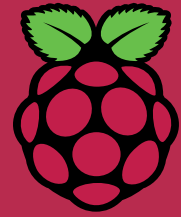# Raspberry Pi Foundation: Learn at Home campaign
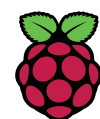
Phase 1 & 2 impact report

Hayley Leonard, Thom Kunkeler, and Diana Kirby
December 2020

Raspberry Pi Foundation: Learn at Home campaign

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Background

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The closure of schools because of the coronavirus pandemic has called attention to the digital divide, which sees poorer families struggling or unable to access education. The pandemic didn't cause this divide, but it has highlighted it and its impact on many people in our society. Working to close this divide has become significantly more urgent as a result of the pandemic and the ongoing disruption to schooling, which we know has a disproportionately negative impact on children who already experience disadvantage. The Raspberry Pi Foundation (RPF) has been working with youth and community organisations across the UK to deliver Raspberry Pi computer kits to young people who do not have a computer at home on which they can complete their academic work for school or college.

The impact of this programme on young people and their families has been evaluated through a number of different measures, which are outlined below. This report provides an overview of the key outcomes of the programme, measured between 13 July and 3 December 2020.

This report focuses only on young people who received Raspberry Pi computer kits between 13 July and 21 August 2020, which included the first two phases of the programme after the initial pilot. The pilot was generously funded by the Bloomfield Trust. The programme has continued beyond these initial phases, and a separate evaluation of the impact of later phases will be published in due course.

Our youth and community organisation partners included, among others, Youth Action in Blackburn, Learning Partnership West in Bristol, and Mercy Foundation Centre in Battersea. All of our partners worked directly with young people in need and all had put infrastructure in place to support families in need during the lockdown. All of our partners came to us through a recommendation from a funder, or were recommended to us by UK Youth. In addition to an initial recommendation, our partner scoping and onboarding process provided an extra layer of due diligence.

Since April 2020, the Raspberry Pi Foundation has distributed more than 3500 Raspberry Pi computer kits to young people around the UK. This has only been possible thanks to generous funding donated by more than 30 individuals and organisations, particularly the Bloomfield Trust.

The young people who received Raspberry Pi kits

The young people who received Raspberry Pi kits

In total, 947 Raspberry Pi kits were distributed to young people around the UK between 13 July and 21 August 2020. Youth and community organisation partners were asked to share demographic details of the young people and their families to help us understand who was being reached by the programme. The age, gender, and ethnicity of the young people are presented in Table 1 (note: one partner did not provide any demographic details, so the data in the table represents 802 young people from the full cohort of 947). The young people were all school pupils or college students. Household sizes ranged from 1 to 12 people. Around half of the households (48%) included one or more people who were employed at least part-time, and 40% of the households included one or more people who were unemployed, registered carers, or retired.

Table 1: Demographic information provided for 802 young people of 947 who received Raspberry Pi kits between 13 July and 21 August 2020

Age	4–23 years (avg 11.15)
Gender	
Male	477 (60%)
Female	315 (39%)
No record	10 (1%)
Ethnicity	
White British/White other	464 (59%)
Asian British/Asian other	156 (19%)
Black African/Caribbean/other	82 (10%)
Mixed/multiple ethnic groups	38 (5%)
Other ethnic group	10 (1%)
No record	52 (6%)

How we measured the impact of the programme on recipients

How we measured the impact of the programme on recipients

The impact evaluation was designed to combine different types of methods to provide both breadth and depth of data. A custom homepage was built into the Raspberry Pi computers, which meant that the use of the devices could be tracked over time. This is the first time that RPF has been able to track device use and it means that there is an objective measure of how often the kits are being used. Homepage visits are tracked through Google Analytics, but no other data on the websites visited or the programs used is tracked through the device. It should be noted that if a young person changes the homepage or does not access the internet through the device, the data from their device is not tracked. The tracking data therefore provides a broad overview of the device usage, as well as providing an indication of when the kits were set up.

The young people were also asked about their use of the Raspberry Pi kit and its impact on a number of different aspects of their lives through a range of self-report measures, which are explained below. The demographic information of the young people who engaged with each type of measure is presented in Table 2.

Surveys

During setup, the young people were directed to a baseline survey in which they were asked to provide some basic demographic information, explain how they were using devices and completing their academic work at the time, and report how confident and interested they were in computing. Between 13 July and 3 December 2020, the survey was accessed by 524 young people, and completed by 422 of them.

It was planned for this survey to be repeated at monthly intervals so that change could be assessed over time, with survey responses linked together through each device's unique tracking ID. However, completion rates for the repeated surveys were very low and so it was decided that a follow-up survey would be sent out directly to the young people through the youth and community organisations. This meant that answers from the same young person could not be linked together over time. As an alternative, the young people were asked to report directly how their use of devices and the time that they spent on academic work had changed since receiving the Raspberry Pi kit, along with any other impact that the

kit had made on them. Between 11 November and 3 December 2020, 75 young people completed the follow-up survey.

Case studies

As part of the setup process, youth and community organisation partners were asked to complete some short case studies with the young people who they were supporting. The representatives of the organisations asked the young people and their families questions about the setup process, the impact of the kits on their ability to do their academic work and on their feelings about academic work, and how else they had been using the kits. The representatives took notes and shared the completed case studies with RPF. In total, case studies were completed for 189 young people.

