



Keep your students on task with a faster Chromebook

The Intel-powered Acer Chromebook R 11 handled Google Play education apps faster

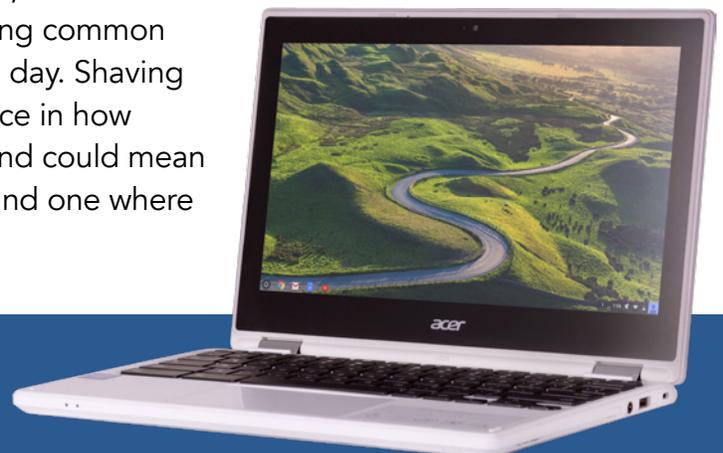
Step into any classroom and you'll see that students can have trouble staying on task, sometimes turning even the smallest delays into major disruptions. For schools using Chromebooks™ to improve and diversify lessons, the choice of device can have an impact on classroom dynamics, helping or hurting attention spans.

The new Acer® Chromebook R 11 with Intel® and the ASUS™ Chromebook Flip are currently the only two Chromebooks on the market that support Google Play, which means that students can now access a whole world of touch-optimized Android education apps. Choosing the Intel®-powered Chromebook* over the Rockchip-based ASUS Chromebook could provide a better experience for your students that helps them stay on task and gives them more time to learn.

In Principled Technologies hands-on evaluations, we found that the Acer Chromebook R 11 was faster at handling common tasks that students perform multiple times each day. Shaving seconds off those tasks can make a big difference in how students perceive the quality of their devices, and could mean the difference between a smooth class period and one where students are off task and distracted.

Now you can
run Android apps
on Chromebooks

Up to
41% faster
to complete common
tasks on the Intel-powered
Chromebook



It's what's inside that counts: How a faster processor can speed up lessons

Inside every Chromebook is a small but powerful chip that determines the device's performance. Like a brain, the processor is in charge of assessing input and output: it prioritizes computing tasks and lets the rest of the system know how and when it should operate. The processor determines so much about how your computer runs, so it's vital to look at which processor your Chromebook uses before you make a purchasing decision for your class, school, or district. A better performing processor can give your students a more responsive experience that helps minimize classroom downtime.

Only two Chromebooks on the market can give your classroom a full, touch-optimized Android app experience with Google Play support:¹ the Acer Chromebook R 11 with Intel Celeron® processor N3160, and the ASUS Chromebook Flip with a Rockchip RK3288 processor. To help you decide which Chromebook could give your students the best experience, we selected the most popular Android education apps from App Annie,² a leading resource for insights on applications. We completed common tasks in these apps on both devices to show where the Intel-powered Acer Chromebook R 11 works faster, which can help your students stay on task and maximize learning time each day. See [Appendix C](#) for detailed results from all of our testing.



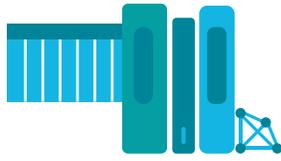
Faster downloads from Coursera: Online courses

Coursera lets students access over a thousand courses from top universities free of charge, making it a popular app for teachers looking to expand their high school lessons.³ We found that with the Intel-powered Acer Chromebook R 11, students could download an eight-minute course faster than they could on the Rockchip-based ASUS Chromebook Flip, which means students could get right down to business.



