Connected education
Preparing for the digital campus

Alcatel·Lucent
Enterprise

The modern student – born into a life of technology

Most students today have never experienced life without the internet or smartphones. This reality is reflected on campus, where digital learning processes and experiences enhance traditional textbooks and have upended conventional classroom teaching methods. Online lessons, testing and assessments are now part of most curricula. Laptops, tablets and smartphones have become primary instruction tools for students, who download an increasing number of online applications to enhance their digital learning experience.

Professors and lecturers, too, rely on robust, reliable Wi-Fi across their campus to access the full range of teaching tools available to them.

The digital classroom: Evolution of technology in higher education

Changing realities for students and learning

Higher education institutions are undergoing a profound digital transformation. Technology is fueling the transformation and driving the education evolution by enabling more personalized and dynamic learning experiences, with a focus on student success. Many on this transformation journey compare their campus to a smart city, highlighting the need to provide the underlying technologies that support internet of things (IoT) devices. Innovative classroom instruction paradigms, dormitories, lecture halls, labs and athletic complexes must all be on the network to provide the ubiquitous connectivity students and staff expect.

For anyone who follows student technology usage research from the Educause Center for Analysis and Research (ECAR), it will come as no surprise that more than 50% of incoming students from high school have used technology devices in high school. And, once in a higher education environment, an overwhelming majority of students utilize multiple personal devices — including smartphones, laptops and tablets — to accomplish their academic work. Further, more than 85% of respondents believe that these devices are important to their academic success[1].

Mobile device usage enables the evolution of education, freeing students to adopt learning environments that work best for them. The blended learning[2] model combines classroom and online learning to give students more control over the time, pace and place of their instruction. The importance of blended learning is now second to the flipped classroom model in which students watch video lectures on their own and attend class for discussions and collaborative activities. According to ECAR research, the majority of respondents report that a blended learning environment is the dominant experience — however, when you analyze different student demographics, the trend to more online, self-paced learning is preferred (see figure 1)[3].
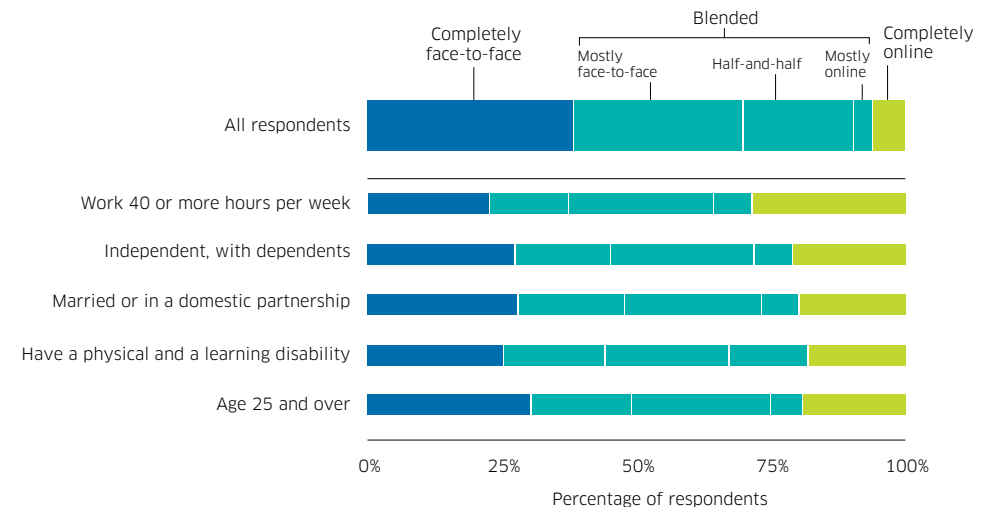

Figure 1: Student learning environment preference based on demographic factors

1   Educause Center for Analysis and Research (ECAR), Study of Undergraduate Students and Information Technology, 2019

2   The Educause definition of "blended" is from the work of Means, Bakia, and Murphy, who contend that the forms of blended learning "encompass all of the middle ground in the spectrum between fully face-to-face and fully online instruction." See Jeffrey Pomerantz, Malcolm Brown, and D. Christopher Brooks, Foundations for a Next Generation Digital Learning Environment: Faculty, Students, and the LMS, research report (Louisville, CO: ECAR, January 2018); Barbara Means, Marianne Bakia, and Robert Murphy, Learning Online: What Research Tells Us About Whether, When and How (New York: Routledge, 2014).

