to more effectively prepare students for the workplace. Some amendments have been made to this content and we will continue to keep this under review.



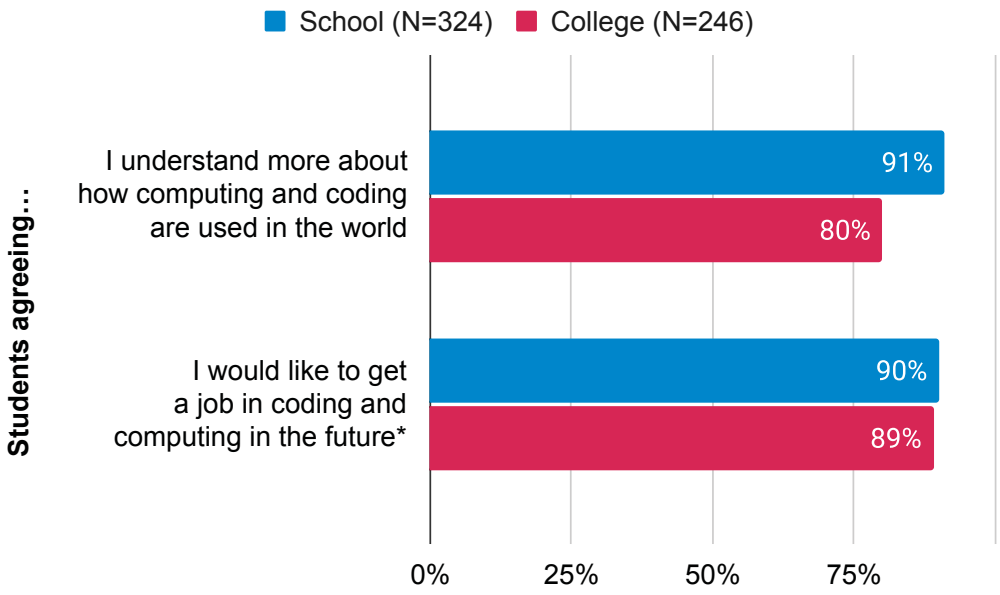
These responses were reflected in the assessment scores:

	School (N=3499)	College (N=2129)
At least 40% of available marks	93%	92%
At least 60% of available marks	77%	70%
At least 80% of available marks	42%	34%
Average mark	*70%*	*69%*

