

Recipe for a Kano Implementation



You're an Engineer!

Tie everything together that you've learned about Creative Computing--You're an Engineer!

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Overview

Now that you're planning your Kano Lab, we've got some resources to help you get up and running.

Further communication and support:

- Connect with us & to our global community! Mention us on Twitter **@TeamKano** and post / like us at our Facebook page **@KanoComputing**- we love pictures, quotes, questions, and feedback.
- If you have any questions or ideas, you can always email us at education@kano.me.
- Our [help center](#) and [forum](#) have answers to many Frequently Asked Questions.
- Thousands of learners and makers share their creations on [Kano World](#) - a safe, fun coding community for all

Kano philosophy

We are creating a world where anyone, anywhere, can learn, make and play with technology, not just consume it. From kids in [Sierra Leone](#) who never had a computer, to young makers in the [UK](#) and [US](#) - all are part of the new creative generation.

- A computer is now cheaper than a curling iron. 2.5 billion of us have one in our pocket: a sealed sapphire screen, a million times more powerful than the mainframe that took Apollo to the moon.
- But for all that power, a tiny 1% of 1% of us can do more than swipe – only 50 million of us can program, according to IDC.
- But the **new creative generation is rising**, from Santiago to Shenzhen, combining music and code, silicon and open-source. They need tools, not just toys. Curation and explanation, not just disruption.
- The first PC revolution was about computers that anyone could use. The next PC revolution is about computers anyone can make.

Here are some of the ways our schools have brought that spirit into the classroom:

- Branding Kano students as beta testers for a product and teaching them about the importance of feedback, Product Development, and [Design Thinking](#).
- Scheduling Google hangouts between the students and Kano team to give authentic feedback and meet a technology company. Email education@kano.me if you are interested.
- Decorating the room (see the "[Setting up your space](#)" section) and continuing to post achievements in a physical way.

Logistics

Learners

Most of our school users are **ages 8 - 12**, or **grades 3-6** in the US and **Key Stage 2** in the UK.

With younger students, the most difficult aspect is typically reading instructions and typing, so while it is possible to run workshops with younger kids (ages 6-7), we'd recommend having extra support (as a child may have at home) to help with reading or writing difficulties.

With older students, you may move more into physical computing, using the Pi with other sensors or boards. There are wonderful resources available at the [Pi website](#) for different projects. Additionally, you could move further into different coding-focused programs, with more advanced projects in Scratch or teaching Python using the Codecademy content available on the kit.

Teacher profile

The profile of a Kano teacher certainly varies. Kano can very much be a **self-guided** program, as young people can build and get started coding with little guidance. Anyone, anywhere can run a **Kano workshop**.

Over the past 4 years, we have seen wonderful **teacher-led** programs as well, and we have an education team that supports teachers who bring Kano to groups of young people at a time. Our resources here and on the [educator page](#) are to help those who want to add some structure to the Kano experience. Teachers of all disciplines, all over the world, use Kano Computer kits and apps to bring computational creation into their

curricula."Here are some guidelines we'd recommend for teachers and program leads:

- At least 1 adult for every 12 students; during the initial computer building experience, and for younger learners, we'd recommend 1 adult for every 6 learners.
 - A lead teacher to plan out Kano projects ahead of time and determine the structure of the overall program. This person should have teaching experience and aim to foster curiosity and exploration.
- An IT specialist in the building or on call to help with any tech issues that come up, especially during the first session.
- **A note on subject expertise:**
 - Specific subject expertise is important if the program is intended to teach something specific, including coding. If the goal of the program is to get kids up to a certain level of proficiency in Python for example, then it would be desirable to have a teacher involved who has programming experience.
 - Otherwise - we've found that teachers with goals of bringing creativity to programs are a great match--even without a background in computer science or technology!

Number of kits

For optimal engagement, we would strongly suggest having a maximum of 2 students using one Kano Computer kit at a time. 1 Kano Computer kit per student is ideal, especially as students work with the software or for more advanced learners.

We certainly aim to promote collaboration and teamwork as part of the Kano program, and we would certainly suggest having a blend of group discussion and teamwork with the Kano Computer kits. In each of our [lesson plans](#), we aim to include portions where students share with one another or work together on certain aspects.

