21st-Century Inventory

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by Jim Lengel, Hunter College School of Education

We have looked at the history of education in America over the 19th,

20th,

and 21st centuries (Education
1-2-3),

and glimpsed a *Day in the Life* of a 21st-Century School. This article delves more deeply into Education 3.0, analyzes more closely the day in the life, and asks you to compare your school with what you have seen.

Education 3.0

- What does it look like?
- How is it different?
- What's the focus?
- Why?

Our goal is to explore the questions,

- What does Education 3.0 look like?
- How is Education 3.0 different from what we are doing today?
- What skills does it focus on? Why?

Principles

- Problems worth solving
- Productive collaboration
- Self-directed research
- Good storytelling
- Tools for the task
- Curious and creative

A careful examination of the days in the lives of 21st-Century students and teachers leads to six principles that describe what's going on, and help distinguish Education 3.0 from 2.0. In the 21st-century school...

- Students work on problems worth solving
- Students and teachers collaborate productively
- Students engage in self-directed research
- Students learn how to tell a good story
- Students employ tools appropriate to the task
- Students learn to be curious and creative

x	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Of course they do many other things as well -- they learn their times tables...

...and the causes of the Civil War...

and play
sports

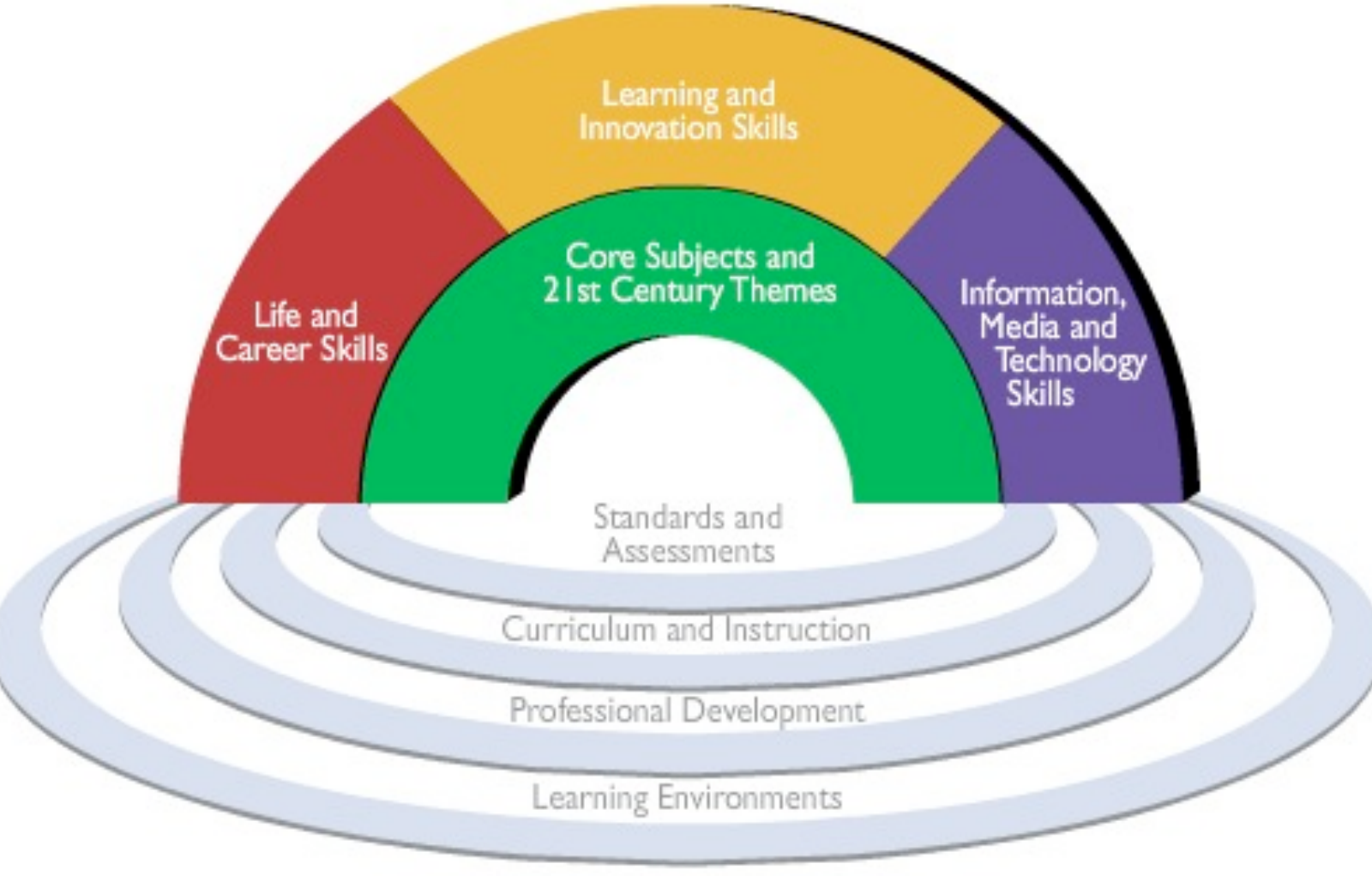
and sing in the choir

--

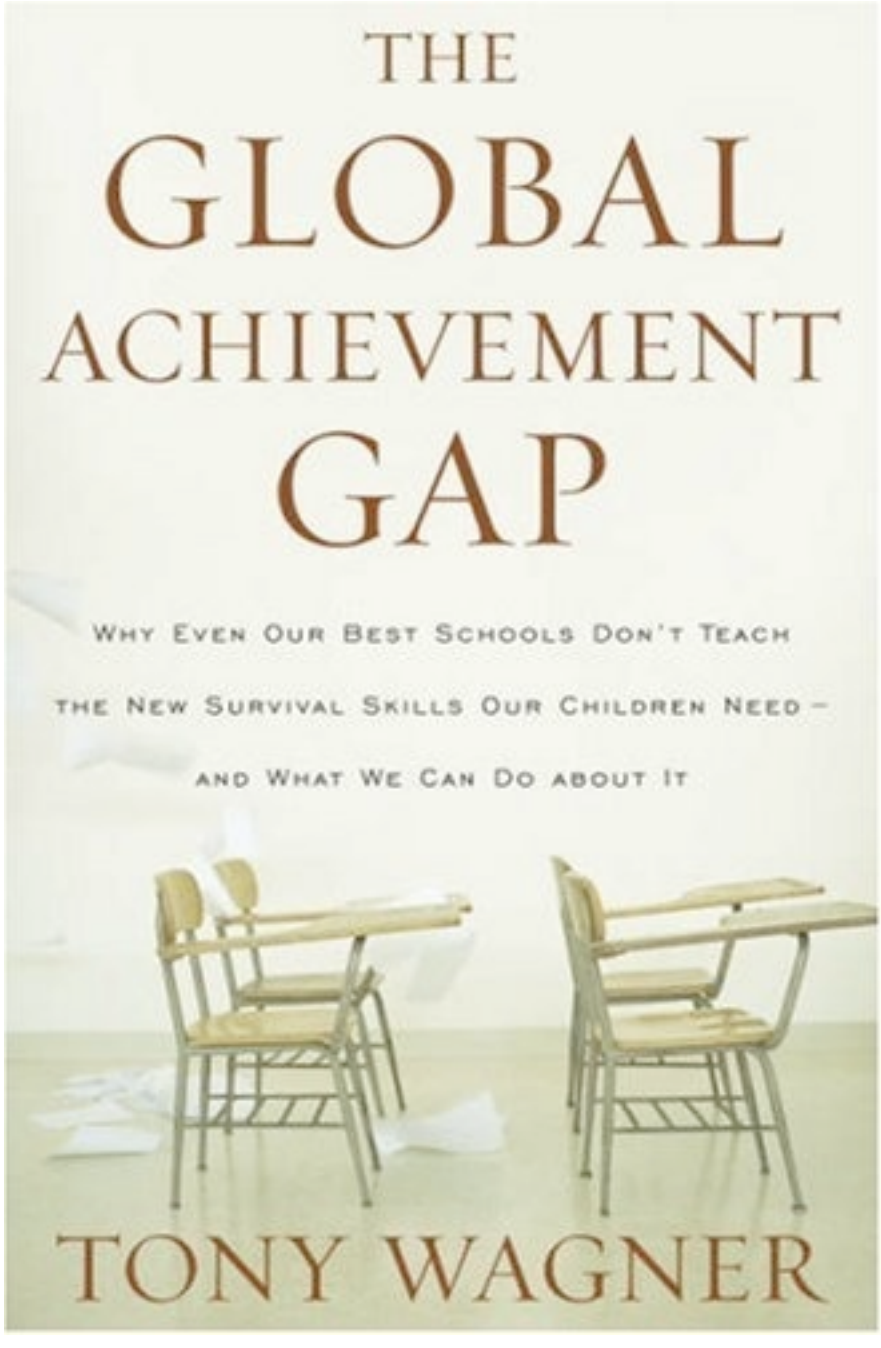
Principles

- Problems worth solving
- Productive collaboration
- Self-directed research
- Good storytelling
- Tools for the task
- Curious and creative