Interviews

During the collection of the case study data, the young people were asked if they consented to being contacted by RPF for a short interview about their Raspberry Pi kits in the future. Of those who consented, 23 were approached to set up an interview, and 15 completed interviews with a member of the RPF Impact and Research team via telephone or videoconference. A family member or a representative of the youth or community organisation partner was also present in each call. Calls were recorded and then transcribed, and the transcripts were reviewed before analysis. One interview was excluded from analyses because the young person had difficulty understanding and answering the questions. The demographic information of the remaining 14 interviewees is presented in Table 2.

Table 2: Demographic information of the young people who engaged with each self-report method

	Baseline survey	Follow-up survey	Case studies	Interviews
No. of young people	422	75	189	14
Age in years				
Average	9.96	12.37	12.4	14.5
Min.–max.	4–21	6–22	4–23	9–22
Gender				
Male	221 (52%)	47 (63%)	115 (61%)	8 (57%)
Female	193 (46%)	28 (37%)	65 (34%)	6 (43%)
Prefer not to say/ No answer	8 (2%)	0	9 (5%)	0
Ethnicity				
White British/ White other	234 (55%)	44 (59%)	119 (63%)	6 (44%)
Asian British/ Asian other	109 (26%)	10 (13%)	15 (8%)	2 (14%)
Black British/ Black other	41 (10%)	16 (21%)	21 (11%)	3 (21%)
Mixed/multiple ethnic groups	16 (4%)	5 (7%)	11 (6%)	2 (14%)
Other ethnic group	9 (2%)	0	4 (2%)	1 (7%)
Prefer not to say/ No answer	13 (3%)	0	19 (10%)	0

Setting up the Raspberry Pi kits
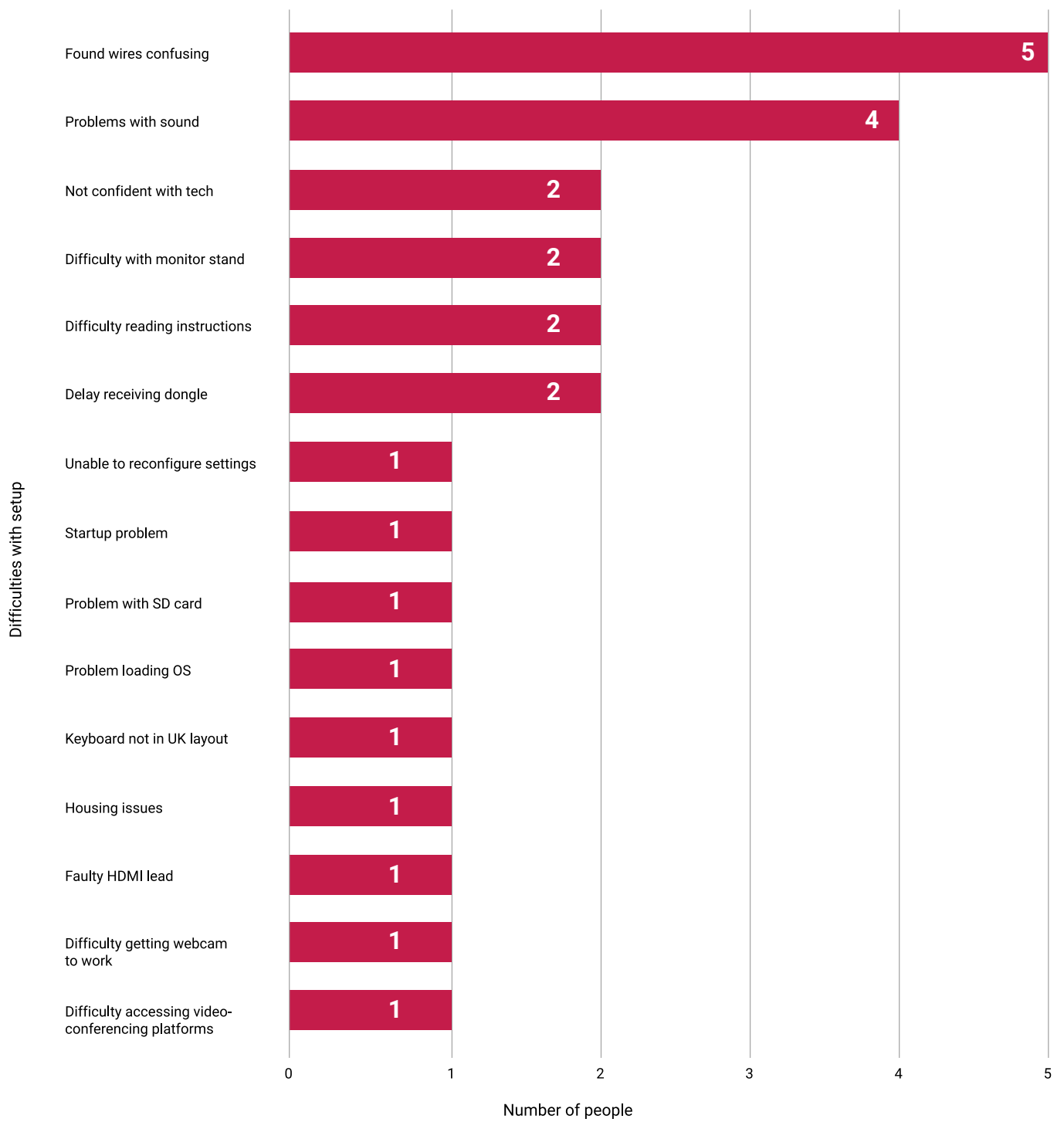
Setting up the Raspberry Pi kits

In these phases of the programme, each young person received a Raspberry Pi 4 Desktop Kit (which includes a Raspberry Pi 4 Model B 2GB RAM), a 21" HANNspree monitor with built-in speakers, and an A4Tech USB webcam (which includes a microphone).

