

# Behind the Scenes

at a 21st-century school



The kinds of learning and teaching and leadership we see in the *Days in the Lives* presentations would be impossible in most schools today. That's because they lack the infrastructure necessary to enable what Sally and Mr. Bacon and Mrs. Hunter did during their busy days. Not just the technical infrastructure, but the teaching and learning infrastructure as well.



We can all imagine the cables and wires and routers and servers and computers and iPods that make up the technical infrastructure of the 21st-century school. Harder to picture is the teaching and learning infrastructure: the online content, the new teaching techniques, the varied schedule, and the cross-disciplinary planning that take advantage of the technical infrastructure. Both types of infrastructure -- technical and educational -- are far different from what we see in most schools today. This presentation describes each type of infrastructure in some detail, beginning with the technical and moving to the educational.



The work of our three protagonists was supported silently and efficiently by an unseen set of technologies carefully planned and installed and maintained to support teaching and learning and leadership. This technical infrastructure consists of five elements:

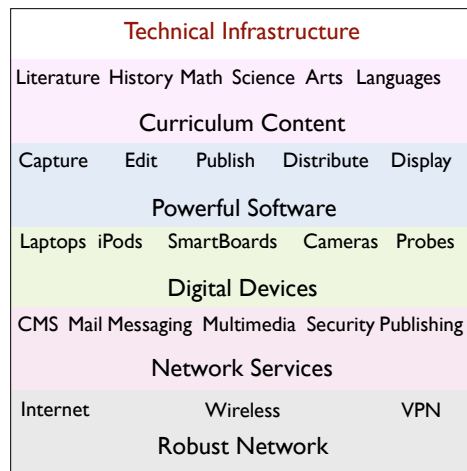
A **robust network** underlying the whole enterprise;

**Reliable network services** that provide what the people need to do their work;

An array of **digital devices** in their hands and backpacks and desktops;

**Powerful software** that lets them create and communicate with these devices; and

**Solid curriculum content**, in digital form, from respected authors, that helps students to learn and teachers to teach.

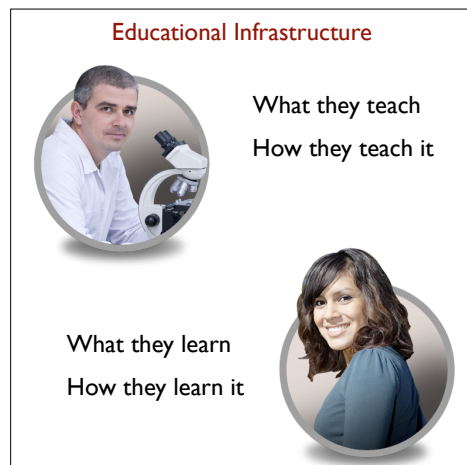


### Robust Network

(Network diagram. Add wireless nodes. Add students. Add devices.)

The network enables members of the school community to access the information and services they need from a variety of devices and places. The network provides entry to the school site from anywhere, so that students can study their academic materials whenever they need to. The local area network in the school is tied directly to the internet backbone with a fiber-optic connection, with wired backup, to ensure 24/7 reliability and the high bandwidth necessary for the kinds of work described in the days-in-the-lives. Within the school, wireless access points permit faculty and students to use a variety of devices wherever they are working. Outside of the school, a Virtual Public Network is used to provide members of the school community secure access identical to what they enjoy in the building.

*The network is like the foundation of a house: it supports everything else, but without the rest of the structure, it's not much to live in.*



It's not enough to simply buy and build the technical infrastructure described above. That, in fact, is the easy part. The hard part is adjusting the methods of teaching and learning to take advantage of the new technologies and to build the skills necessary for the 21st century. Most of what surprised us in the Days-in-the-Lives of Sally, Mr. Bacon, and Mrs. Hunter were not technologies but radically altered educational activities. These key alterations in the 21st-century school include:

- What students learn
- How they learn it
- What teachers teach
- How they teach it

Let's examine each of these in turn.

### Educational Infrastructure

- New skills
- New assignments
- New assessments
- New expectations

- New groupings
- New tools
- New independence
- New schedule



The path followed by Sally Student at H.S. 21+ scarcely resembles that taken by most high schoolers in America today. Her steps covered different ground, and she ended up at a different place. *What* Sally learned, and *how* she learned it, reflect a rethinking of the purpose of school. The knowledge and skills the people will need in the 21st century are different from those needed in the 20th. While literacy and numeracy remain the price of entry to the new workplace, the key value is in the skills of collaboration, creativity, and innovation. General problem-solving strategies are more important than the knowledge of specific solutions.

And so Sally's assignments are grounded in reading, writing, and mathematics, but they also require collaboration with other students, extra rewards for creative analysis, and the expectation of innovative solutions. The problems assigned by the teachers in most cases have no single answer. To design this new set of assignments was no easy task for the faculty of H.S. 21+. They had to craft carefully into each assignment a combination of solid content acquisition, along with collaborative problem-solving activities. And figure out how to evaluate the latter. And ensure that all the assignments taken together formed a coherent package that comprehended the full set of competencies called for by the 21st century. During her day, Sally spent much less time in a group of 25 in a classroom, and much more time with a group of five or six in a library or laboratory. She spent less energy on paper and pencil tasks, and much more energy on computer-based tasks. She seldom found herself performing the exact same task as the student next to her. She learned as much outside of the school building and day as she did inside.