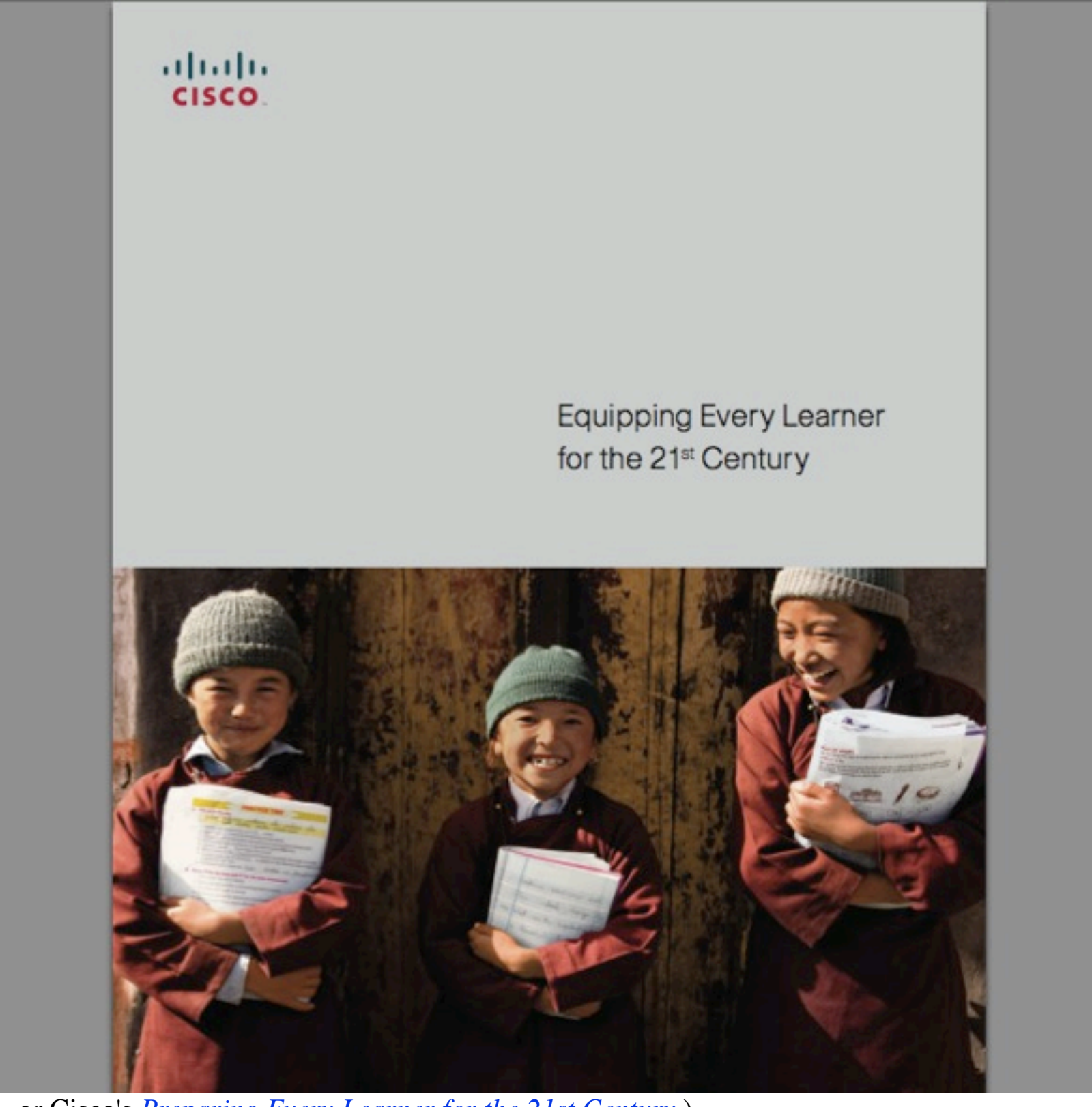
but they accomplish these according to the six key principles of 21st-century learning.



