Understanding the Value of Touch

The Acer Advantage in Education

Learning in the modern classroom requires reimagining both how students use technology *and* the student computing device itself. Neither a traditional laptop nor a stand-alone tablet alone can meet the many needs of the typical K–12 student who shifts between activities as varied as typing a research paper to capturing and creating media to collaborating with their peers. Over the past few years, the appearance of touch-based, convertible laptops is beginning to change the definition of effective learning with technology. With a touchscreen and a stylus, students interact with their devices much as they would with paper and pencil. At the same time, students leverage the full power of digital resources and connectivity to improve when, how, and what they learn.

Sales of technology into schools are surging. **In 2016 alone, 12.6 million mobile PCs were sold to US education customers, up 18% from the previous year, and the upward trend is expected to continue**[1]. But which devices should educators purchase to future-proof their learning environments?

Acer is leading the way forward with a touch-based, convertible device for every K–12 technology deployment, regardless of choice of operating system: Windows* 10 or Chrome*.

Acer TravelMate Spin B1
Windows 10 Education
Intel* Celeron* N3450 processor
4 GB memory
64 GB storage

Acer Chromebook* Spin
Chrome OS
Intel Celeron N3350 processor
4 GB memory
32 GB storage

1 www.futuresource-consulting.com/Press-K-12-Education-Market-Qtr4-0317.html

The Four Benefits of Touch-based Devices

Touchscreens, alongside styluses and convertible form factors, are transforming student and educator usage of classroom technology. With the inclusion of touch, laptops with mobile apps become creative tools while retaining the productivity that comes with a full-sized keyboard and a desktop ecosystem. Consider the four primary benefits of touchscreens in education:

Interact intuitively

Already familiar with touch-based smartphones and tablets, the modern student can use touch gestures to interact with their devices seamlessly and accurately while continuing to use the keyboard, touchpad, and mouse when appropriate.

Merge keyboarding and handwriting

Research shows that digital notetakers often retain less than their analog peers[2]. However, with a touchscreen and a stylus, students can use their devices just as they would a piece of paper and a pencil to analyze and synthesize what is most important. Further, students can make their own decisions about which input method—keyboarding or handwriting—is best for the task at hand.

Unlock mobile apps

PC operating systems are evolving to accommodate touch-based mobile apps. The newest Chromebooks accommodate web apps, Chrome apps, and Android* apps—an increasing number of which are optimized for use with a touchscreens.

Choose the "right" usage model

Many touch-based laptops are designed with convertible form factors. Students can flexibly choose the multi-modal position to fit any learning need in any learning environment: a tablet for when they are on the go, the tent for sharing media with a peer, or a laptop for maximum productivity.

2 ww2.kqed.org/mindshift/2017/08/17/digital-note-taking-strategies-that-deepen-student-thinking

"What's special about the Spin 11 is that it brings high performance, Android apps, a Wacom EMR (Electro-Magnetic Resonance) stylus, and an 11.6-inch Gorilla Glass antimicrobial touchscreen. These are things you don't expect to find in an education-focused Chromebook…"

—Tony Hildenbrand, AndroidCentral.com[6]

The Next Generation of Chromebooks

Google's growing influence in education can hardly be overstated. Seventy million educators and students now use G Suite for Education*, and in 2016, Chromebooks represented 58% of devices sold to US K–12 schools[3]. Even in the midst of growing success, Google* is not standing still and recently announced a vision for the next generation of Chromebooks[4]. The Acer Chrombeook Spin 11 represents the most complete iteration of the next generation of Chromebook hardware designed specifically for education.

Wacom technologies*

The combination of the EMR (electro-magnetic resonance) Pen and Wacom feel IT screen far outperform other Chromebook touchscreens and styluses—delivering a student digital writing experience writing that is as natural as writing with pencil and paper[5].

Android apps

Unlike many Chromebooks just one or two years old, the Spin is fully compatible with Android Apps from the Google Play Store. As Google fine tunes the integration of Android apps into its Chrome OS ecosystem, this compatibility will only become more important.