The first part of the case study reports and interviews focused on the process of setting up the Raspberry Pi kits. By the time of the case study, 92% (174) of the young people had successfully set up their kit, with 65% (122) of the young people and their families reporting no difficulties with setup. Of the 20% (38) of young people and families who had difficulties setting up their kit, 12 did not specify the nature of the difficulty. The remainder mentioned a range of issues, with the most common difficulty being that they found the wires confusing (see Figure 1).

At the time of the case study, 86% (162) of the young people had successfully accessed the internet using their Raspberry Pi kits, 12% (22) had not accessed the internet, and 1% (2) did not answer.

Of the 22 young people who had not accessed the internet using their Raspberry Pi kits:

- 12 had not tried to do so yet, for example because they had not set up their Raspberry Pi kit or because they had an unresolved setup problem

- 3 stated that they were missing a part

- 3 required support to know how to access the internet

- 2 had no/very limited access to the internet at home and were waiting for the start of the 3 months' free internet access provided by their youth or community organisation as part of the programme

Figure 1: Difficulties reported by young people and families about setting up the Raspberry Pi kits

When asked what most helped them in setting up the Raspberry Pi kits, young people and their families mentioned a range of different sources of support, with the most popular being the instruction booklet (mentioned in 32% of the case studies). Other sources of support were family members or representatives from youth and community organisation partners, the Raspberry Pi Beginner's Guide, and videos on YouTube.

Overall, the majority of young people reported that the setup process was quite straightforward, and those who did have some difficulties found appropriate support (see Table 3). It should be noted that a small number of young people and families had continuing issues with setup, and so it is important to keep track of the setup process in future phases of the programme.

Table 3: Young people's experiences of setting up the Raspberry Pi kits

Theme	Example quotes
Ease of setup	"I was really surprised how simple it was to get going. No issues with plugging everything in, just switched it on and away it went." "Everything that was needed was already in the box. Dead simple to set up."
Using appropriate support	"I think my mum set it up for me, mostly. And then, yes, my mum set it up using Google and the book that they gave us to use. So it wasn't that hard. It was quite easy, actually."

"At first it took me a while as I didn't know what wires to put in. I managed to call [the youth or community organisation] and an amazing team was able to help me out on Google Hangouts."

"Without the instruction manual, I'm not sure I could have got it to work. I followed the setup exactly as it said and when something did go wrong, I checked the FAQs section which was really useful. Great piece of kit for the kids to learn."

Continuing difficulties

"As yet the family have not been able to get onto [...] the Raspberry Pi; Mum is not technical-minded and so this is a struggle for her. The family has tried to sort this with the use of YouTube and the instructions that have been sent out by [the youth or community organisation] and Mum is still unable to complete this."

Time spent on devices and academic work

Time spent on devices and academic work

The data from Google Analytics collected from the devices identifies 725 unique devices accessing the homepage between 13 July and 3 December 2020 (as shown in Figure 2a). As might be expected, the use of the kits was lower over the summer holidays, with an increase in use from the end of August and over the autumn term. Figure 2b shows that from the beginning of September, the homepage was visited between 100 and 400 times per day.

(a)