(For more information on the source of these principles, connect to the Partnership for 21st-Century Skills,

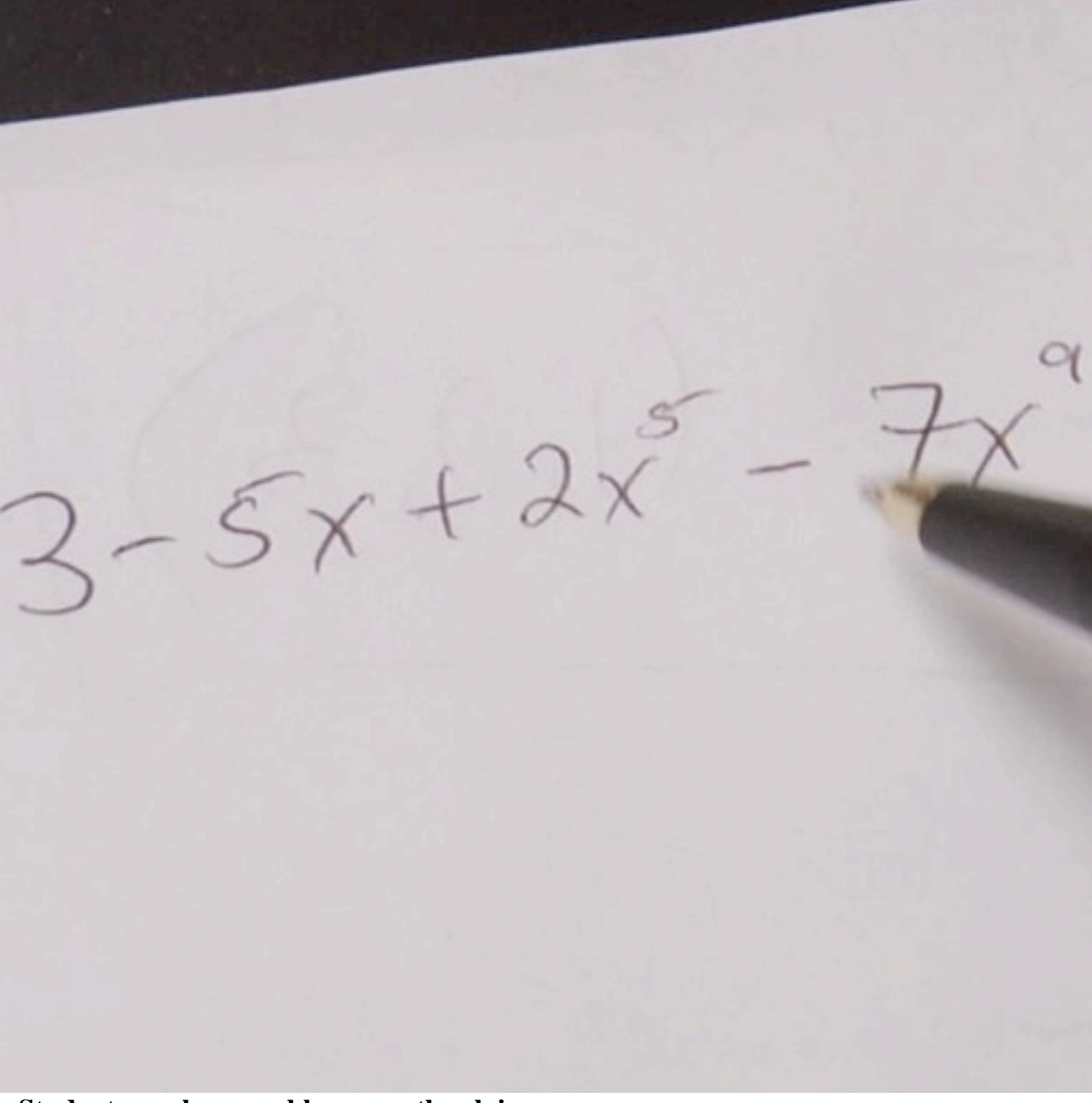


or read Tony Wagner's *The Global Achievement Gap*,



or Cisco's *Preparing Every Learner for the 21st Century*.)

And of course they use many new technologies as they do this work -- but the technology is not at the center of their attention, nor ours. Technology enables many of the things they do, and helps them to work faster and deeper, but it's not an end in itself. Let's look at each principle in turn.



Students work on problems worth solving

By this we don't mean factoring polynomials --

Example :

Find the square root of $x^4 - 4x^3 + 8x^2 - 8x + 4$ using division method.

Solution:

$$
\begin{array}{r|l}
x^2 & x^4 - 4x^3 + 8x^2 - 8x + 4 \\
\multicolumn{2}{r}{\underline{x^4}} \\
2x^2 - 2x & -4x^3 + 8x^2 \\
\multicolumn{2}{r}{\underline{-4x^3 + 4x^2}} \\
2x^2 - 4x + 2 & 4x^2 - 8x + 4 \\
\multicolumn{2}{r}{\underline{4x^2 - 8x + 4}} \\
\multicolumn{2}{r}{0}
\end{array}
$$

not those kinds of arcane academic
problems,

which seem to fill up most of the time in the 20th-century school.