Ruggedized design

The Spin meets military-grade specifications for accidental drops with a polycarbonate chassis and rubber trim. An anti-microbial Corning* Gorilla* Glass screen and a spill-proof keyboard with recessed keys further protect the device from the rigors of everyday classroom use.

Dual cameras

In addition to the student-facing camera at the top of the screen, the Spin adds a 5MP, wide-angle world-facing camera to the top of the keyboard. With the device in in tablet mode, the extra camera is used to take photos and videos of objects in front of students.

A quality processor

The Intel Celeron N3350 processor inside the Spin Chromebook is designed for high performance and high efficiency ensuring students spend more time learning and less time waiting for the device to catch up.

To put the Acer Chromebook Spin 11 to test, we designed two fictional but realistic classroom learning scenarios: a 5th grade math lesson and a 9th grade social studies project. Both scenarios showcase not only the expectations of tech-savvy students and teachers, but also the performance advantages of the touch-based Acer Chromebook Spin 11 powered by an Intel processor. Compared to other Chromebooks with touchscreens on the market, the Spin's touchscreen together with the EMR pen deliver a much more accurate, productive, and enjoyable digital writing experience.

3 www.futuresource-consulting.com/Press-K-12-Education-Market-Qtr4-0317.html
4 www.blog.google/topics/education/new-generation-chromebooks-designed-millions-students-and-educators
5 www.wacom.com/en/overlays/feel-it-overlay
6 www.androidcentral.com/acer-chromebook-spin-11

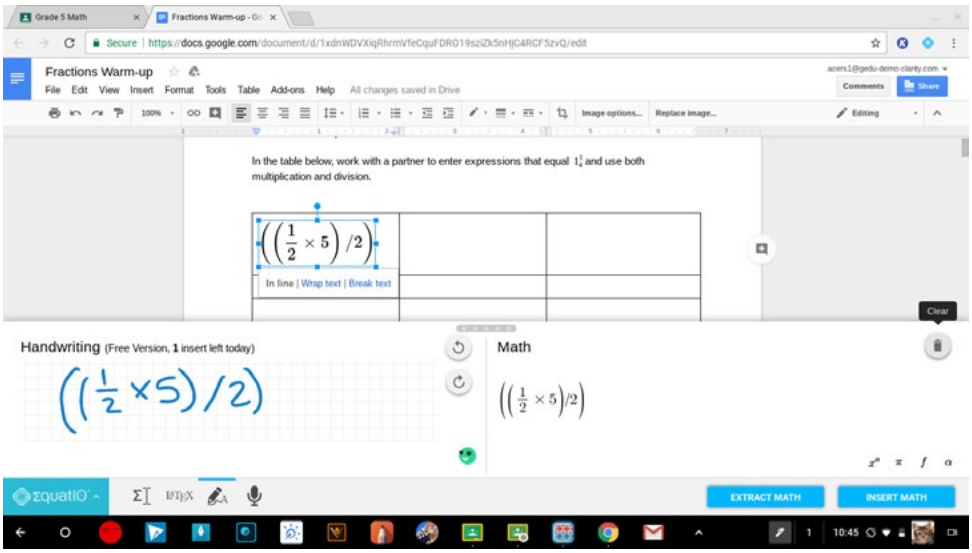
Grade 5 Math

Students create a mathematics portfolio piece to showcase their strategies for solving fractions problems.

As students return to the classroom from recess, Mrs. Jones is using her Acer Chromebook Spin 11 in tablet mode to project Google Classroom onto the display at the front of the room. Mrs. Jones's fifth graders have a half-set of Chromebooks, meaning one Chromebook for every two students.

One student, Alex, sits down at her table group, and notes that the teacher has posted an announcement to Classroom directing students to a warm-up exercise in a shared Google Doc. Alex flips open the cover of an Acer Spin and logs into her account. She taps the Classroom icon pinned to the Shelf and opens the Google Doc with the link the teacher shared. Alex knows the routine; she needs less than 24 seconds to open the Google Doc and get to work. The instructions ask students to work in pairs to insert expressions that use both multiplication and division to equal 1¼.