You can again share kits across multiple classes or reuse in multiple workshop settings (see "[Sharing Kano Computers and Account Creation.](#)")

Here are some of the ways teachers have used different packages based on budget and setting:

Bundle	# of kits	Uses
Starter Pack	1-4	Kano-and-tell: Students take home kits and come back in at the end of the week with a show-and-tell--a great way to show to families what students are learning
		Monitor art: Teachers set Kanos up with screens at school, and learners can create during breaks.
		Homeschooling: Educate students at home with Kano.
Group Pack	5-9	STEAM cart: Schools or classes equip a mobile cart with kits for teachers or students to check out for certain projects or lessons.
		Innovation pod / Lab / Makerspace: Schools or libraries set up a Kano section and run workshops or allow students to take home.
		Code club: Teachers, parents, or even students can start up afterschool coding clubs.
Class Pack	10 -30	Class set: Each student in the class, perhaps some in pairs depending on class size, would have a Kano. The class can work on Kano projects at the same time.
		Camp or club set: Each student in a club or camp can purchase a kit as part of the program. Another model is for clubs to own a set of Kanos to bring to schools or run workshops on site.
		School zone: Equip the entire computer lab or makerspace with Kano Computer kits.
Master Pack	50+	Corporate gifting: Provide Kano Computer kits to your employees, along with trainings for parents with their kids.
		Kano Academy: Several schools have equipped multiple classrooms with Kanos.

		<p>Ongoing clubs: Clubs run multiple camps with Kano and provide the Kano as part of the club package. Our bulk discounts increase at scale as well.</p>
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The Kano Computer

You can purchase the Kano computer kit with or without the screen.

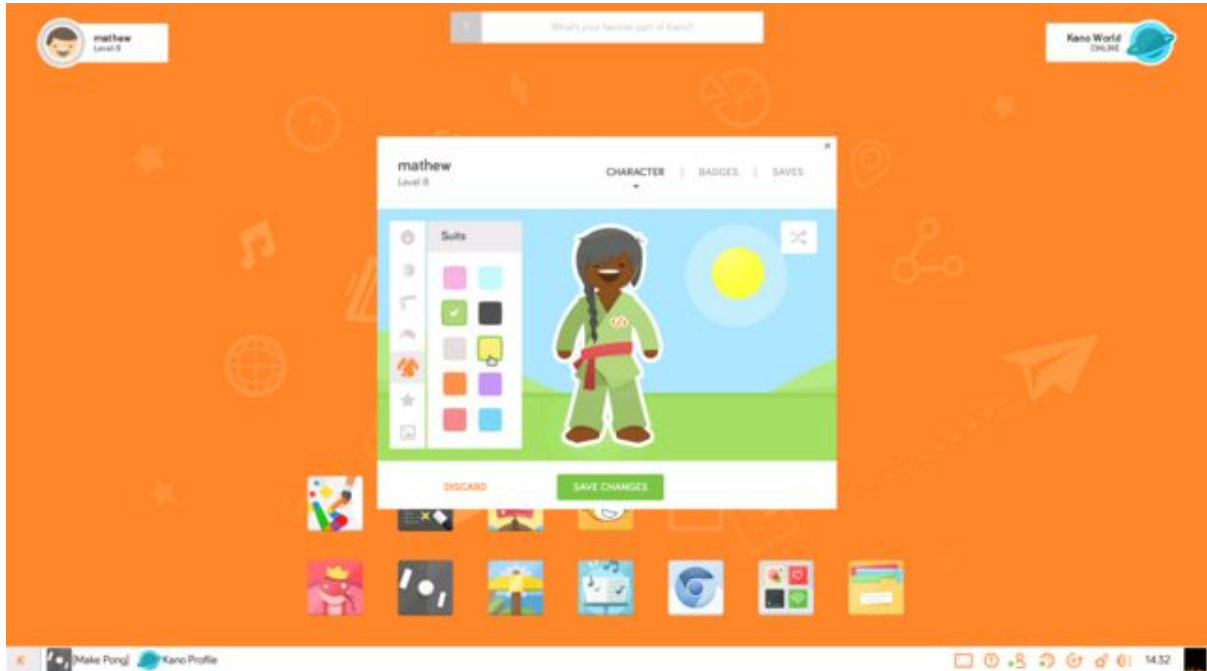
Every Kano computer kit must have an HDMI screen for display. If you don't have an HDMI port, you can purchase a VGA to HDMI adapter. Learn more about adapters we'd suggest [here](#) on our help site.