(b)
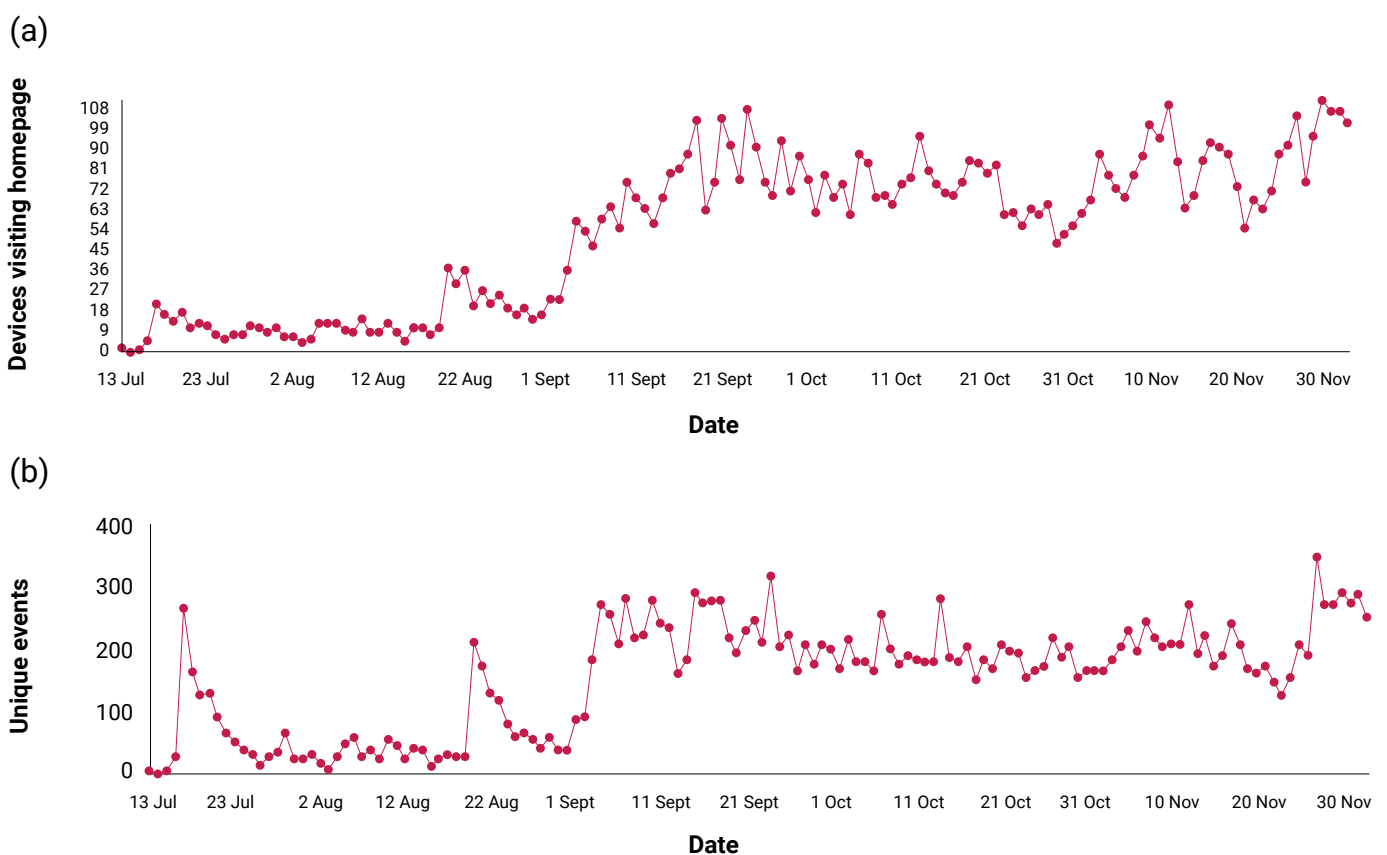
Figure 2: (a) Number of devices visiting the homepage and (b) number of times the devices visited the homepage, between 13 July and 3 December 2020

In the follow-up survey, the young people were asked how long they spent using the Raspberry Pi kits and how much time they spent on their academic work. Most young people spent between 1 and 2 hours per day on their academic work, and around 70% reported using their Raspberry Pi kits for between 1 and 3 hours per day. When asked how much of the time spent using their Raspberry Pi kits was spent on academic work, 44% chose the option "Most of the time", and 36%

chose the option "About half the time". Only one respondent did not report using the Raspberry Pi kit for academic work.

When asked whether the time that they spent on academic work and on other devices had changed since receiving the Raspberry Pi kits, most young people reported spending more time on academic work and less time on other devices (see Figure 3).
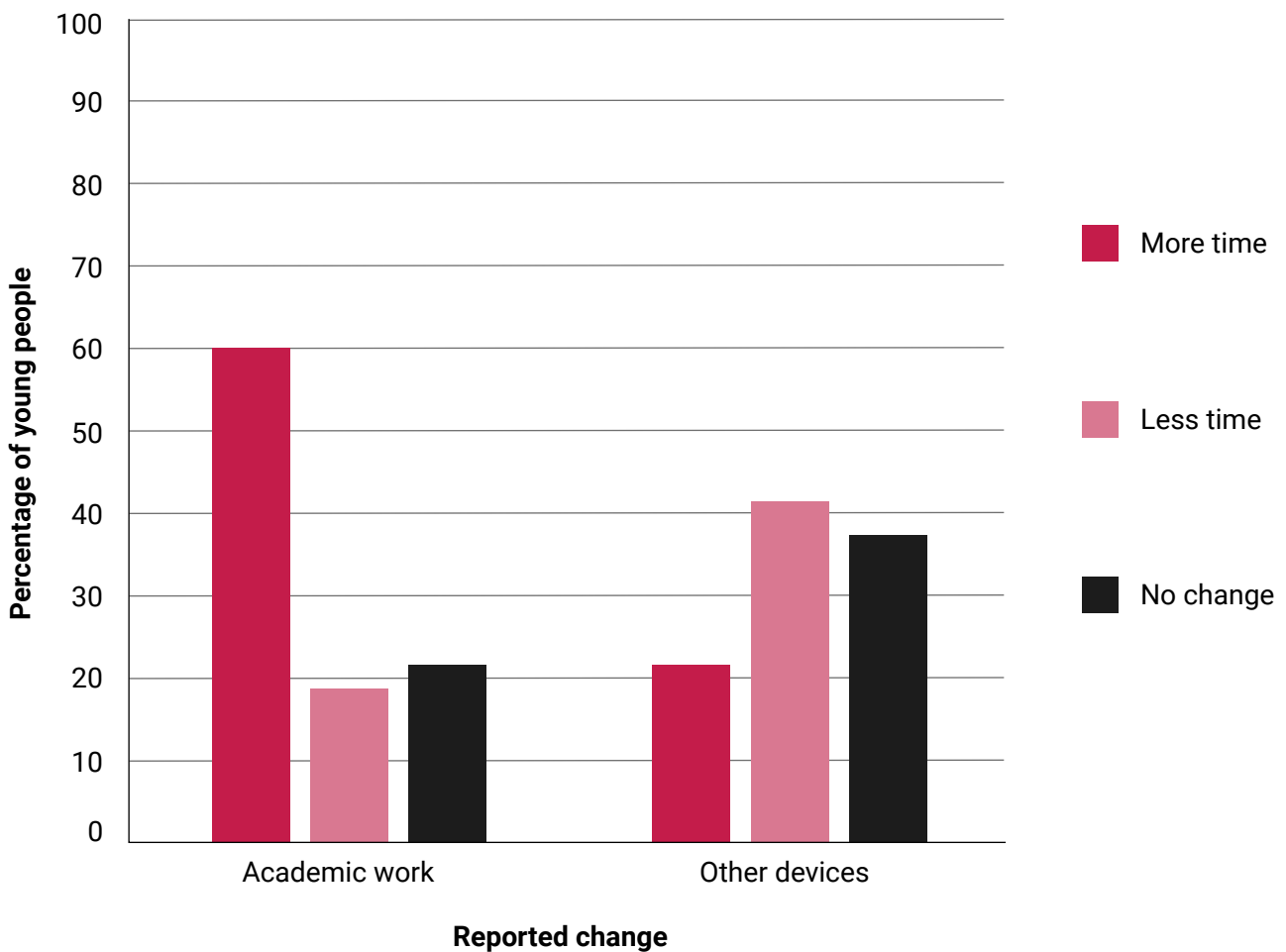
Figure 3: Percentage of young people reporting a change in time spent on academic work and on other devices since receiving the Raspberry Pi kit