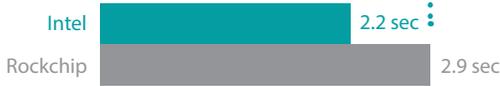
About the Acer Chromebook R 11

Android apps are optimized for a full touch experience. The Acer Chromebook R 11 features a multi-touch display to help students get the most out of their Google Play education apps. The Chromebook R 11 also has a 360° hinge, so students can use the device like a laptop, a tablet, or set up as a tent on their desk—whatever the situation calls for. It also comes equipped with a fast USB 3.0 port. To learn more, visit <http://www.acer.com/ac/en/US/content/series/acerchromebookr11>



Access the classroom community faster in ClassDojo

According to ClassDojo, over 90% of K-8 schools use their app to build a classroom community between teachers, students, and parents.⁴ The Acer Chromebook R 11 launched this app faster than the Rockchip-based device, and also let students view profile reports and load images to their student stories faster. Because students are likely to use ClassDojo several times throughout the school day, a more responsive experience can reduce wait times and cut down on distraction.



Faster reminders in the Remind app

Another Android app linking teachers, students, and parents is the Remind app. Over 90% of school districts use Remind to send messages directly from teachers to students and their parents.⁵ We found that the Intel-powered Acer Chromebook R 11 could load documents, PDFs, and YouTube™ videos from attachments more quickly than the ASUS Chromebook Flip. This means that the Intel-powered device can minimize delays and provide a better experience for students and parents accessing reminders from school.



Wait less to communicate with Edmodo

Edmodo is a large K-12 social learning community that boasts nearly 75 million members.⁶ Again, as with other popular apps, the Intel-powered Acer Chromebook R 11 provided a better experience than did the ASUS Chromebook Flip with Rockchip processor. It could allow students to launch Edmodo faster and let them open images and a video faster, for a better experience with less time wasted out of the school day.





Faster interactive learning on the BrainPOP app

Founded in 1999, BrainPOP is a learning resource that supports a variety of subjects for millions of users around the globe.⁷ In our tests featuring this app, the Intel-powered Chromebook launched a Jane Goodall movie faster, launched a featured movie faster, and even launched the app itself faster than the Rockchip-based ASUS Flip. Cutting down wait time lets students access their BrainPOP lessons faster and can help them stay on task.



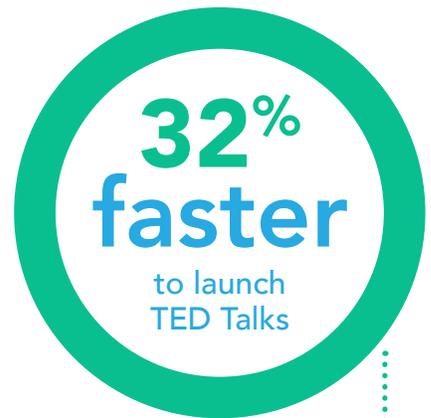
A more responsive experience using Khan Academy

Khan Academy offers a personalized learning resource for students around the world, with resources appearing in more than 36 different languages.⁸ The Acer Chromebook R 11 launched Khan Academy faster than the ASUS Chromebook Flip and loaded both an early math video and a full-length SAT preview faster. With the Intel-powered Chromebook, students using Khan Academy would get to their lessons more quickly and spend less time staring at a loading screen.



Get into TED Talks quicker

The TED Talks app features a wide-ranging library of over 2,300 lectures, which teachers at all grade levels can use to fuel student curiosity.⁹ With the Intel-powered Acer Chromebook R 11, we found that students could launch the app, load the featured video page, and play the featured video quicker than they could with the ASUS Chromebook Flip. Students who have faster access with the Intel-powered Chromebook wouldn't have to wait nearly as long to dive into the lectures, which could mean fewer distractions and a smoother experience.





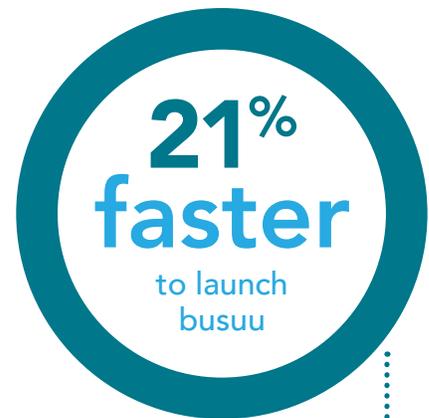
More time to learn a language with Duolingo

Over 50 million people worldwide use Duolingo to learn languages, and Duolingo for Schools brings a fun, interactive experience to the classroom.¹⁰ We found that the Intel-powered Acer Chromebook R 11 can launch the Duolingo courses menu faster than the ASUS Chromebook Flip with Rockchip processor. Students would also benefit from being able to change lessons and change languages faster with the Intel-powered Chromebook.



