

# QR Codes 101

QR codes are a fast, easy, free, and fun way to spice up your lesson plans and school communication by linking the brick-and-mortar world to the digital domain. If you're not using them in your classroom yet, here's a primer and some inspiring ideas to get you started.

One hot July afternoon, a teacher was leading a group of ninth grade students on a tour of the World War II memorial in Washington, D.C., methodically stopping at each part of the monument while lecturing about its historical highlights. Unfortunately for the teacher, his students were highly distracted by another tour that was visiting the monument at the same time. Those adult tour participants weren't following around a typical tour guide but instead consulted their own mobile devices and small booklets. As they reached different parts of the memorial, they used their phones to scan quick-response (QR) codes that linked to supplementary historical videos, WWII radio broadcasts, and webpages with related information. The adults were very engaged in completing learning tasks that required them to access various parts of the monument, much like a scavenger hunt. They didn't need to stay together as one large, unwieldy group, but instead moved around in small groups and at their own pace. They could even revisit some sections or

replay audio or video clips as needed to complete their tasks.

The ninth graders couldn't help but peer over the shoulders of the adults to see and hear the digital content that was bringing their tour to life. One student whispered to another, "I wish we were in that group."

The adult tour was a mobile scavenger hunt hosted by ISTE's Special Interest Group for Mobile Learning (SIGML) at ISTE's 2009 conference. The easy access that QR codes provided to information was a big part of the tour's success.

QR codes are versatile tools to extend learning inside and outside the classroom. You can use them to give students quick access to additional content, from the practical—such as links to assignments and websites—to the engaging—such as audio and video clips or clues for games. And, as their name suggests, QR codes save precious class time by speeding up activities.

Ready to give QR codes a try? Read on to learn how to make them, how to read them, and how to use them inside the classroom and out.

## What Is a QR Code?

A QR code is a two-dimensional scannable code, similar in function to a traditional bar code that you might find on a product at the supermarket. The main difference between the two is that, while a traditional bar code can hold a maximum of only 20 digits, a QR code can hold up to 7,089 characters, so it can contain much more information.

As you can see here, QR codes are shaped like a square made of a combination of black and white pixels. The smaller squares in the three corners of the code make it readable from any angle.

QR codes can contain a variety of different types of data, including:

- Text, such as a short message or contact details
- URLs to websites or multimedia content, such as videos
- Coordinates on a map
- A phone number or text contact



QR codes embed more than 350 times as much information as the old-fashioned bar codes that retail and grocery stores use.



Scan this one to watch a video of SIGML's 2009 mobile scavenger hunt at the World War II Memorial in Washington, D.C.



The booklet that SIGML provided to participants to guide them through the WWII Memorial tour included QR codes

like this one, which links to a recording of Franklin Delano Roosevelt's Day of Infamy speech, to provide background on each part of the monument.



## How to Read a QR Code

If you've never scanned a QR code before, now's a perfect time to try it. You will need a mobile device with a camera, internet access, and a QR code reader app. The type of device doesn't really matter, as long as it has a camera and an internet connection. You could use a smartphone of any kind, a tablet, a PDA, or even a laptop with a web-cam. The readers are usually free, and a simple search online or in the app store of your choice will bring up many options. QR code reader sites will usually

automatically download the version of the reader that your device uses.

Once installed, all you do is open the app, and the reader will access the device's digital camera and go to scan mode. You usually don't even have to push a button; you just need to make sure you can see the entire QR code in the target box on your screen. The reader will convert the embedded information, and your mobile device will perform the action contained in the QR code, such as take you to a webpage.

## How to Create Your Own QR Code

Say you want to create a QR code that directs people to your school's website. Just follow these five simple steps:

1. Find a QR code generator.
2. Choose the type of code you want to create.
3. Enter the information.
4. Click Submit.
5. The QR code should appear on your screen. Copy and paste it, or save it to your computer as an image file for future use.

Easy, right? Just the same, here are a few tips to help you avoid problems:

### Print QR codes at least an inch square.

You can create QR codes in any size you want, but keeping them at an inch or bigger will ensure that all devices will be able to scan them. Newer smartphones have higher-resolution cameras that can read much smaller codes, but not everyone has the latest model.