The case studies and interviews highlighted some reasons for the changes in time spent on academic work and on other devices. For example, in the case studies, many young people explained that the Raspberry Pi kits meant that they could access online learning and do academic work at home:

> "I don't have to walk to the library every other day when I know I can just open my Pi computer and directly start my homework."

> "I would not have been able to do my college work as I have no IT equipment at home at the moment, and it is really helping me as more work is being set online."

> "Going into Year 11, it is a really important time at school. Due to coronavirus, my whole year has been sent home and given online lessons, which I can now do."

> "It makes it so much easier to get my work done, I don't have to stay behind at school. I can come home and do it."

Many young people also explained that they could work more easily and effectively since receiving the Raspberry Pi kits:

- 37 young people said that the Raspberry Pi kit had made it **easier to do their academic work**

- 20 reported that they were **doing more academic work**

- 8 said that they could now **complete academic work on time**

- 5 mentioned that they could now **work somewhere with fewer distractions**

- 4 commented that they could now **complete academic work more quickly**

> "Having the kit has made it much easier for me when doing my work. I am able to send things on time and do all my homework."

> "It made it easier for me to do some work. It was hard to see everything on my phone so I just didn't do it."

> "I spend so much time on it, but it's so good! Both me and my sister share it for all our schoolwork. I enjoy doing my schoolwork now. I use the program on the computer to do extra work for school so that I get better grades."

Out of nine responses in the interviews, eight young people mentioned that since receiving their Raspberry Pi kits, they spend **more time on homework**. For three others, **the kit is significantly better** than computers that they had before. **Broken or slow computers** made it difficult for these young people to complete their homework. Now, they have the possibility to do their homework, and in a way that is faster than before:

> "Before I got my computer, I had a really old laptop, but it's really slow, so it doesn't really work that well. So the Raspberry Pi really improves and helps with my homework stuff."