Instead of typing in math notation, Alex and her learning partner, Mica, use the Chrome Extension, EquatIO, from Texthelp* to add expressions to the Google Doc. The extension slides an equation editor into the bottom of the browser and allows students to enter math notation with handwriting. Because the Spin 11 comes with a touchscreen and a Wacom EMR Pen, Alex and Mica enjoy using handwriting entry to edit the collaborative doc, especially for stacked fractions.



After the warmup, the lesson continues on to finding fractional parts of whole numbers. Ms. Jones asks students to show their solutions visually to three problems with a Math Learning Center* math app. The open-ended virtual manipulatives are ideal for modeling the foundational strategies in K-5 mathematics. After launching the Chrome App version of Number Frames, Alex and Mica flip their Acer Spin into tablet mode and use the touch interface to showcase their strategy, by placing, dragging, and adjusting markers in an array and then use the Pen tool to explain their thinking.

Apps and services used

*Book Creator**

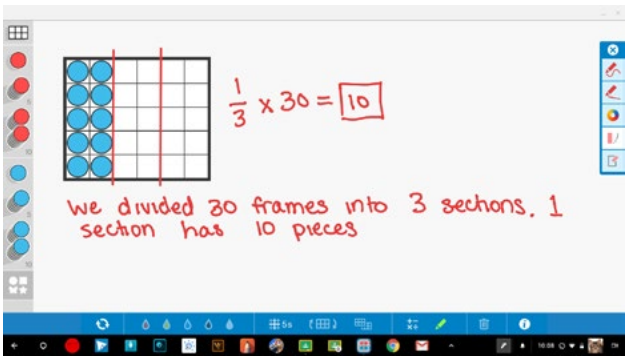
*Google Classroom**

*Google Docs**

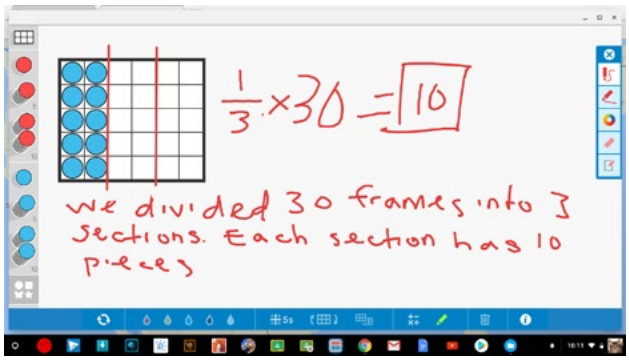
Number Frames

*EquatIO**

Acer Chromebook Spin



Lenovo N23 Yoga Chromebook**



The Wacom EMR Pen delivers an accurate digital handwriting experience on the Acer Chromebook, while handwriting with their fingers on the Lenovo N23 Yoga can be a frustrating experience for students.

Alex and Mica use Book Creator to turn the ordinary math problems into an eBook and a portfolio piece. Book Creator—built for a touch-first users and with a 5-star rating on Common Sense Media—is an ideal app for publishing student work to share with peers, parents, or even a global audience[7]. Alex and Mica launch the app and add the problems along with screenshots of their app solutions. They use the Acer stylus to add handwritten annotations to each slide. On an extra page, the students even use the front facing camera on the Acer Spin to snap a photograph of strategy they had drawn on a sheet of paper. After finishing, they publish their book to the Book Creator server and share a link with peers on Google Classroom. ***Many competitor Chromebooks, like the Samsung* Chromebook Plus and the Lenovo N23 Yogo, do not include world-facing cameras.***

The Acer Advantage

- Take full advantage of touch-based Chrome and web apps.
- Leverage education-centric features including a Wacom EMR Pen, world-facing camera, and 360° hinge for active learning.
- Convert time spent waiting into time spent learning with a high-performing Intel processor.

The Windows 10 Alternative

Fifth grade students using the Acer TravelMate Spin running Windows 10 have many of their own touch-based options. Purpose-built for education, the TravelMate Spin comes with a 360° hinge, a touchscreen, and an active stylus. Consider the following benefits for students in this scenario using touch on Windows 10:

Fluid Math*
Available from the Windows store, the application recognizes handwritten math and can convert to math notation.