Rather we mean students working on problems the world needs to solve to make it a better place. (It might be that one of these problems could require the factoring of a polynomial or two; if so, they students would learn that when they needed it.

Learning:

- Just in time
- Just in case

That's the difference between *just in time* learning and *just in case* learning.)

In the *Day in the Life of a Student*, our students:

- work with a collaborative project group to solve an issue of public interest as well as academic importance.
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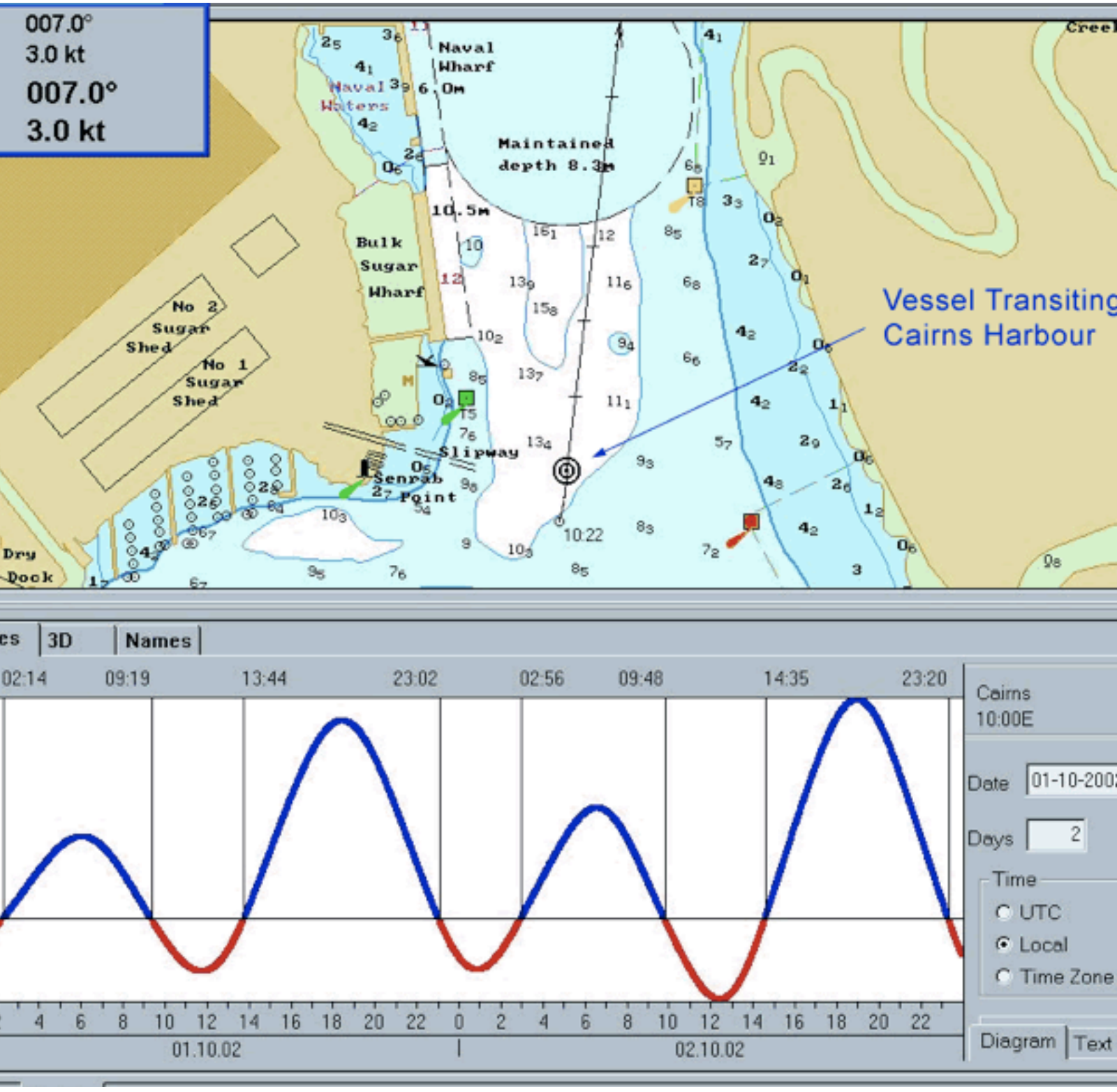