3   Educause Center for Analysis and Research (ECAR), Study of Undergraduate Students and Information Technology, 2019
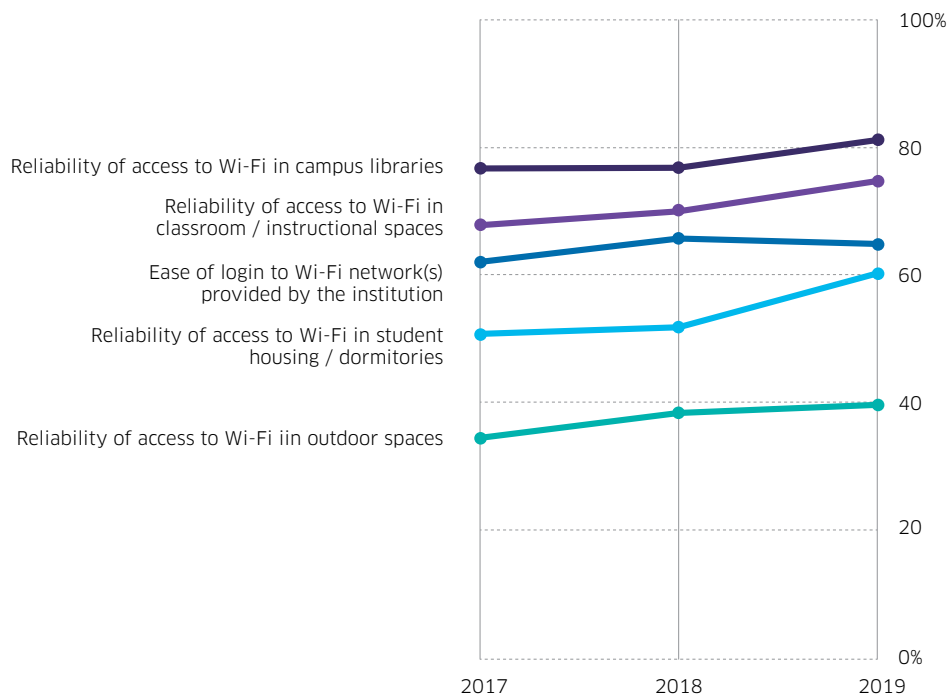
Figure 2: Student survey: The percentage of respondents that rated Wi-Fi access as 'good' or 'excellent'

Reliability of access to Wi-Fi in campus libraries

Reliability of access to Wi-Fi in classroom / instructional spaces

Ease of login to Wi-Fi network(s) provided by the institution

Reliability of access to Wi-Fi in student housing / dormitories

Reliability of access to Wi-Fi iin outdoor spaces

100%
80
60
40
20
0%

2017   2018   2019

Despite the importance of device usage for academic success, students have seen little improvement in the network technologies that support these devices. While it is important to note that the most improved area is in the student housing/dormitory domains (see figure 2)[4], educational institutions as a whole are still far behind what is available in classroom/instructional spaces as well as the library. One respondent in the ECAR study was quoted as saying:

"Please make Wi-Fi more consistent in the dorms!! It is frustrating to have to walk to the library just to do one assignment."

What all this means is that students require a reliable Wi-Fi network for their academic success. Institutions need to commit to the professional development instructors need to create a learning environment where their students can thrive.

"Please make Wi-Fi more consistent in the dorms!! It is frustrating to have to walk to the library just to do one assignment."

4   Educause Center for Analysis and Research (ECAR), Study of Undergraduate Students and Information Technology, 2019

The role of technology

Advanced technology on campus creates new ways for students to learn, and changes how teachers plan and deliver the curriculum. It also provides the digital tools for IT departments to simplify operations, better comply with regulations and deliver a safer environment for students. For example: HVAC systems, smart lighting, sprinkler systems, bathroom sensors, surveillance cameras and connected door locks are IoT devices that require reliable connectivity everywhere on campus.

An important technology capability is user mobility. Mobility requires connectivity anywhere, and goes beyond offering Wi-Fi in the lecture hall: It requires a seamless experience of connectivity provided everywhere on campus, including residence halls, science labs, gymnasiums, libraries and outdoor facilities.

Wi-Fi networks need to extend across the entire campus, but also need to deliver good performance to support higher densities of wireless users with bandwidth-hungry applications, especially in classrooms due to bring-your-own-device (BYOD) learning initiatives, digital testing and new, immersive learning applications.

Is your network ready?

Digital learning requires a WLAN infrastructure that can handle a large influx of mobile devices and the bandwidth-hungry applications running on them. There are several things you can do to prepare for this:

- **Plan for density**: Students typically bring multiple mobile devices to school. Adding faculty and staff devices, classroom tools like projectors and printers, connected lab equipment and all sorts of new IoT devices means planning for density is planning for success.

- **Assess WLAN bandwidth requirements**: Determine what is required to support the faculty teaching style, including mobile devices. For example, if instructors expect to use video-based teaching aids that stream video to multiple devices, a WLAN network capable of supporting multiple, high-quality video streams will be required. An HD-quality video stream uses 4 Mb/s of bandwidth per user and interactive learning games require multi megabits of bandwidth per user.