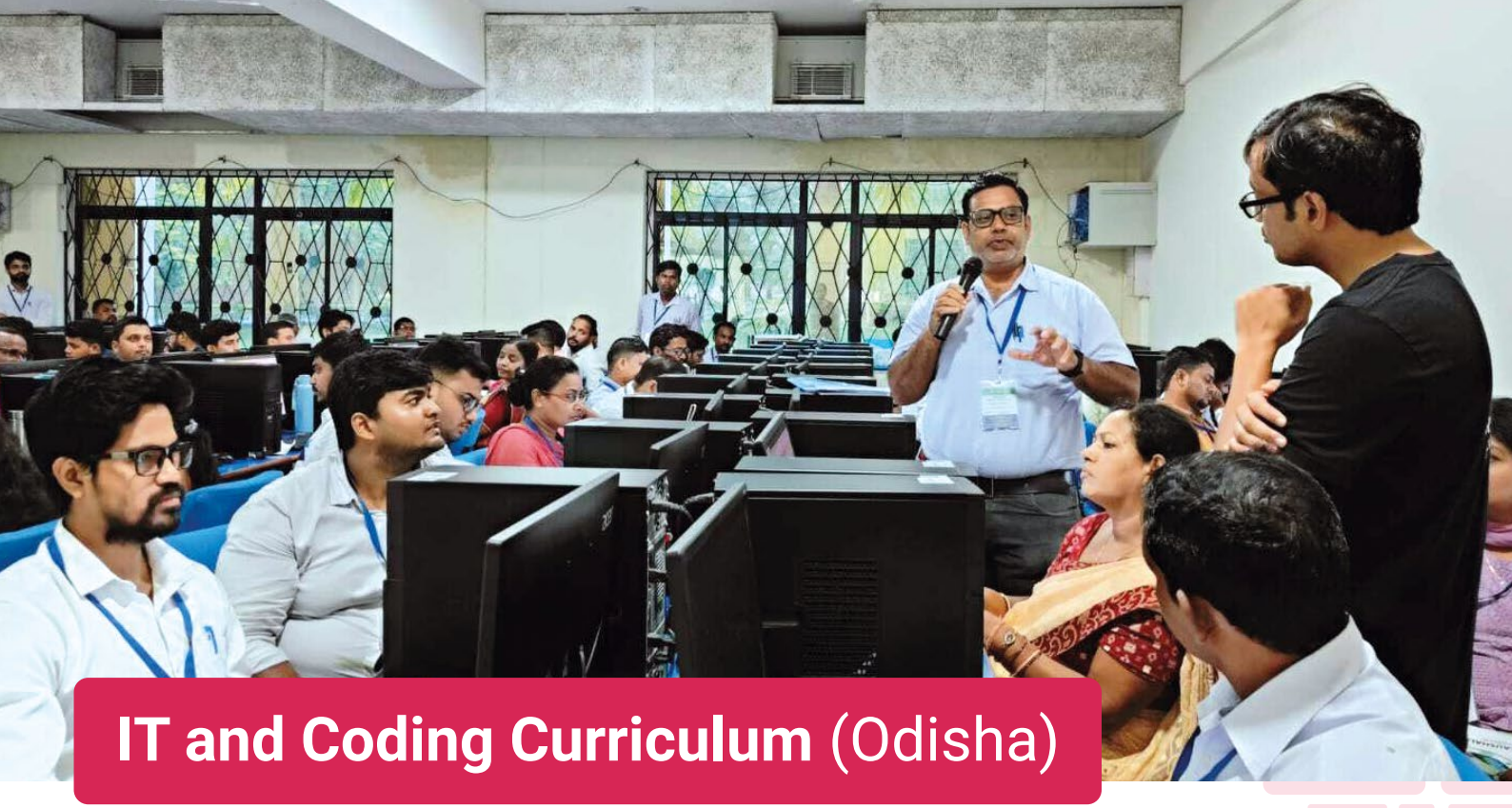
Impact will continue into the future

Students also reported a better understanding of how computing and coding are used in the world, and an interest in getting jobs in these fields in the future. This was evident from the survey responses, and in discussions with school students where in most cases they expressed an interest in further learning — many stated a desire to learn how to create apps, websites, and games; to learn how to create using Java; and to learn more about physical computing.

> **'More than 70[% of] students answered that they want to do more Python coding and want to be a coder in the future[...]'**
>
> (Observer)



** Only grade 9 students in the school were asked if they would like to get a job in computing in the future (N=72)*



IT and Coding Curriculum (Odisha)

The project

The Raspberry Pi Foundation is working with two other organisations (Learning Links Foundation and Quest Alliance) to develop and deliver a computing curriculum for students in grades 9 and 10 in the state of Odisha in partnership with Panchasakha Sikhya Setu (PSS). This curriculum is called the IT and Coding Curriculum (Kaushali).

In the 2023/24 academic year, both grades 9 and 10 received the same content. This was because the officials observed that students in grades 9 and 10 had similar levels of technical knowledge due to lack of exposure to a formal computing curriculum. In the 2024/25 academic year, the grade 10 students have received more advanced content.

In July and August 2023, all three partner organisations worked together with the aim of training 314 master teachers (MTs), who were then expected to train teachers from over 8,000 schools to deliver the curriculum. Teachers were selected by headteachers and block-level officials to be MTs based on their background in STEM-related subjects and their interest and motivation to be part of a rigorous training programme on coding and computing.

A three-day in-person training session was conducted for MTs, co-facilitated by trainers from all three partners. These MTs then conducted three-day in-person training sessions for teachers in their respective blocks. Before the teacher training sessions, the partners also organised three-hour virtual refresher sessions to guide MTs through the training deck and address logistical considerations. RPF has since been responsible for providing ongoing support to 1,898 schools across ten districts.

Our evaluation

We conducted a mixed-methods evaluation that aimed to address the following questions:

- Are the intended outcomes for teachers and students being achieved?
- What is leading to or preventing the achievement of the intended outcomes?

Method	Volume of data
Master teacher training feedback	281 responses
Kaushali teacher follow-up survey	410 survey responses
Teacher interviews	15 interviews (5 with master teachers, 10 with non-master teachers)
Student projects	Sample of 20 projects
Session monitoring form	4,095 session monitoring form responses from 1,228 schools in our districts
Webinar feedback	404 webinar feedback responses

Some caution is advised in interpreting these findings. Although our evaluation is based on a significant volume of data, much of the data has arisen from the perceptions of self-selecting samples of respondents — as can be seen in the follow-up survey, the webinar feedback, and the session monitoring form responses. Respondents are more likely to be more engaged with the programme and so responses may not be fully representative of the programme as a whole.