The [Kano Screen Kit](#) is a great monitor and tote case for the Kano Computer. If you don't have HDMI screens in your school or club, you may want to opt for the Kano option, as it's optimized for displaying from the Kano OS and Raspberry Pi.

In more detail, the Kano system includes:

- Hardware: Computer anyone can make, includes key components:
 - Computer board: As of 3 March - Now with new Raspberry Pi 3!
 - SD card with Kano OS
 - Beautiful orange keyboard
 - Speaker
 - Case with customizable stickers
 - HDMI & Power Cables
 - Optional: [Screen](#) you can make! 10.1" LCD screen, 1280 x 800, 720p (scales to 1080p)
 - Add on: [Programmable LED lightboard](#)
- Software: Operating System optimized for education
 - Onboarding flow that walks students through writing their first lines of code in an exciting way.
 - A curated desktop with educational apps that work even without internet connection. Apps include:
 - Make Art - create art with code
 - Make Music - create songs with code
 - Make Minecraft (special version of Minecraft with further coding functionality)
 - Make Snake & Make Pong - change the rules with code

- Scratch
- Terminal Quest - Exciting journey that challenges students to use code to solve problems
- (With internet connection): Access to educational apps including Codecademy content, Kahoot!, and more!



- Web: Kano World (world.kano.me): Web portal where creators share the art and games they've built. [Make Art](#) and some of our other apps are also accessible from the web - learners can code their art from any computer and switch between laptop, mobile, and Kano!

Other Equipment you'll need

Every Kano computer requires power. Your room will need to have power outlets near every Kano unit. The Kano screen comes with a power splitter, so the screen and the computer can use the same power supply unit and require one outlet. Make sure you're prepared with enough power strips for your group.

Make sure to have the wifi password handy when your students get powered up if you aim to connect to the internet, as they'll be asked for the wifi information. Again, internet connection is not necessary but will allow students to save work to their accounts and share, as well as download other educational apps.

Sharing Kano Computers & Account Creation

Kanos can absolutely be disassembled and put back together again, and many teachers share Kanos with multiple classes; libraries may hold a set of kits for check out or run workshops that require kit reuse.

One thing to keep in mind with kit sharing is account creation. When learners power up the Kano for the first time, they go through a wonderful onboarding flow and account creation process. In order to make sure that happens with a new user, and to support multiple accounts per kit, you can follow a few simple steps listed [here](#) on our help site.

When more than one student creates an account on a kit, the account is associated with the SD card in the kit. It's important to map SD cards to Kano users for this reason - each account created with a specific SD card will remain on that SD card. We would recommend **numbering** each SD cards and keeping track on a log sheet, like the one below. Email us if you'd like a copy of this exact sheet.



CLASS:

SD Card #	Student	Account name	KW Username	KW Password
1				
2				
3				
4				
5				
6				

Account creation & student email addresses

One more note on account creation - students will be asked for their email addresses when they set up Kano accounts. Kids will be emailed about exciting challenges and updates in the community, and they will be able to share their creations easily with their teachers or parents.

Please prepare for this step in the process if you need permission from parents to share this information. Otherwise, you can have kids enter one single email address for the class or a mock email address in order to move forward.

Kano program tips

Setting up your space: We've seen rooms of all shapes and sizes work for a Kano implementation--creative use of space is part of the fun! If you're looking to design your space for a Kano implementation, we have a few ideas from our community to share below.

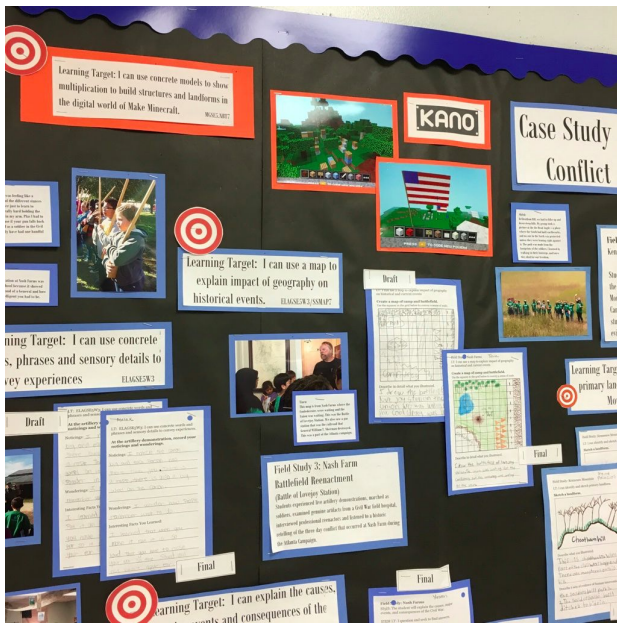
You can feel free to use images from our press pack at press.kano.me to decorate.