Math Learning Center apps
The full set of virtual manipulatives are available as Web apps and many are available on the Windows store.

The Windows Ink* Workspace
The workspace is built right into the shelf of Windows 10 and empowers students to annotate a screenshot of any application or webpage.

7 www.commonsense.org/education/app/book-creator

Case Study: Union School District

Already one of the highest performing districts in the city, Union School District is not standing still. Union serves 5,800 elementary and middle school students across 8 schools in San Jose, California. Three years ago, the district launched a 1:1 Chromebook initiative to enhance instruction and better prepare students for 21st century learning.

Heather Haggerty, Union's Director of Information and Instructional Technology, described the goals of the initiative: "We wanted a safe and secure device for every student. We wanted to open up the world to students through anytime, anywhere learning with student-centered devices that were there for students when they needed them, to give them control over their own learning." Learn more about Union's Chromebook initiative: futureready.unionsd.org

Why Acer

To start their initiative, the district chose one of the first touchscreen Chromebooks, the Acer Chromebook C720. The district is now in its refresh cycle, adding about 1,500 Chromebooks a year. Most recently the district purchased Acer R 11 Spin Chromebooks that seamlessly switch between tablet and laptop forms to fit a variety of learning modalities.

According to Haggerty, students and teachers can depend on Acer Chromebooks to be sturdy, durable, and manageable. Haggerty was particularly interested in the additional camera on the Chromebook Spin C751. Now with the Chromebook in tablet mode, students can use the front- facing camera to take images and video of the world in front of them. Haggerty also cited Acer's customer service as "the best in her 22 years of education IT experience."

The Value of Touch

As a school district without a high school, decision-makers in Union School District are keenly aware of the technology needs of the youngest learners. Teachers wanted touchscreens so students could interact intuitively much as they would with a tablet at home. In September, the IT department turned on Android apps for their domain. As Android apps become more prevalent on Chromebooks, touchscreens will only become more powerful.

Peek into classrooms across the district and you will see students using their Acer Chromebooks to improve their classroom experience: collaborating with peers around flat panel displays; leveraging resources like Zearn and Imagine Learning; or documenting learning with apps like WeVideo and Seesaw. In Union School District, touch-based Acer Chromebooks are helping to make "future-ready learning" a reality.

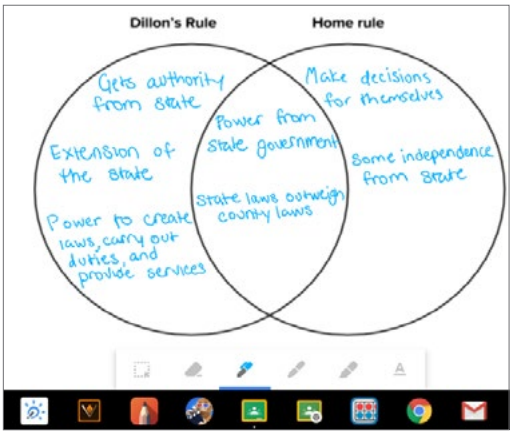
Grade 9 Social Studies

Students research the roles and responsibilities of local government and share what they learn in short video screencasts.

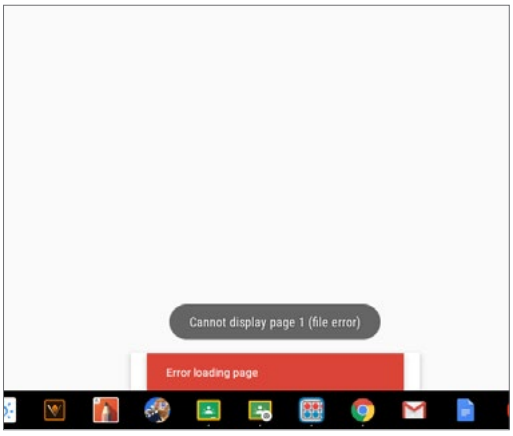
Ever since his high school went 1:1 with the Acer Chromebook Spin 11, Mr. Murphy, a ninth grade social studies teacher, has been steadily moving towards a paperless classroom. Mr. Murphy believes the Spin's touchscreen—along with the EMR stylus—is a game-changer, empowering his students to use their Chromebooks just like a pencil and a piece of paper. Currently his students are learning about the roles and responsibilities of county governments with resources from iCivics.