> "I did have computer access, but the thing is the Pi's actually quite a bit faster than my laptop. I think it's just because [...] my laptop, it just makes [doing homework] that much slower."
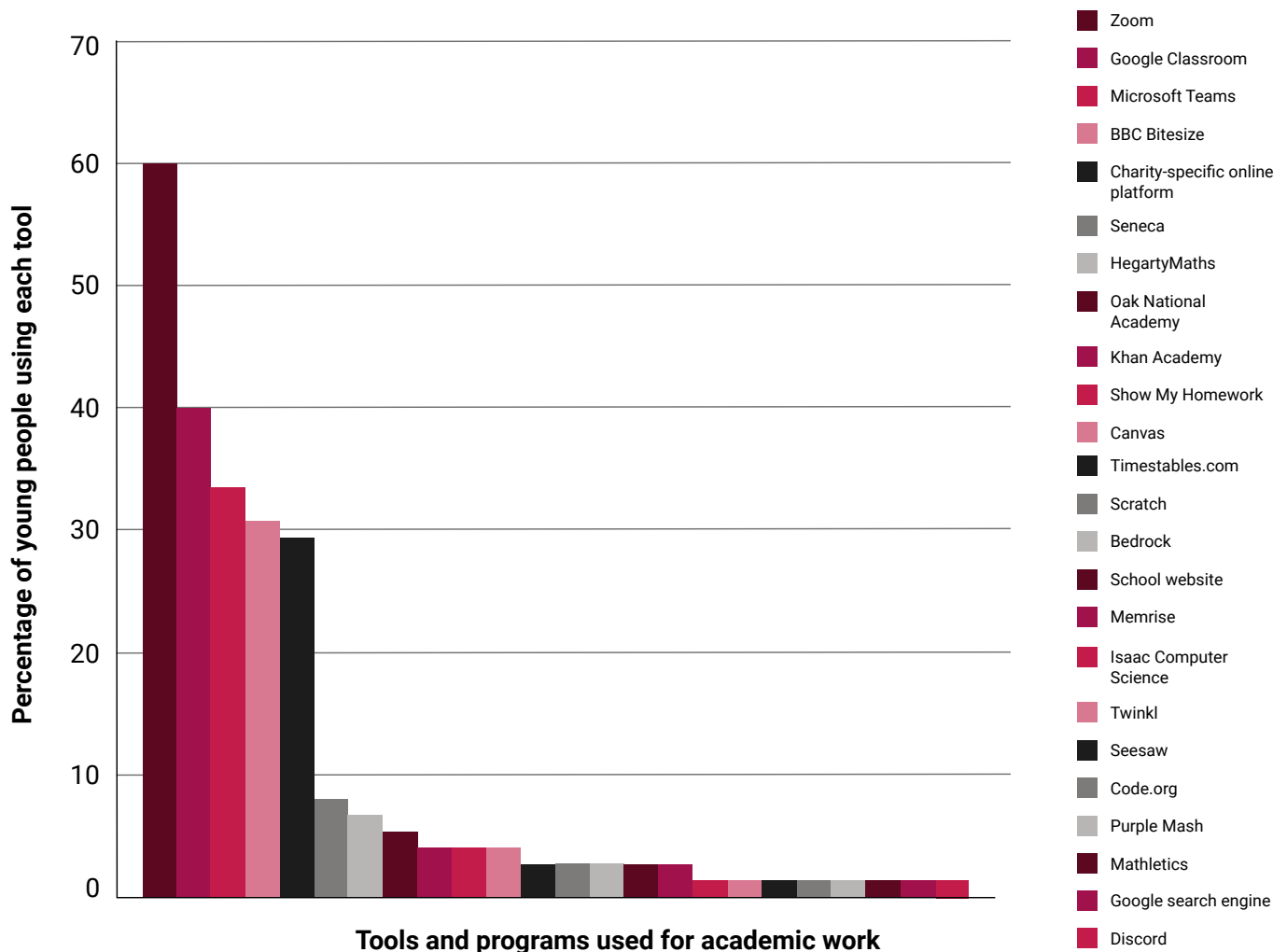
Three of the young people interviewed did not have access to a computer at home at all before receiving the Raspberry Pi kit. In some cases, this meant that the young people had to use phones, or were not able to complete their homework. For one young person, the Raspberry Pi kit was a "lifesaver":

"I'm not going to lie. I hadn't had a laptop for a long time. My laptop broke recently, so I thought the Raspberry Pi was... it was a lifesaver in a way because I didn't really have anything. So yes, it's actually helped me out a lot. I actually use it quite a bit for my work. Before the Raspberry Pi, it was quite a struggle because I'd have to go to libraries [and] internet cafes. So it was a bit hard. So this has actually been really good for me."

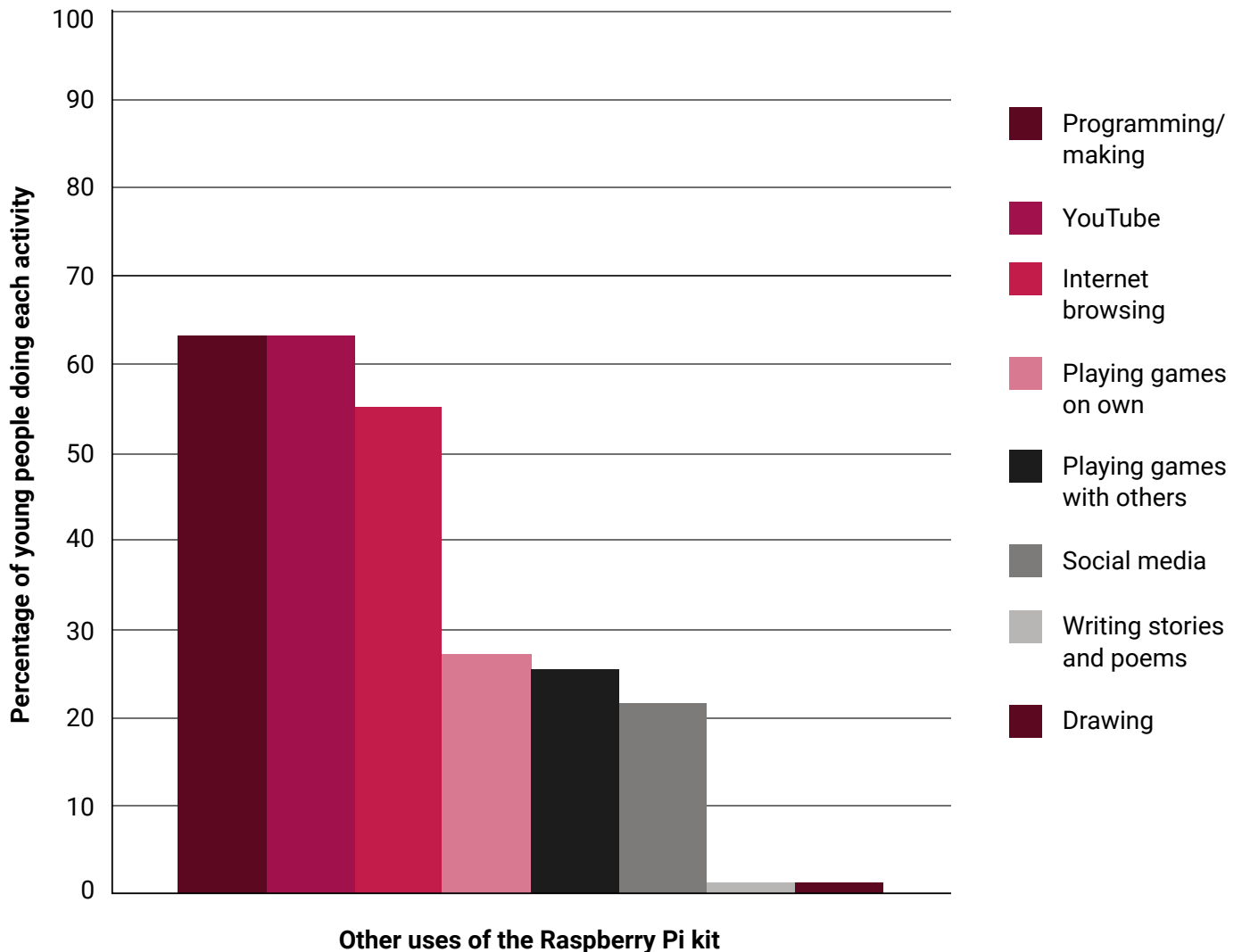# How the young people were using the Raspberry Pi kits