- find the concepts in one subject fully coordinated with the topics and assignments of the others.
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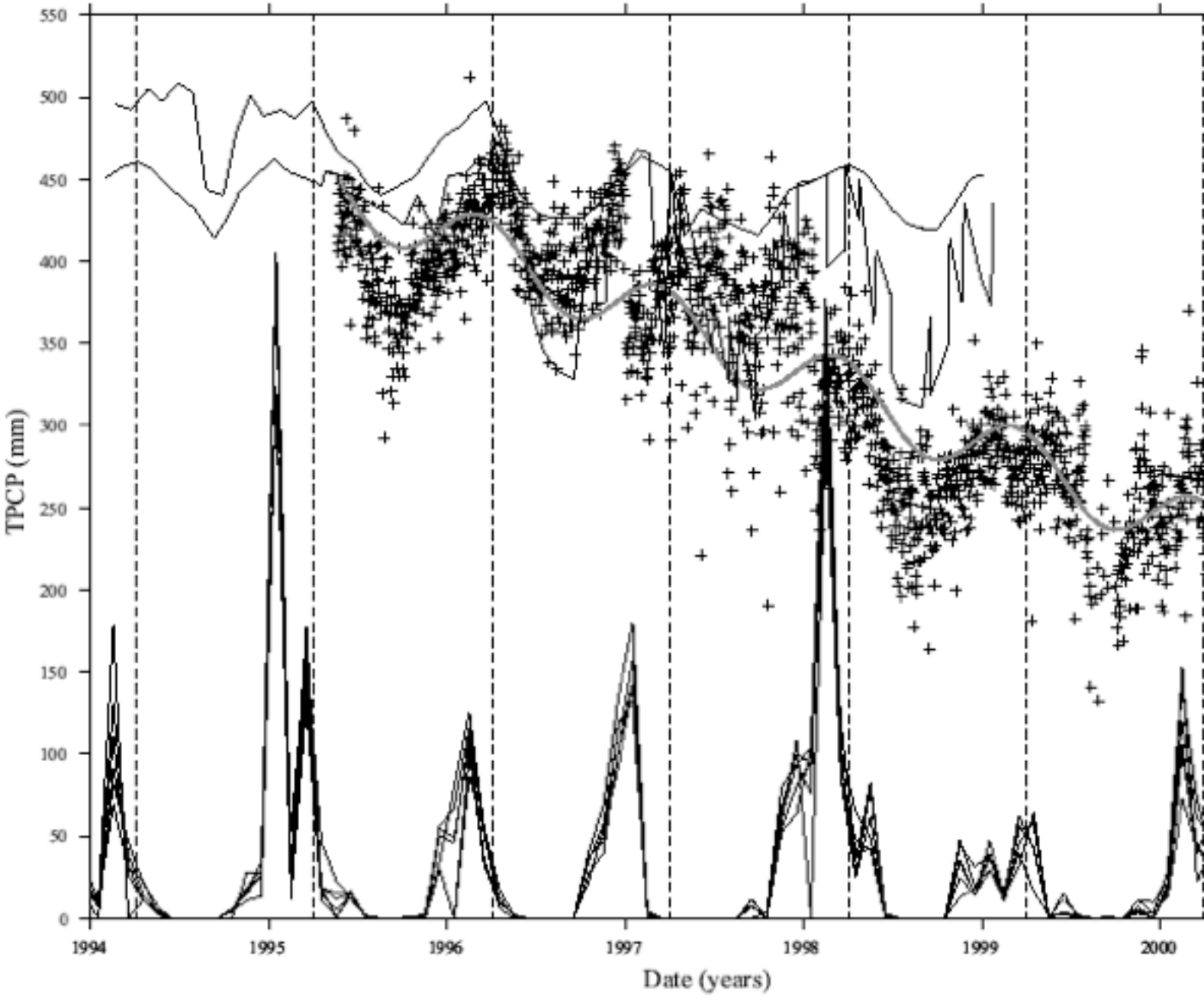


- learn the aspects of their subjects actually used in the real world, such as probability and statistics, estimation and measurement in math.
-

- work at a community internship to build elements of character that complement academic work.

Students collaborate productively

They seldom work alone on a project,

but they are often solely responsible for an aspect of the group's work.

They take advantage of digital communication tools to collaborate with teachers, distant experts, and peers as they work.

They ways they work mirror the ways adults work in 21st-century businesses and laboratories.

In the *Day in the Life*, our students:

- work in a credit-bearing team project group with a faculty coach, during time allotted for this purpose within the school day.

meet with their peers in spaces designed especially to facilitate small-group project work.

use desktop videoconferencing for distance-learning, discussions with subject-matter experts, guest speakers, or remote teachers.

discuss with their families the ideas they encountered at school, using the family discussion questions from the school's web site.

connect to multilingual, multicultural and international resources, and applied them to their academic projects.

Principles

- Problems worth solving
- Productive collaboration
- Self-directed research

Students engage in self-directed research

Their research is aimed at solving the kinds of problems described above, and is often original and along lines their teachers have never explored.