Launch language lessons faster in busuu

busuu is another leading language learning app, providing courses in 12 languages to over 60 million users.¹¹ Our test results show that the Acer Chromebook R 11 can provide a more responsive experience than the ASUS Chromebook Flip for this popular app as well. The Intel-powered Chromebook launched the app, loaded a user profile, and loaded the lessons menu faster. Being able to jump quickly from task to task can enhance the learning experience for classrooms using busuu.



Fight distractions with faster devices

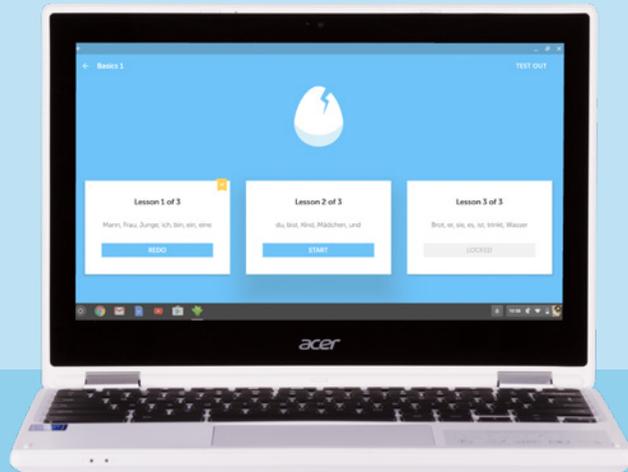
A second or two, or even fractions of a second, may not sound like a lot of time. But usability statistics show that 0.1 second is the limit for a user to feel like the system reacts instantaneously, and a user's train of thought will stay uninterrupted for only 1 second. This means that students can get a better experience from Chromebooks that don't force them to wait. Fewer distractions and class interruptions can lead to a better learning experience for the whole class.¹²

Conclusion: Pick a faster processor and find more time for your lessons

There's so much to see and learn each school day, week, and year. Being able to access a complete touch-optimized app experience from the Google Play store can give students information in new and interesting ways. Teachers looking to maximize instruction time and make it through their lesson plans can benefit from anything that helps keep students on task and gives them more time to learn.

With the Acer Chromebook R 11 and the ASUS Chromebook Flip, you have the new ability to include Android apps in your lesson plans. But when it comes to classroom technology like Chromebooks, you want to choose the option that offers a faster experience, so you can reduce idle time and cut down on potential distractions for your students. The Intel-powered Acer Chromebook R 11 can not only give students access to helpful Android education apps, it can also do many common tasks faster than the Rockchip-based ASUS Chromebook Flip. For a Google Play-enabled Chromebook that can save time in the classroom, consider the Intel-powered Acer Chromebook R 11.

Complete tasks
faster
in these Android
education apps



Cousera

41% faster

to download a lecture



Edmodo

14% faster

to open a video from a post



TED Talks

32% faster

to launch the courses menu



ClassDojo

24% faster

to launch the app



BrainPOP

15% faster

to play a movie



Duolingo

17% faster

to launch the app



Reminder

12% faster

to load the attachment



Khan Academy

16% faster

to launch the app



busuu

21% faster

to launch the app

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- 1 At time of publishing: https://googlechromereleases.blogspot.com/2016/09/stable-channel-update-for-chrome-os_21.html
 - 2 Visit appannie.com to learn more.
 - 3 <https://www.coursera.org>
 - 4 <https://www.classdojo.com>
 - 5 <https://www.remind.com>
 - 6 <https://www.edmodo.com>
 - 7 <https://www.brainpop.com>
 - 8 <https://www.khanacademy.org>
 - 9 <https://www.ted.com/talks>
 - 10 <https://www.duolingo.com>
 - 11 <https://www.busuu.com>
 - 12 <https://www.nngroup.com/articles/response-times-3-important-limits/>

On October 13, 2016, we finalized the hardware and software configurations we tested. Updates for current and recently released hardware and software appear often, so unavoidably these configurations may not represent the latest versions available when this report appears. For older systems, we chose configurations representative of typical purchases of those systems. We concluded hands-on testing on November 1, 2016.

Appendix A: Detailed system configuration

The table below presents detailed information on the two Chromebooks we tested.