Kano door



Kano bulletin board - kids post their learnings



Kano project board

Room setup:

Large round/square table - To facilitate student interaction, some classes will form a circle or square, with students facing center.



Student groups at small tables - You may for example include 2 groups of 2 students per table, with a Kano for each group. The groups can then discuss and collaborate for certain projects.

Traditional long table - Sometimes, it's not possible to move tables or computers given space and access to power. No problem! As long as students have a small amount of space for building the Kano initially, the computer is small and can be used on just about any surface.



The session

When using Kano, we recommend anywhere from 45 minutes - 90 minutes per session. In the first session, you'll assemble the computers and get started with coding. (You can see the content section and the projects on our website for tips on how to structure this session.)

Beyond that, you can implement various projects with the Kano software and hardware. We recommend spending some time to introduce the topic you'll cover, and then really allowing students to lead learning. You can allocate time for kids to share in groups and for group discussion.

One of our partners implemented **Engineering Journals** at the end of each session, where the children reflect on what they've learned for the day and answer a set of questions. This journal can be digital (on the Kano) or physical.

Kano Clean-up and Storage

Taking care of technology is important, and our teachers have made Kano clean-up part of the lesson. Once kits are assembled, most teachers will leave them assembled and store them on a Kano shelf or cubby labeled with the student's kit number. The computer, power cable, and keyboard fit nicely into the back of the screen for those with Kano screen kits, and in other cases, those items will be stored together with the computers. In lab settings, the kits may remain connected to their screens.

One creative idea: teachers assign Kano keepers each week to make sure all equipment is put away properly. Students earn their "Kano keeper" badges after they are on clean-up duty.

We know that things can go missing! If you need any extra keyboard connections, cases, or wires, just send us an email, & we're happy to send extra parts your way.

Learning and Sharing Day

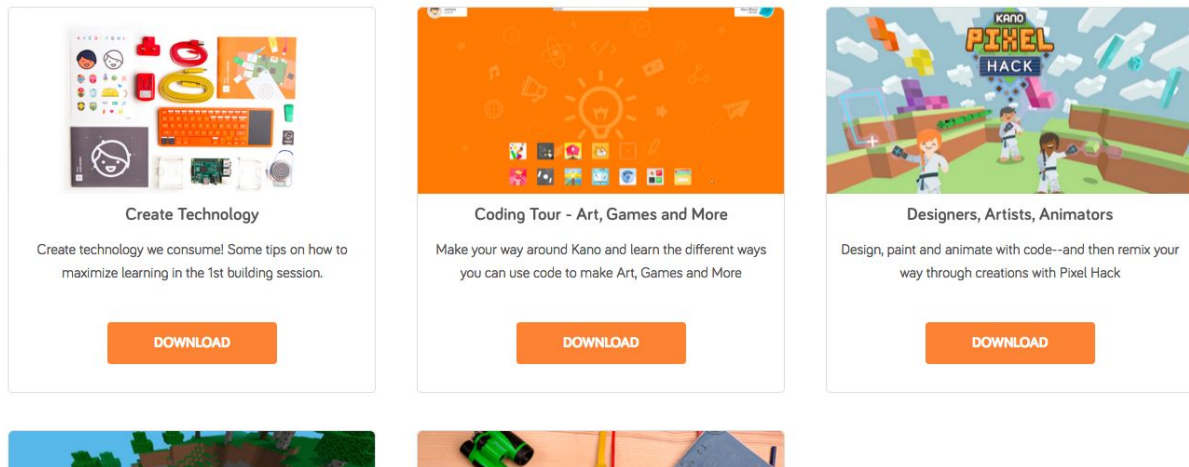
One really great way to wrap up your Kano program is to invite families in to share what children have learned. You can center the day on a specific project that the kids will present, or hold a panel, where kids prepare questions for panelists (which can be students as well, teachers, or parents). Let us know when you're scheduling your event, and we can promote and support it!