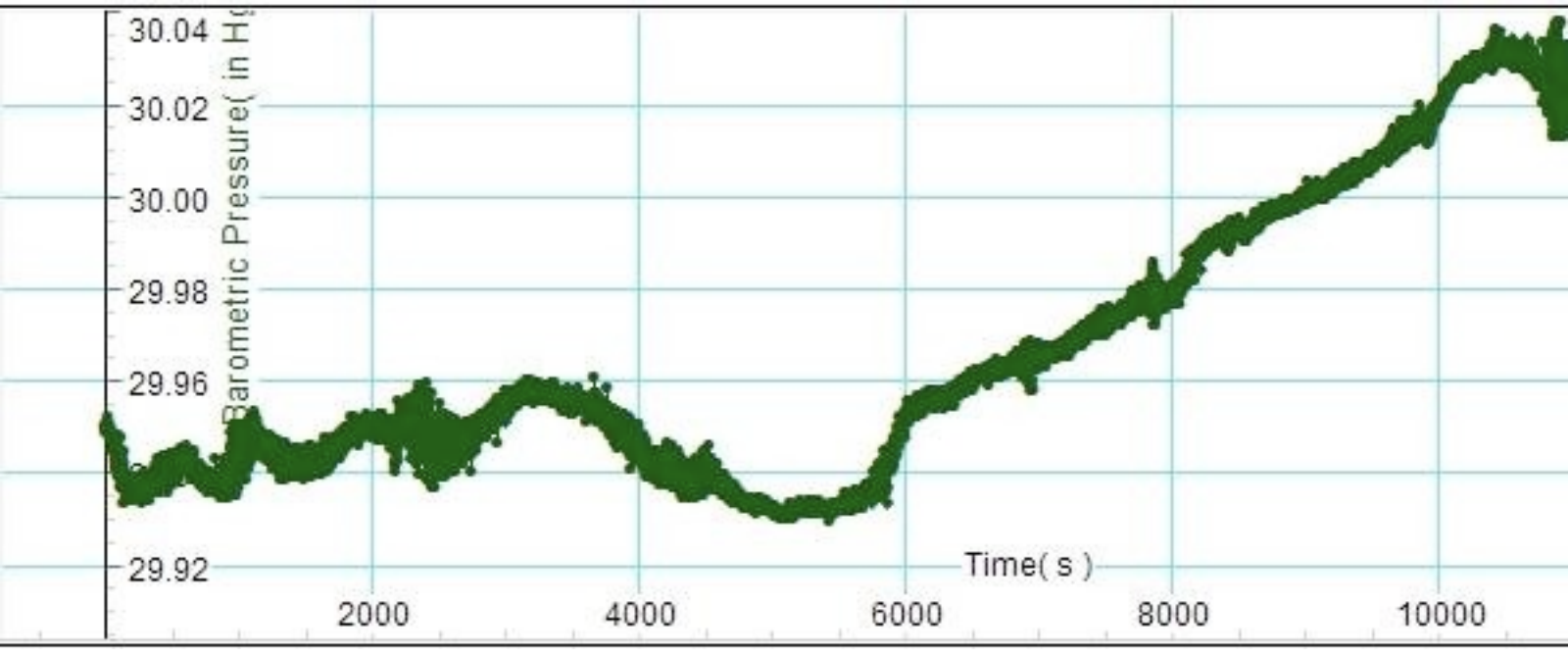
Seldom do they research the same old questions from last year,

seldom is the entire class researching he same topic.

And always they are gathering ideas from a much wider array of sources, made available through digital archives and networks.

Students in our *Day in the Life…*

- effectively search online sources, determine their authority and reliability, and skim the search results to find what they seek.



use real-time data from their own digital probes and from sources all over the world to explore issues and solve problems.

use an extensive library of electronic texts, tutorials, and online courses that they downloaded to their laptops and iPods.

use digital communication technologies to tap the knowledge of peers and online experts.

complete much of their academic work -- especially their independent and group project work -- outside of school hours.

Principles

- Problems worth solving
- Productive collaboration
- Self-directed research
- Good storytelling

Students learn how to tell a good story

Explaining, publishing, presenting and persuading are important skills for every student in the 21st-century school. Throughout their school careers, and throughout each day in their school lives, they are called upon to compose, prepare, and present their ideas through public speaking, PowerPoints, prose, and podcasts -- the same forms used in higher education and business.

Students in our model school:

- employ images, video, music, and animation to bring deeper understanding to their academic work and presentations.

borrow from the school's lending library of devices to make media capture and editing and display possible.

publish their work to an online multimedia portfolio that provides evidence of learning.

present the results of their work to an audience outside the school, combining oral presentation and digital media.