As a quick review of learning from the previous day, Mr. Murphy opens class by asking his students to fill in a Venn Diagram comparing two sources of county power: Dillon's rule and home rule. He makes a copy of the warm-up activity for each student with Google Classroom. Because the Spin is Android App compatible and his school's IT department has enabled the Google Play store, Mr. Murphy encourages his students to use the Android version of Classroom. The Android version gives students PDF annotation tools directly inside of Classroom and saves students a step of having to open a PDF in a 3rd party application.

Acer Chromebook Spin



Lenovo N23 Yoga Chromebook



Filling in the Venn diagram is seamless on the Acer Spin in both laptop and tablet mode. However, if students were using the Lenovo N23 Yoga Chromebook, switching between laptop and editing mode causes a Google Classroom error and students would lose their work.

Mr. Murphy then asks students to extend what they have learned with research into actual county governments using NACo County Explorer. One ninth grader, Billy, collects information on the county of his birth, Multnomah County, OR, on a iCivics PDF. Because this worksheet requires more advanced annotation features, Billy uses Squid, another Android App that runs on his Acer Spin to record his findings digitally.

Apps and services used

Google Classroom (Android App)

NACo County Explorer

Squid (Android App)*

*Realtime Board**

*Explain Everything**

Counties Work!

Billy opens a Realtime Board shared by Mr. Murphy, finds his county on the map, and pins his research to share with his peers. As more and more student work populates the collaborative whiteboard, Mr. Murphy projects the map and uses the Realtime Board pen tool to draw attention to specific information on student forms.

Next, students choose a learning partner and create short presentations comparing and contrasting two different counties. Mr. Murphy gives his students space to make their own decisions about the creative tools they use. Billy, along with his partner, Suzanne, chooses to create a screencast with Explain Everything. Some students make videos with WeVideo*, and others create graphics with AutoDesk* Sketchbook*. Regardless, of the tools they choose to use, the Android versions of these apps, along with the Acer Spin touchscreen, give students a creative boost.

For example, in the Android version of Explain Everything, Billy and Suzanne, embed the live Multnomah County webpage, and then use the Pen tool to draw directly on the screen while recording voiceover to go along with their annotations. When they finish, they export an .mp4 of their video and simply upload the file to Realtime Board to close the learning loop and share with their peers.

After students finish and post their creations to the Realtime Board, students play Counties Work!, a game from iCivics, that reviews and solidifies their learning through a game-based experience. The game, built in Unity and WebGL, loads quickly and plays without lag on the Intel-powered Acer Spin.

The Acer Advantage

- Bring Android apps to boost student productivity and creativity
- Annotate PDFs accurately with the Wacom EMR Pen to write and draw on the Acer Spin just like on a piece of paper
- Speed through processor-heavy workloads with a powerful Intel processor.

The Windows 10 Alternative

The Acer TravelMate Spin provides a similarly technology-enhanced learning experience for those classrooms choosing a Windows 10 deployment. The touchscreen, alongside the comprehensive Microsoft* Office* 365 offerings, provide a flexible and comprehensive learning ecosystem for students. Consider how touch improves student learning in this scenario with the following Microsoft products:

OneNote*
Microsoft's notetaking application lets students write or draw notes with the Acer Active Stylus and then convert them to typed text later. Students can even access their notes with OneNote Online and use the application to collaborate with peers.

Fresh Paint*
Available free from the Windows Store, Fresh Paint gives students all the tools to achieve their creative and artistic vision.

Edge*
Microsoft's newest web browser allows students to take handwritten notes directly on webpages, like the NACo County Explorer, and then save the images to OneNote.