Content

Kano has been integrated into STEM and STEAM curriculum worldwide, and we work with educators to help tailor resources we have to meet your needs--whether those are state standards, school philosophy, or important subjects.

We're growing projects on our [educator site](#) and will continuously publish new resources there to help you.

Getting Started with Creative Computing



We suggest a **project-based** approach--creating projects or tailoring some of our projects to meet your needs. These projects center on using the Kano apps or hardware components to focus on anything ranging from computer literacy, to coding, to art and music.

We've seen a few models work for implementing projects:

- Kano projects can be implemented during your class or club, on allocated days of the week. You can select a certain number of projects to run based on the class schedule, amount of time, and other topics to cover.
- Kano can be the core technology used for a club or camp. You can have a projects for each session.
- Alternatively, learners can have 1 central project they work on with Kano.
 - One camp had young creators work in groups to craft a Kano play, coding the music in Make Music, scenery in Make Minecraft, costumes in Make Art, and script in Leafpad. At the end of the camp, groups shared their plays
- We've integrated at both ends of the spectrum- programs focused on **learning to code** and those aimed at **integrating technology across subjects**.
 - The apps optimized for learning to code are: Terminal Quest, Scratch, Make Art, and Codeacademy content.

Please check out our resources, which will continue to grow. The [Pi](#), [Scratch](#), and [Minecraft](#) each have wonderful communities with content as well. **Just make sure that with Scratch and Minecraft, you're**

looking at projects that work on versions that run on the Raspberry Pi computer.

We aim to empower our community to publish resources as well, so please send us your suggestions - education@kano.me.

Outcomes

Our goals at Kano revolve around engaging young people with technology; building confidence around technology; creative thinking; and fostering 21st century skill development. You can find a sample "Goals and Outcomes" pulled from a few rubrics we created with partners below. If you'd like to work with us on a survey for your students or to tailor these outcomes to your needs, let us know.

Sample Goals and Outcomes for Kano Implementation			
Need	Goal	Indicator of Success	Good references:
Students have low engagement levels	Students will increase engagement in learning about and using technology.	Surveys distributed to students; Interviews; Hours spent engaging with technology; Completion of projects	Research shows how critical it is to reach back further in pipeline to engage students with technology in primary school. http://www.oecd-ilibrary.org/docserver/download/9612031e.pdf?expires=1452681801&id=id&accname=guest&checksum=C9167EE8CA87ABAC5860F9775F09EB23 ; https://www.kcl.ac.uk/sspp/departments/education/research/aspires/ASPIRES-final-report-December-2013.pdf
Students have low confidence in their ability to use technology	Students will gain confidence in their abilities to talk about and use technology. Students will be	Surveys distributed to students; Interviews; Willingness to try new things with technology; Desire to try and fix issues that arise; Participation in	Research shows links between confidence in using technology and desire to pursue a future that involves using technology.

	more resilient when faced with a challenge in IT.	Learning and Sharing day at end of term	http://services.google.com/fh/files/misc/images-of-computer-science-report.pdf
Students do not have many opportunities to blend creativity and technology; Students do not have many opportunities to integrate technology across domains, including music, language arts, and writing.	Students will create, not just consume, technology; Students will blend science, technology, engineering, arts, and math (STEAM), for example to code pictures, depict scenes from history, and build their own games.	Assembly of fully functional computer; Completion of projects; Participation in Learning and Sharing day at end of term	http://cdn.nmc.org/media/2015-nmc-horizon-report-k12-EN.pdf ; http://www.publications.parliament.uk/pa/ld201415/ldselect/lddigital/111/111.pdf
Students do not have many opportunities to integrate technology to solve authentic, real-world problems, important for 21st century skill development .	Students will use technology to solve authentic, real-world problems. Students will describe ways technology is used in the real world, for example in film, tourism, or music. (Optional add-on: Students will describe how they will use technology in the future or in their desired careers.)	Reflections in students' engineering journals; Engagement in discussions on using technology in the real world (optional: these can include career talks); Completion of projects	https://net.educause.edu/ir/library/pdf/ELI3009.pdf