Sally's day reflected the ways people work in the world outside of school. The learning methods at H.S. 21+ stand in stark contrast to most high schools. And require a heightened sense of self-discipline on the part of students, along with self-motivation, and self-scheduling. Sally did not arrive at H.S. 21+ with these traits -- they were taught as part of the curriculum.

The methods of learning relied on technologies at every step -- not "educational" technology, but real-world computer and network tools, the same ones used in the world of research and business, including technologies often banned in American schools, such as instant messaging and web publishing. All day long, Sally applied common workplace technologies to serious academic tasks.

This new form of learning calls for a different kind of planning and organization, a different set of expectations for students, and a new role for teachers, as well as the robust technology infrastructure described above.

### Educational Infrastructure



- New content
- New skills
- New collaboration
- New schedule

- Just in time
- Interdisciplinary
- Varied spaces
- Varied groupings
- New technologies

Few high school teachers today are asked to teach collaboration skills or problem-solving techniques, as Mr Bacon did. Few are asked to coach a small group of students through a problem-solving exercise and then grade them on it. Few are required to coordinate their every assignment with their peers in other subjects. Teaching at H.S. 21+ is nothing like teaching in a regular school. You must teach and evaluate not only the concepts of your subject area, but the new collaboration and innovation skills as well.

A teacher's work at H.S. 21+ consists of two parts: standard subject matter teaching, and a project-coaching assignment. Both types of work are carefully scheduled into the teacher's day. And the subject-matter teaching is hardly standard -- it's very carefully crafted to mesh in time with the problem-solving assignments, and with the work of teachers in other subject areas. This scope of work calls for a wider range of skills on the part of the teacher: teaching techniques, curriculum planning expertise, and professional collaboration skills. The content taught at H.S. 21+ tends toward the applied and the practical. It focuses on those aspects of each subject that help students to confront the group problem-solving tasks assigned to them. (For this reason, the problems must be carefully chosen so as to require a wide range of content knowledge for their solution.) And thus the decision of what to teach, and when to teach it, is much more in the hands of the H.S. 21+ faculty working as a whole. There's more *just in time* teaching at H.S. 21+, and less *just in case* teaching. Just in time to apply it to the problem students are trying to solve in your group project. Just in time to bring concepts from several disciplines to bear simultaneously on a common issue. Just in time to provide a contrasting approach to what's being taught right now in another subject.

And teachers teach in different places, to different sizes of groups. In the auditorium to 150 students, in a classroom with 25, in a seminar space with six. Teachers teach in different modes: a lecture here, a discussion there, a coaching session somewhere else. This calls for a richer repertoire of teaching skills than we are used to.

The reliance on technology that we saw in the *Days in the Lives* -- for finding information, for analyzing it, and for presenting one's findings -- sets a high bar of expectations for the teacher, who must not only keep abreast of new technologies in his or her field, but find new ways to take advantage of them in the classroom.

## Leadership



- Paint a new picture
- Lead and support faculty
- Ensure technology
- Monitor results

Schools like H.S. 21+ do not develop of themselves. They are engendered by a well-thought-out vision, and implemented by a team of faculty and educational leaders. Leadership of such a school is a tough job. At the outset, it consists of:

*Building a new perception of learning and role of school on the part of parents, students teachers, and community.* While business organizations such as Cisco Systems, and educational groups such as *21st-Century Skills* support leaders by providing a clear rationale for changing this perception, nonetheless the kind of schooling pictured in the *Days in the Lives* is far different from what the community is used to. Leaders must paint a clear picture of what the revised school looks like.

*Leading and supporting the faculty* to build a new kind of curriculum, a new type of schedule, and a new way of working with students that supports this vision. Starting from a revised set of learning goals, the leadership must coach the faculty through the process of creating the new assignments, presentations, online resources, and facilities they'll need to open the school. And make sure they have the resources they need to do this work.

*Introducing the students* and their parents to a new set of expectations, a vastly modified set of learning goals, and a new array of technologies. Getting them started in a new school like H.S. 21+ requires more than a login password and a schedule; it calls for each student to rethink what school is about and how they work within it.

*Coordinating all of the aspects*, especially facilities and information technology, with the faculty and students so they combine as they should when they should. As the 21st-century school settles in and grows, leadership remains critical as it:


*Nurtures faculty and students* as they learn the ropes in a new environment. This involves monitoring their progress, listening to their concerns, and supporting their unanticipated needs.

*Ensures the full functioning of the technology infrastructure*, encouraging users to point out areas of improvement, and communicating directly and often to the technology staff (which reports to and is evaluated directly by the school leadership.)

*Monitors the perceptions* of students, parents, and faculty of how well the school is achieving its goals, and communicates with them frequently, and addresses their concerns.

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There's more going on behind the scenes at H.S. 21+ than meets the eye. The 21st-century school depends on self-disciplined students, a creative faculty, a responsive set of technologies, and careful leadership to permit the kind of education we saw in the day-in-the-life presentations.