**Don't crop too closely.** A thin white border must remain around the QR code so the scanner can discern the code from other information around it, such as text or pictures on a page.

**Use a URL shortener.** Long URLs can make a QR code more complicated, as it has to hold more information. Shortening the URL with a program such as bit.ly will result in less complex QR codes.

**Stick to flat surfaces.** You can place QR codes on many different items—bookmarks, posters, T-shirts, mugs—or even 12 feet high on the side of a building. But if the area is too curved, it will be difficult for a scanner to get a good read.

**Test it first.** If it's the first time you're using a particular QR code generator, you should test at least one code on as many different devices as you can before going public with it.

Step 1



Search for and install a QR code reader. The screenshots here feature i-nigma.

Step 2



Open the application.

Step 3



Scan the code, making sure the entire code is inside the red box.

## QR Code Readers

A few of the most popular QR code reader apps are BeeTagg, i-nigma, KAYWA, Quickmark, and ScanLife. You can find them in the Apple App Store or Android's Google Play marketplace.

## QR Code Generators

While it's usually easier to scan codes using a mobile device, you can create them with any computer that can access websites like the ones below. Some programs, such as BeeTagg, can both generate and read codes.

**BeeTagg:** [www.beetagg.com/en/beetagg-qr-generator](http://www.beetagg.com/en/beetagg-qr-generator)

**BeQRious:** <http://beqrious.com/generator>

**Delivr:** <http://delivr.com/qr-code-generator>

**KAYWA:** <http://qrcode.kaywa.com>

**Maestro:** [www.sparqcode.com/static/maestro](http://www.sparqcode.com/static/maestro)

**Mobile-Barcodes:** [www.mobile-barcodes.com](http://www.mobile-barcodes.com)

**QR Stuff:** [www.qrstuff.com](http://www.qrstuff.com)





## QR Codes in the Classroom

There's a plethora of interactive and background digital information out there, ready and waiting

to turn run-of-the-mill lesson plans into engaging activities that students love. Here are a few ideas that you can adapt to your subject area and grade level.

**Make displays interactive.** You have only so much wall space in the classroom. Why not add QR codes to a display so students can learn more? The codes could take them to a video or website with additional questions, clues, or information. Remember that you can do this with any kind of display. For example, you could label parts of a skeleton with QR codes that link to videos about how a particular joint moves. You could also add QR

codes to locations on historical maps and link to digital information about important events that happened in those locations.

**Promote a book.** Tag books in your classroom library with QR codes that link to background information or student-created reviews. This will make choosing a book much easier for students.

**Meet the author.** Scanning QR codes in books or on a bookmark could give students access to information about the author, such as a brief interview, pictures, or a biography.

**Access the web without the wait.** Give young students quick and easy access to their favorite websites by letting them scan a QR code instead of typing in a long URL.

**Link analog and digital.** If students have created a digital artifact, such as a video or blog post, as part of a project, they can add a QR code to the printed part to connect the analog part of the project to the digital.

**Scaffold student learning.** Give students links to useful sites that may help them get started on an assignment or project. Or you can add QR codes to math problems that link to video tutorials.

**Check answers.** Let students check their own answers after completing learning tasks by scanning QR codes that link to the answers.

**Provide links to missed work.** Create a calendar with QR codes that connect to video-recorded class activities (such as science labs) so that students who were absent can see what they missed.



## Take It Outside

Typically, the majority of structured learning and teaching takes place inside the classroom, yet the nature of QR codes allows

teachers to create authentic, engaging opportunities for learning outside of school. While field trips are a great way to connect students with community resources, learning during such outings is often passive, as students merely listen to a guide or teacher or complete a worksheet. However, a well-crafted activity supported by digital content embedded in QR codes can turn an ordinary field trip into an exciting learning event.

For example, organizers of the SIGML event at the WWII Memorial asked participants to explain why the existence of such a memorial is important. To help them come to a conclusion, they had access to the

monument itself as well as historical video footage and recordings that were tied to various parts of the memorial by way of QR codes.