Case Study: Beaverton School District

Beaverton School District, located in the northwest corner of Oregon, is changing the way students learn and teachers teach with technology. After the community passed a 2014 bond, the district launched Future Ready, a technology-supported learning initiative for its over 40,000 students.

Steven Langford, Beaverton's Chief Information Officer, clarified the goals of the program, "From the beginning, our work was not just about getting devices into the hands of students, which is important. It also encompassed professional development for teachers to understand both the curricular and pedagogical changes needed as students began to use technology in a more substantial manner related to their learning."

Why Acer

Beaverton spent the first year of the initiative building infrastructure and uncovering the exact requirements for student devices. Thorough planning set the stage for rapid and effective transformation. Beaverton has now issued Acer R11 C738T Chromebook devices to all students in Grades 4-12. The devices go home with students, meaning that learning does not stop at the end of the school day or at the door of the school.

The R 11 Chromebooks feature touch screens and a 360 degree hinge, which enables the Chromebooks to flexibly meet the learning demands of the moment, whether as a tablet or as a laptop.

The Value of Touch

Students drove the push towards defining touch as critically important. According to Langford, "They are so used to interacting with screens via touch, and the ability to use the device both in a laptop form factor and a touch tablet was important to students. It gave them the best of both worlds—the ability to type if needed, or to interact with the screen as they needed."

In the midst of the district's Future Ready program, Acer touchscreen Chromebooks have become a fully-integrated and natural part of the everyday learning experience. Take them away from students and they'll ask, "How are we supposed to work?"

Case Study: North Penn School District

North Penn School District—a Google for Education Reference District located in Montgomery County, Pennsylvania—has an ambitious vision for digital learning across its 18 schools. The district is rapidly moving towards one-to-one technology for all of its K-12 students and believes that technology can help foster "systemic change for transformational learning, equity and access for all, and increased student achievement."

According to Director of Technology, Kristen Landis, "From the very basic usage to more of a transformative way, devices are used every day in the classroom." North Penn looks to transformational tools to create engaging learning environments in and out of the classroom. Beyond widespread use of Google Classroom and other G Suite products, students and teachers commonly use tools like Kahoot and Quizlet for interactive reviews, Screencastify for capturing and flipping learning, and Recap and Flipgrid for sharing knowledge and student voice.

Why Acer

At the time of North Penn's technology evaluation, Acer was one of only a handful of companies that was producing touch-based Chromebooks. Choosing the Acer 738T R 11 was the future-proof decision, positioning students and teachers to not only leverage an intuitive touch environment, but also to make use of Android Apps on Chromebooks as they continue to come online in the years ahead.

Now, North Penn has deployed more than 7,000 Acer Chromebooks in Grades 6–12 and is currently piloting approximately 1,000 devices in its elementary schools. Within three years, every student in every school will have access to their own device.

The Value of Touch

When it came to choosing the devices to power its digital age learning initiative, the needs of students were a top priority. Landis clarifies: "Touch is native to our students and allows for more interactivity with the device as well as the content on the device."

Take, for example, the Android app, Whiteboard. With Acer R 11's in tablet mode, students can use their devices much as they would a piece of paper, intuitively drawing and writing directly on the screen. Touch boosts student creativity, transforming Chromebooks from a tool to get work done into a tool to creatively express their themselves and their learning.

Conclusion

Educators have a surplus of choice when it comes to choosing devices for classroom learning. They must balance criteria—from cost to performance to battery life—to select the device that will empower the type of learning they envision for students. One criteria that should top any decision maker's list is the presence of a touchscreen and stylus. Touch provides an intuitive and flexible option for students that allows them to interact with their devices just like paper and pencil and choose the best usage model to fit their learning needs.

Acer devices, including the Acer Chromebook Spin and the Windows 10 Acer TravelMate Spin power meaningful learning environments with their education-focused features, including a ruggedized build, convertible form factors, additional cameras, and high performing Intel processors. Perhaps most importantly, the Acer devices—while still budget-friendly—provide students with the best possible touch experience.