How the young people were using the Raspberry Pi kits

In the follow-up survey, young people reported using a wide variety of tools and programs on the Raspberry Pi computers for academic work, as shown in Figure 4. The most commonly used tools were those that supported communication, such as Zoom, Google Classroom, and Microsoft Teams, but young people also reported using a number of different tools to support their learning, with the most popular being BBC Bitesize. Around 20 young people identified different activities that they accessed through their youth or community organisation's own online platform, including advanced coding classes and makerspaces.

Legend:
- Zoom
- Google Classroom
- Microsoft Teams
- BBC Bitesize
- Charity-specific online platform
- Seneca
- HegartyMaths
- Oak National Academy
- Khan Academy
- Show My Homework
- Canvas
- Timestables.com
- Scratch
- Bedrock
- School website
- Memrise
- Isaac Computer Science
- Twinkl
- Seesaw
- Code.org
- Purple Mash
- Mathletics
- Google search engine
- Discord

Figure 4: Tools and programs used for academic work on the Raspberry Pi computers in order of popularity, as reported in the follow-up survey

The Raspberry Pi kits were also being used for other activities, presented in Figure 5. More than half of the young people reported using the kits for programming or making (mostly those who were accessing their youth or community organisation's online platform), along with more general internet browsing or watching videos on YouTube. Fewer were using the Raspberry Pi kits for gaming or social media. One young person reported using their Raspberry Pi kit for other creative purposes, such as drawing and writing stories and poems.

Figure 5: Other uses of the Raspberry Pi kits in order of popularity, as reported in the follow-up survey

The interviews also highlighted a number of new skills that young people were learning through the use of the Raspberry Pi kits. Some young people were using the Raspberry Pi kits to learn more advanced computer skills, such as Linux usage, command-line programming, or coding in Python:

"I was messing around with something... [that] allows you to run [...] programs on the Pi. You can run something [...] which means that you can emulate Windows programs on the Pi. I've been messing around with that, it's quite fun."

"Well, when I first got it, I tried to learn Python, but I've never done it before. So it was with some Python editors and stuff. I basically made a bug that drew weird shapes, and you could change the shape with numbers."

The majority of conversations showed that the young people had learned basic ICT skills with the Raspberry Pi kits, such as using a desktop computer and mouse, or even skills such as changing the background or using LibreOffice:

"I've never used a desktop before. And I've also learned how to control the mouse. I was exploring how to make stuff, and then to do some crafts. I've been making small rockets and I've also been making a box to put your money inside. I've made some games, and I've also made some paintings."

"I want to say Raspberry Pi is a bit different, especially like instead of having Word and Microsoft, I think it's called Libra or something like that, if I'm not mistaken. So, obviously, it did take a while for me to get used to it, but it is kind of like Word. It's quite similar. So I guess I've kind of learned how to use that, in a way."

Impact of the Raspberry Pi kits on the young people and their families

Impact of the Raspberry Pi kits on the young people and their families

In the follow-up survey, the young people were asked about their confidence and interest in computing on a scale of 1–5. Average scores of 4.08 and 4.19 suggest a high level of both confidence and interest, respectively. When asked whether this had changed since receiving their Raspberry Pi kits, more than half of the young people reported increased confidence and interest, with the remainder reporting no change. None of the young people reported decreased confidence or interest.