- **Handle bandwidth needs with Wi-Fi 6 or Wi-Fi 7 technology**: Gigabit Wi-Fi devices are already available to students. Adopting Wi-Fi 6 or Wi-Fi 7 technology enables faster data rates and multiple concurrent downstream communications to multiple wireless devices. Wi-Fi 7 also enables concurrent upstream communications. Both technologies provide better support for a higher density of users, devices and applications.

- **Eliminate roaming issues**: As users roam between access points (APs), their devices can get stuck on an AP instead of associating with a closer one with a stronger signal. This drains battery life and degrades performance. The ideal network infrastructure should eliminate this behavior, so older generation devices or disproportional user distributions don't drag down the network.

- **Adjust LAN access to support next-generation APs**: Wi-Fi 6 or Wi-Fi 7 APs typically generate an aggregated throughput above 1 Gb/s. To avoid bottlenecks and cabling rework, upgrade to access switches that support 2.5 Gb/ 10 Gb ports (with PoE) and 10 Gb, 25 Gb or 40 Gb uplinks.

Alcatel-Lucent OmniAccess Stellar WLAN

The Alcatel-Lucent OmniAccess® Stellar WLAN product line meets all these demands, and more. Its next-generation access points with distributed intelligence (controllerless) deliver enterprise-grade connectivity with operational manageability, creating a new paradigm in wireless networking that's efficient, secure, simple and affordable. With our local, personalized approach, a tailored solution can be built to suit every learning environment.

The OmniAccess Stellar WLAN solution offers:

- **Simplicity**: Leveraging the latest technologies, it is simple to deploy and scalable while offering high-speed Wi-Fi
- **Performance**: Distributed intelligent architecture eliminates the controller bottleneck for better performance and high availability
- **User centricity**: Easy connectivity and the leveraging of automatic user profiles provide an exceptional and secure user experience for students, teachers and visitors

- **IoT readiness**: Unique IoT enablement technology allows for secure and automatic connections of any device
- **Analytics capability**: Smart analytics monitor and control applications, help analyze students' behavior and enable proactive network enhancements
- **Unified management**: Native, unified management for LAN and WLAN with a cloud enabled management platform that provides consistent security for wired and wireless users, individual quality of service and even time of day restrictions
- **Cost-effective evolution**: Innovative controllerless technology reduces costs and is easy to expand by simply adding more APs
- **Optional location-based services (LBS)**: Enabled by Bluetooth Low Energy (BLE) capabilities in the APs, LBS provides more services to students/visitors such as indoor wayfinding; class attendance; retail advertising and contextual information about buildings, objects and art, as well as enabling advanced analytics to understand people flow and occupation of school areas

Conclusion

For many students, how a school integrates high-performance Wi-Fi into the campus environment can be just as important as their favorite classes or the structure of the curriculum. Students today don't remember a time before the internet. They expect an experience like at home, where their devices connect automatically and seamlessly. They expect to be able to connect with any device, anywhere in and around the school whether it's to communicate, be entertained or to access educational resources.

In addition to student expectations, a campus network must also meet the technology requirements of faculty, staff and IT departments. When designing an efficient and cost-effective campus network, it is important to:

- **Understand the limits of the existing network**: Objectively analyze and evaluate the capabilities of the existing network infrastructure and plan a gradual upgrade to ensure that it meets the expectations of faculty, students, staff and the community

- **Deliver a high-performance network**: Provide a WLAN infrastructure that can handle a large influx of mobile devices and bandwidth-hungry applications

- **Ensure the LAN does not become a bottleneck**: Deploy multi-gig technology in access switches to avoid additional cabling and increase available bandwidth

- **Enable pervasive mobility**: Ensure that all devices coming into the school environment get their share of network resources with connectivity everywhere, and the same quality of experience (QoE) over wired and wireless networks by leveraging simplified device onboarding

- **Ensure the network is IoT-friendly**: Simplifying the connection of IoT devices, while keeping the network secure, allows campuses to embrace new safety/security devices and automation technologies

- **Allow for simplified operations**: Build and operate a robust network with a single management system, and use virtual networks for unique requirements rather than separate, dedicated networks

- **Offer in-depth security**: Provide not only firewalls, but protection at every level for users, devices, applications and the network itself

Learn more

Alcatel-Lucent Enterprise's OmniAccess Stellar access points are part of a comprehensive portfolio of networking solutions including comprehensive LAN switching, network management, analytics and security.

To find out more about the Alcatel-Lucent OmniAccess Stellar WLAN solution, visit www.al-enterprise.com/en/stellar-mobility-wifi

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