About Acer

Preparing our 21st-century learners for real world challenges necessitates the use of versatile technology to help improve academic achievement and encourage skills like creativity, problem solving, communication, and analytical thinking to compete in the global, increasingly digital marketplace. Acer, a global leader in personal computing solutions, is focused on aiding in the accomplishment of these objectives by providing innovative and cost-effective solutions to the global education community that suit all technology needs and infrastructure requirements. Acer's education product offerings include tablets, chromebooks, notebook and desktop PCs (including touch enabled), LCD monitors, and projectors. Sub-brands include the Aspire, TravelMate and Veriton series.

Getting Started with Touch-based Apps

Chrome Apps

EquatIO	The new, easy-to-use Chrome extension from texthelp allows teachers and students to use handwriting and voice to add their math equations to Google file types, including Docs, Forms, and Slides. *Grades 3-12* www.texthelp.com
Math Learning Center Apps	The set of virtual manipulatives help elementary students visualize common mathematical models with geoboards, number lines, money pieces, and more. A touchscreen and stylus make using the web-based apps intuitive. *Grades K-5* www.mathlearningcenter.org
Kami	Kami, a PDF annotation tool for Chrome, enables students and teachers to write directly on top of digital worksheets. Highlighting, drawing, and adding shapes are all better with touch. *Grades K-12* www.kamihq.com
Book Creator	Originally designed for use on tablets, the popular elementary eBook authoring platform has arrived on the web. Now students with touch Chromebooks can combine text, images, audio, and drawings to publish their stories. *Grades K-12* www.bookcreator.com
Explain Everything	The interactive whiteboard app lets students create and share their own unique screencasts to demonstrate learning. While recording, students can write and draw directly on their touchscreens. *Grades K-12* www.explaineverything.com

Android Apps on Chromebooks

Google Classroom	The Android version of the increasingly common LMS from Google is optimized for touch and allows students to annotate PDFs with pen tools directly within the app. *Grades K-12* classroom.google.com
Squid	Squid brings low-latency digital notetaking to Android-enabled touchscreen Chromebooks, enabling students to seamlessly take notes during class and markup PDFs and images. *Grades K-12* www.squidnotes.com
Adobe Photoshop Sketch	The app adds a creative suite to Chromebooks. Students can layer multiple images, draw with pens, pencils, and paint brushes, and export their favorite sketches to Photoshop or Illustrator for further editing. *Grades 6-12* www.adobe.com/products/sketch.html

Windows Apps

Fluid Math	Fluid Math depends on handwritten entry to create a comprehensive math workspace for students whether they are focused on learning about fractions, algebra, or calculus. *Grades K-12* www.fluidmath.net
Fresh Paint	The painting app provides the platform for learners of all ages to express their inner artist. The expansive assortment of tools all depend on a touchscreen and active stylus.*Grades K-12* www.microsoft.com/en-us/freshpaint/default.html
Windows Ink	Windows Ink is built directly into Windows 10 and allows students to write directly on top of everything from Word documents to web pages and then export the notes to OneNote. *Grades K-12* www.microsoft.com/en-us/windows/windows-ink

Understanding the Value of Touch

Interact seamlessly and accurately with intuitive gestures

Merge keyboarding with handwriting

Unlock the power of all types of apps: Chrome, Android*, and web*

Choose the right usage mode for any type of learning

The Acer Chromebook Advantage*

POWERED BY INTEL*

More learning, less waiting with the Intel* Celeron* N3350 processor.

+ Outstanding performance
+ Extended battery life
+ Efficient multitasking

RUGGEDIZATION

A polycarbonate chassis with rubber trim meets military-grade specifications for accidental drops and tough classroom use.

KEYBOARD

A spill-resistant design alongside recessed, tamper-proof keys increases the Chromebook lifespan.

CAMERAS

An extra camera on the keyboard allows students to capture photos with the Chromebook in tablet mode.

SCREEN

Antimicrobial Corning* Gorilla* Glass screen keeps the Chromebook germ-free for the long haul.

WACOM* TECHNOLOGY

A Wacom* EMR Pen and touch screen provides a natural writing experience with fast and accurate control for learners of all ages.

ANDROID APPS

Google Play compatibility opens the door to using Android apps on Chromebooks.