System	Intel-powered Acer Chromebook R 11	Rockchip-based ASUS Chromebook Flip C100PA-DB01
Vendor and model	Acer Chromebook R 11	ASUS Chromebook Flip C100PA-DB01
Processor	Intel Celeron® Processor N3160 (Braswell microarchitecture)	Rockchip RK3288 (ARM Mali-T624)
Processor frequency (GHz)	1.6	1.8
Processor cores	4	4
Memory	2GB DDR3L SDRAM	2GB DDR3L SDRAM
Storage	16GB SSD	16GB SSD
Battery type	3 cell Li-Ion	2 cell Li-Ion
Battery capacity (Wh)	32	31
Display	11.6" (1,366 × 768)	10.1" (1,200 × 800)
Wireless	802.11 a/b/g/n/ac	802.11 a/b/g/n/ac
Bluetooth®	Bluetooth 4.0 compatible	Bluetooth 4.0 compatible
USB ports	1 × USB 3.0, 1 × USB 2.0	2 × USB 2.0
System weight (lbs.)	2.7	1.9
OS	Chrome™ OS version 53.0.2785.154	Chrome OS version 53.0.2785.154
Firmware	Google_Cyan.7287.57.82	Google_Veyron_Minnie.6588.197.0

Appendix B: How we tested

At Principled Technologies, we pride ourselves on the rigor and relevance of our testing. To that end, we followed scientific testing procedures and used the two Chromebooks in our study just as students would. Because we want you to be able to recreate our results, in this section, we provide all of the steps we followed—our complete testing methodologies.

For all apps under test, we first downloaded the app from the Google Play Store (beta), pinned the app to the shelf, and made sure that no other non-default apps were installed. We logged into each app, created user accounts, and ensured that automatic logon was enabled. For apps that required it (ClassDojo, Remind, and Edmodo), we created teacher accounts and populated content to simulate classroom content.

Coursera: Online courses

1. Playing a course introduction video
 - a. From the main menu, click Start Course.
 - b. Click Introduction.
 - c. Start the timer, and click the Overview of the Course video.
 - d. Stop the timer when video playback begins.
2. Downloading a nine-minute lecture from course
 - a. From the main menu, click Start Course.
 - b. Scroll down, and click Week 4.
 - c. Start the timer, and click the cloud download icon next to Block 9 Step-by-Step.
 - d. Stop the timer when the downloading animation completes.
3. Downloading an eight-minute lecture from course
 - a. From the main menu, click Start Course.
 - b. Scroll down, and click Week 4.
 - c. Start the timer, and click the cloud download icon next to Block 6 Step-by-Step.
 - d. Stop the timer when the downloading animation completes.

ClassDojo

1. Launching the app
 - a. Start the timer, and click the app from the shelf.
 - b. Stop the timer when the app fully loads.
2. Viewing a student profile report
 - a. From the main menu, start the timer, and click View Student Report.
 - b. Stop the timer when the profile fully loads.
3. Loading an image posted to student story
 - a. From the main menu, start the timer, and click the photo.
 - b. Stop the timer when the photo fully loads.

Remind

1. Loading a PDF attachment from announcement
 - a. From the main menu, click the recent announcement.
 - b. Start the timer, and click the PDF attachment.
 - c. Stop the timer when the attachment fully loads.
2. Loading a .docx attachment from announcement
 - a. From the main menu, click the recent announcement.
 - b. Start the timer, and click the .docx attachment.
 - c. Stop the timer when the attachment fully loads.
3. Loading a YouTube video from announcement
 - a. From the main menu, click the recent announcement.
 - b. Start the timer, and click the video link.
 - c. Stop the timer when the video playback begins.

Edmodo

1. Launching the app
 - a. Start the timer, and click the app from the shelf.
 - b. Stop the timer when the app fully loads.
2. Opening an image from post
 - a. From the main menu, start the timer, and click the image post.
 - b. Stop the timer when the image fully loads.
3. Opening a video from post
 - a. From the main menu, start the timer, and click the video post.
 - b. Stop the timer when the video page fully loads.

BrainPOP Featured Movie

1. Launching the app
 - a. Start the timer, and click the app from the shelf.
 - b. Stop the timer when the app fully loads.
2. Launching the featured movie
 - a. From the main menu, start the timer, and click the play icon.
 - b. Stop the timer when video playback begins.
3. Launching a Jane Goodall movie
 - a. From the main menu, click All Movies.
 - b. Click Science.
 - c. Click Free Movies.
 - d. Start the timer, and click Jane Goodall.
 - e. Stop the timer when video playback begins.