Findings

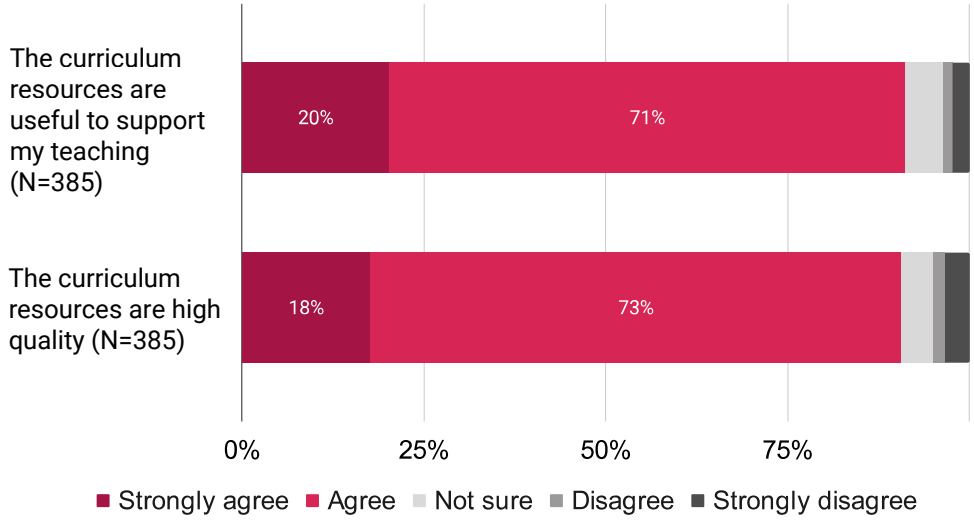
Teachers appreciate the training and resources provided

87% of teacher respondents agreed that the curriculum resources were both high quality and useful for their teaching, and 91% agreed that they felt more confident about teaching students IT and coding as a result of the curriculum resources. This was also evident from the interviews.

Most teachers also indicated that the initial training helped improve their understanding and confidence. In the follow-up survey, 93% either strongly agreed or agreed that the training had helped them to understand the structure, content, and objectives of the curriculum, and 89% agreed that the training had helped them to feel confident in teaching the curriculum.

Teachers were also very positive about the webinar sessions, in both the webinar feedback form and our teacher interviews. In the webinar feedback form, 99% of respondents agreed that the webinar was high quality and useful for their teaching.

Similarly positive feedback was received from the master teachers in their post-training survey, in which 99% of respondents agreed that they felt confident in training other teachers to use the Kaushali curriculum. Master teachers appreciated that their training catered for all experience levels. We added some computer basics to their training, with sections on how to use Google Drive, share a link, and create a QR code, for example. Our team learnt and adapted the training as they went along, building on their experiences of teachers' prior knowledge from previous programmes.



"The curriculum resources are very useful for students."

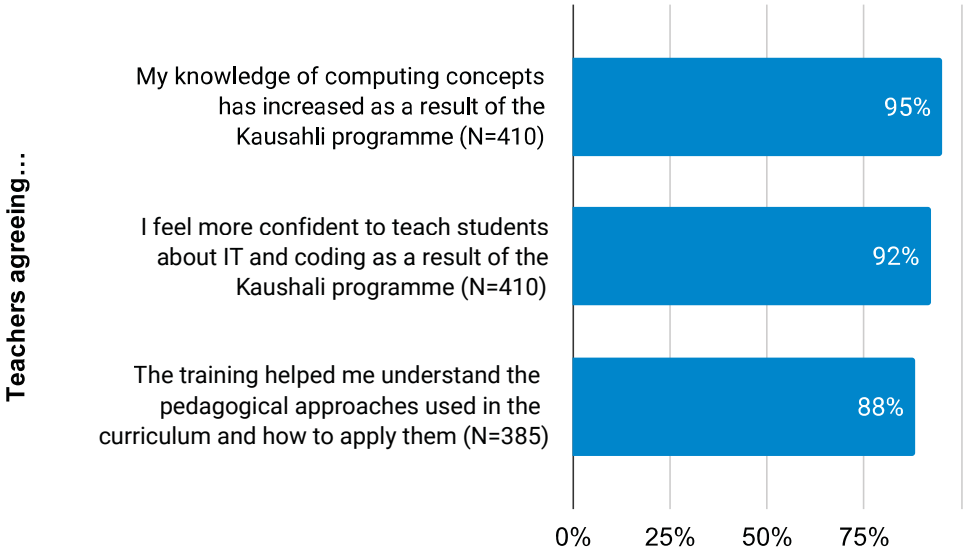
(Teacher follow-up survey)

"The webinar is very useful to acquire practical knowledge regarding the specific topics."