As part of the case study interviews, youth and community organisation partners asked young people, "Has having the kit affected how you feel about doing your school/college work?", to which 68% (129) of the young people answered "Yes":

- 37 young people said that they **enjoy doing academic work more now**, or simply that they **enjoy doing academic work using the Raspberry Pi kit**

- 26 said that they were **happy/excited** about having the Raspberry Pi kit and about the new opportunities that it provided

- 18 reported that they felt **more confident** about their academic work now

- 10 said that they felt **more motivated**

- 7 reported that they felt **less stressed/anxious** now that they had the Raspberry Pi kit

- 6 spoke about **feeling more "normal"** now that they had a computer like their peers

- 3 mentioned feeling **less isolated**

- 1 described feeling **more independent**

Across the follow-up survey, case studies, and interviews, the young people explained a number of ways in which the Raspberry Pi kits had affected their learning and opportunities. Some key themes are outlined in Table 4.

Table 4: Key themes and example responses of the impact of the Raspberry Pi kits on young people's learning and opportunities

Theme	Example responses
Ease of completing homework and ability to submit it on time	"Last year I used my mum's smartphone. It wasn't really smart so I spent ages to submit my homework. I had detention many times because I couldn't do or submit my homework on time... I do my homework on time, I do my research, I download pictures for my homework. Without being afraid about the delay." "Easy to complete homework efficiently and in less time."
Having their own device and not sharing with others	"I have my own computer to do my schoolwork, which has been really good when I have been self-isolating." "I feel so positive, like I can spend quality time and not get rushed to do my work, as I used to do it on my mum's phone, and then she needed it too." "It is my own. I learned how to work on it, switch it on and off, and I enjoy using my computer for school and to play games." "Obviously, I feel more confident because it kind of

does put less stress on you, knowing that you can come home, just do your work whenever, submit it. But before, before I had the Raspberry Pi, it was quite hard. I didn't really feel too confident because I was always stressed out about where I'm going to do my work, know what I mean? Especially currently now, corona, it's really hard because nowhere is open like that, especially libraries. Even before I got the Raspberry Pi, I think they would only allow [me] in the library for an hour. So, what's an hour really going to do for me? So I feel like this has really helped me out."

Connecting with others

"I felt a bit left out during lockdown because a lot of my mates would do work at home with their folks online. It's not that I didn't want to do my work, it's just that I didn't have a computer at home to do it on. Also, during lockdown, lots of my friends were talking to each other online and I couldn't join in as much."

"Working online on project ideas with other young people on [the youth or community organisation] platform with my Pi."

"[The young person] has managed to do her school homework on it, and whilst she's been off school poorly, she has been able to use it to keep up-to-date with learning. She uses the computer every day, and it has made the difference between her keeping up-to-date with her education."

Improved understanding of academic work

"Now I get to research and get the correct answer, where before I used to guess more answers. So it's better for me to get the right answer and understand as well at the same time. Yes, I feel like I've improved and I'm understanding more. Because our homework is connected to learning, I can understand what the teacher's now saying."

"I find it so much easier now that I have a computer to do my work on, because I have Google and then if I don't understand something, I can always email my teacher and they can just email me and tell me this is what. So I find it easier to do work on a computer now than I did when I was in school."

"Because my school nominated me to have one, I am really lucky because lots of other children didn't get one. I realise how lucky I am and want to show my teachers I deserved it. With lots of brothers and sisters in the house (including some with disabilities) it can sometimes be difficult to get any peace to concentrate. My computer is now set up in my bedroom and because I have a webcam, I can go online and ask my friends if I get stuck with something."

New opportunities for learning

"I think the best things were helping my mum learn how to use a computer and learning how to put together my own computer. I also think experimenting on the computer was also exciting."

"I can now join in the STEM girls club activity at [the youth or community organisation]."

"I can build and use my imagination to make things real in tech."

"This has helped me think about my code games that I build and how to use my Pi with Python more instead of Scratch."

Future impact measurement

Future impact measurement

The first phase of impact evaluation covered in this report has been useful in identifying issues with distribution and setup of the Raspberry Pi kits, as well as how best to support youth and community organisations and the young people who they work with. It also demonstrates the impact that the Raspberry Pi kits have had on young people in allowing them to access and complete academic work from school or college, which looks set to remain a challenge for young people, particularly those from disadvantaged backgrounds, for some time to come.

The first phase has also highlighted aspects of the original design that worked well or that could be improved for future evaluations. For example, it has been very difficult to collect ongoing survey data as planned, which affected the analyses that could be conducted. While the interviews and case studies have been very useful for our initial understanding of the impact of the programme, they are extremely time-intensive for both RPF staff and youth and community organisation partners. For future phases, it may be more beneficial to focus this time and effort on supporting young people to complete the follow-up survey. Finally, some future phases will involve distribution of the Raspberry Pi kits through schools, providing an additional opportunity to collect data on teachers' perspectives of the impact of the programme on young people's learning and engagement with school. Focusing on these areas will complement the data collected from the young people and families through the surveys, and from the first phase of evaluation, to provide a more detailed picture of the impact of the programme going forward.

Building on the success of this programme to date, we are planning to increase the roll-out of kits to more community partners and schools around the UK. To make this possible, we are reliant on the generous support of our funders. If this programme is something you or your organisation would like to get involved in, please contact **partners@raspberrypi.org** for more information.

Raspberry Pi

code club

CoderDojo