Khan Academy

1. Launching the app
 - a. Start the timer, and click the app from the shelf.
 - b. Stop the timer when the app fully loads.
2. Loading an early math video
 - a. From the main menu, click Early math.
 - b. Start the timer, and click Counting with small numbers.
 - c. Stop the timer when video playback begins.
3. Loading a full length SAT preview
 - a. From the main menu, click SAT.
 - b. Start the timer and click Full length SATs to take online.
 - c. Stop the timer when the page fully loads.

TED

1. Launching the app
 - a. Start the timer, and click the app from the shelf.
 - b. Stop the timer when the app fully loads.
2. Loading the featured video page
 - a. From the main menu, start the timer, and click the featured video.
 - b. Stop the timer when the video page fully loads.
3. Playing the featured video
 - a. From the main menu, click the featured video.
 - b. From the video page, start the timer, and click the play icon.
 - c. Stop the timer when video playback begins.

Duolingo

1. Launch courses menu
 - a. From the main menu, start the timer, and click Start at the basics.
 - b. Stop the timer when course selection fully loads.
2. Change language
 - a. From the main menu, click Choose a path.
 - b. Start the timer, and click German.
 - c. Stop the timer when the courses menu fully loads.
 - d. Before the next run, click Choose a Path again, and select the Previous Language setting.
3. Start lesson
 - a. From the main menu, click Start at the Basics.
 - b. Start the timer, and click Start under Lesson 1 of 3.
 - c. Stop the timer when the lesson fully loads.

busuu – Easy Language Learning

1. Launch app
 - a. Start the timer, and click the app from the shelf.
 - b. Stop the timer when the app fully loads.
2. Load user profile
 - a. From the main menu, click the hamburger icon to expand the navigation menu.
 - b. Start the timer, and click the user profile icon.
 - c. Stop the timer when the user profile fully loads.
3. Load lessons menu
 - a. From the main menu, click the hamburger icon to expand the navigation menu.
 - b. Click the user profile icon.
 - c. Click the hamburger icon to expand the navigation menu again.
 - d. Start the timer, and click Lessons.
 - e. Stop the timer when the Lessons page fully loads.

Appendix C: Detailed test results

The following table presents all data, except percentages, in seconds.

Task	Intel-powered Acer Chromebook R 11	Rockchip-based ASUS Chromebook Flip C100PA-DB01	Percentage difference
Coursera: Online Courses			
Play course introduction video	1.2	1.4	14.3%
Download 9-minute lecture from course	3.4	5.8	41.4%
Download 8-minute lecture from course	3.3	5.4	39.9%
ClassDojo			
Launch app	2.2	2.9	24.1%
View student profile report	1.3	1.7	23.5%
Load image posted to student story	1.2	1.6	25.0%
Remind			
Load PDF attachment from announcement	2.6	3.3	21.2%
Load .docx attachment from announcement	9.4	10.8	12.9%
Load YouTube video attachment from announcement	3.0	3.4	11.8%
Edmodo			
Launch app	3.2	3.6	11.1%
Open image from post	1.2	1.5	20.0%
Open video from post	3.0	3.5	14.3%
Brain POP Feature Movie			
Launch app	3.5	3.9	10.3%
Play featured movie	2.0	2.2	9.1%
Play Jane Goodall movie	2.2	2.6	15.4%
Khan Academy			
Launch app	1.5	1.8	16.7%
Load early math video	1.2	1.3	7.7%
Load full length SAT preview	3.4	3.5	2.9%
TED			
Launch app	1.9	2.8	32.1%
Load featured video page	1.5	1.9	21.1%
Play featured video	1.9	2.2	13.6%

Task	Intel-powered Acer Chromebook R 11	Rockchip-based ASUS Chromebook Flip C100PA-DB01	Percentage difference
Duolingo			
Launch courses menu	1.9	2.3	17.4%
Change language	1.9	2.0	5.0%
Start lesson	1.4	1.7	17.6%
busuu – Easy Language Learning			
Launch app	3.0	3.8	21.1%
Load user profile	1.1	1.2	8.3%
Load lessons menu	1.3	1.7	23.5%

This project was commissioned by Intel Corp.



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