(Teacher webinar feedback)

Teachers' knowledge and confidence in computing has increased

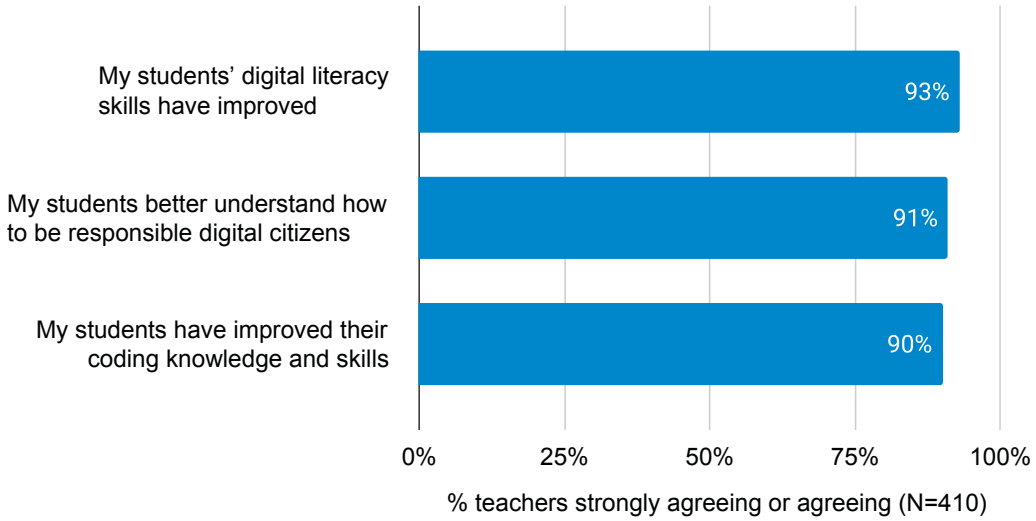
Teachers participating in the programme overwhelmingly agreed that they had seen improvements in their knowledge of computing, their confidence to teach students, and their understanding of the pedagogical approaches used in the curriculum. That being said, many of the teachers also felt that they would benefit from more training and support.



Students are benefitting from the programme

Teachers were very positive about the impact on their students, with almost all agreeing that it had improved their students' coding skills, digital literacy, and understanding of how to be responsible digital citizens. Some of the teachers interviewed also reported that the lessons had had a positive impact on other skills, with many students learning how to use phones, computers, and Excel while developing critical thinking skills.

We also reviewed a sample of 20 student projects against the project evaluation rubric, assigning a score for four areas. 80% were rated at least good for 'Design and final output', 75% for 'Critical thinking', 65% for 'Contextuality', and 60% for 'Creativity'.



What we're learning

Align content with students' experience and interests

Our curriculum projects have highlighted the importance of ensuring that content is carefully aligned with the needs of students based on their context. This entails:

- Establishing a good understanding at the beginning of a programme of the level of students' existing knowledge, doing this through assessment, for example, and ensuring that content is matched to the identified knowledge level
- Providing culturally relevant examples in the content[10]
- Ensuring that for lower grades we include simplified content and assessment using simplified English or local languages

Feedback from older students has also reinforced the importance of ensuring that we are aligning content with industry standards and preparing students for employment.

Provide extensive support to teachers

There are multiple considerations when ensuring that teachers are fully equipped to provide high-quality teaching to students. This begins with the careful selection and training of master teachers who are prepared to provide training to more teachers. The training for all teachers should:

- Consider the prior knowledge, confidence, and experience of the teachers being trained by establishing a clear baseline for each
- Provide adequate time and resources to develop foundational knowledge and skills
- Be delivered in local languages where possible
- Include additional support through webinars, one-to-one calls, and classroom observations to alleviate doubts and provide feedback
- In some cases include supplementary training on other aspects of teaching such as computing pedagogy and classroom management

Ensure sufficient quantity and quality of infrastructure

In several cases we found that teachers' equipment setups were inadequate for delivering the planned curriculum. Slow computers and an insufficient number of computers in a classroom can impact students' usage of computers during sessions, and slow internet can affect the ability of students and teachers to access online resources and applications. This can all lead to content intended for a single lesson being spread over additional lessons, or to students not being able to practise what they have learnt and becoming disengaged.

[10] https://static.raspberrypi.org/files/research/Guide+to+culturally+relevant+and+responsive+computing+in+the+classroom.pdf

In order to address this, we work closely with our partners on ensuring that the right technology is in place at the start of any curriculum implementation. To account for limitations in computers and internet at many schools, we create worksheets and assessments that can be printed so students can more readily practise the concepts they have learnt, and we support teachers in tailoring their approaches to their particular circumstances where needed.

Want to find out more?

The Raspberry Pi Foundation has a mission to empower all young people to realise their potential using technology. If you would like to hear more about our mission or are interested in partnering with us, please contact india@raspberrypi.org.

For further reading on how we've adapted our computing curriculum in India — and if you'd like to explore our work in India more broadly — check out our blog. Our website also has a wide range of resources for teachers and educators.

The RPF website

The RPF blog

Computing Curriculum Framework – blog post

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