You can adapt these off-campus ideas to the subject area and age or level of your students:

**Lead historical tours.** Students can create historical tours of their hometown or important historical sites by researching various topics and creating a QR code booklet for visitors. QR codes connect with student-created videos and text that have been posted on the web and could be linked to customized maps to provide directions to locations of interest (for an example, see [www.rcet.org/geohistorian](http://www.rcet.org/geohistorian)). Students can also participate in these tours.

**Create scavenger hunts.** Students can also create scavenger hunts that teach a larger concept. The task could start

with an overarching question, and QR codes posted in different locations would link to small pieces of information that students piece together to answer the bigger question.

**Offer homework help.** Your homework assignments can include QR codes that lead to YouTube videos explaining particular topics, such as math tutorials or a recording of a piece of music. Teachers could also link to supplementary digital content or class notes to provide students with additional learning resources.

**Tie math to real life.** Students can develop authentic connections to mathematics in their local community. They can study nature and architecture for geometric shapes and angles. Then, using a selection of QR codes, they can compare what they find in real life to definitions and examples online.



QR codes save precious class time by speeding up activities.



There's a plethora of interactive and background digital information out there, ready and waiting to turn run-of-the-mill lesson plans into engaging activities that students love.



## Connect with the Community

QR codes give school leaders the opportunity to enhance communication with families and the community at large. It is now easy for schools to include the codes in all of their print and web-based materials, and they are likely to get parents' attention so the message gets through.

### Spice up the principal's message.

Schools can breathe new life into the traditional principal's message with a personal video linked from a QR code.

**Lead school tours.** Post QR codes at various locations on campus to create a "behind the scenes" virtual tour of the school that gives visitors an opportunity to see all of the hard work that goes into creating a successful learning environment. The tour could begin when visitors scan a QR code at the front door to access a personal video welcome from building administrators describing the mission of their school and great places to visit in the building. QR codes posted on the library doors could link to student-created book reviews, and codes outside the music room can treat visitors to recordings of classes singing or playing

music. And as they pass by each classroom, they can scan codes that link to slide shows of students in action or videos of students discussing their artwork, science projects, and writing.

### Link to important school information.

QR codes can link printed materials to school contact information, such as administrator names, important phone numbers, or the school website.

**Raise funds.** Give interested parents easy access to school fundraisers and community partners. QR codes could link to one of the organizations that team up with schools to provide family discounts and give back to schools.

**Preview back-to-school night.** Ease students' and parents' jitters by including a QR link in school-to-home communication that shows them what to expect when they come for back-to-school night. A quick tour of the carpool or parent-teacher organization sign-ups can go a long way.

**Enhance curriculum night.** Relatives can't always be at school functions. Give them quick and easy access to slide shows or videos of the great projects students have been working on with QR codes.

**Conduct instant surveys.** Was the dance a rousing success or a huge disappointment? How could the graduation ceremony be improved? Get immediate answers from students and parents by posting QR code links to surveys (created using a Google Docs form) at events you want feedback about.

### Give easy access to school calendars.

Include a QR code link to the school calendar in a welcome-back newsletter. Some smartphones will allow you to directly integrate calendar info into your phone's calendar. Now parents will always know when the next big event is happening at school without searching through the crumpled papers in the bottom of their child's backpack. In addition, when you update the school calendar, you don't have to change the QR code. Rescanning it will always provide the most recent version.

**Promote school events.** What's happening at school this week? Scan the QR code to find out! Posting codes around school and in printed materials that link to information about upcoming events will help spread the word.



A well-crafted activity supported by digital content embedded in QR codes can turn an ordinary field trip into an exciting learning event.



*Helen Crompton is a PhD student at the University of North Carolina at Chapel Hill, USA, where she studies mobile technologies and mathematics teacher preparation. She is also a SIGML officer.*



*Jason LaFrance is an assistant professor of educational leadership at Georgia Southern University, in Statesboro, Georgia, USA. He has served in teaching and administrative roles in schools in Florida.*



*Mark van 't Hooft is an educational technology researcher for the Research Center for Educational Technology (www.rcet.org) at Kent State University in Kent, Ohio, USA. He is a former chair of SIGML.*