Principles

- Problems worth solving
- Productive collaboration
- Self-directed research
- Good storytelling
- Tools for the task

Students employ tools appropriate to the task

Just as you seldom see pencil and paper employed in modern offices or universities or laboratories, these 18th-century tools are rare in the hands of students at our model school. Instead they use whatever tool works best for the task at hand: computer, calculator, mobile device, keyboard, or data probe. Students:

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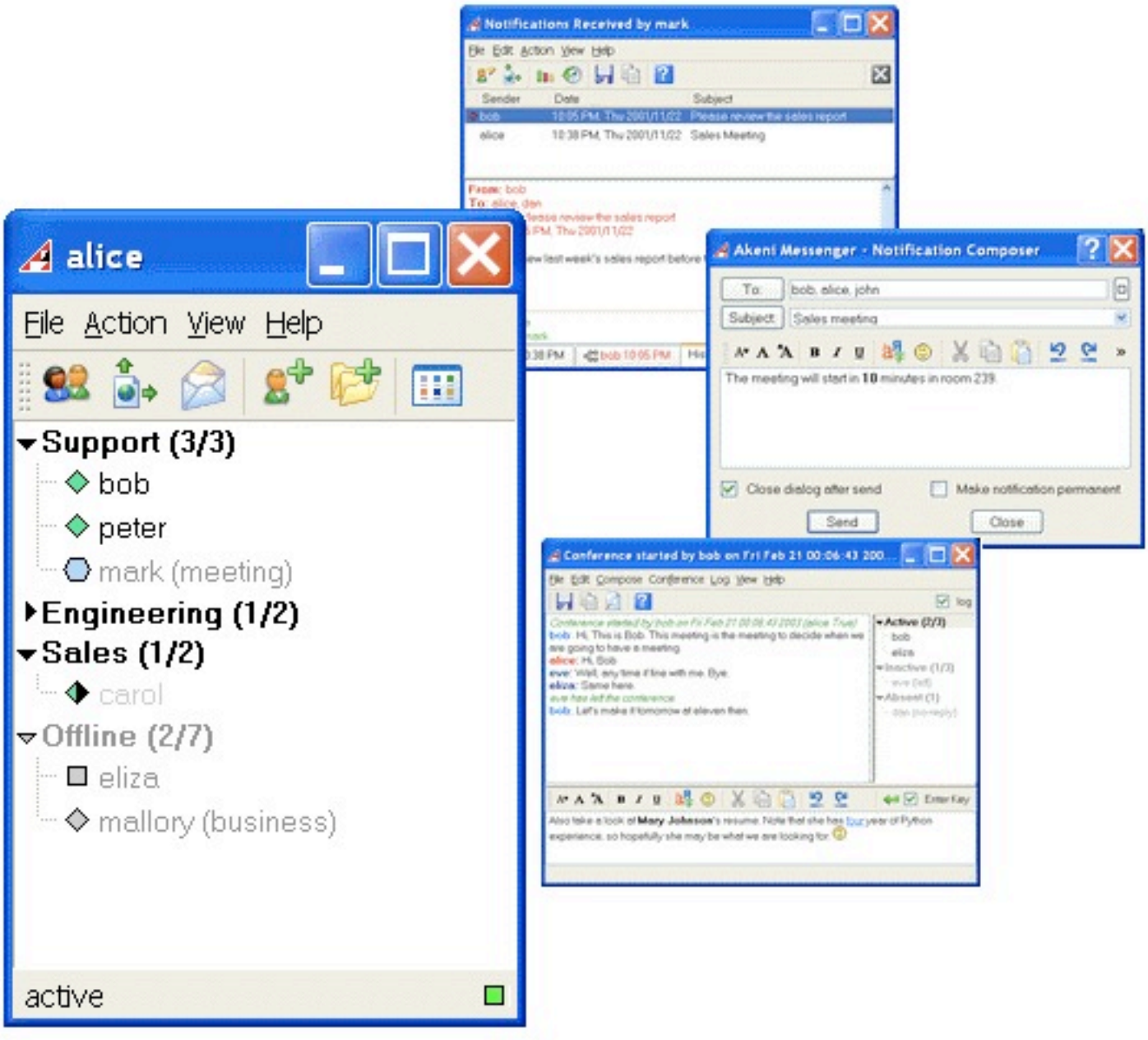

- use digital communication technologies such as instant messaging to work with teachers, peers, and community.
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- listen to podcasts on mobile devices, that extend and enhance their academic work.
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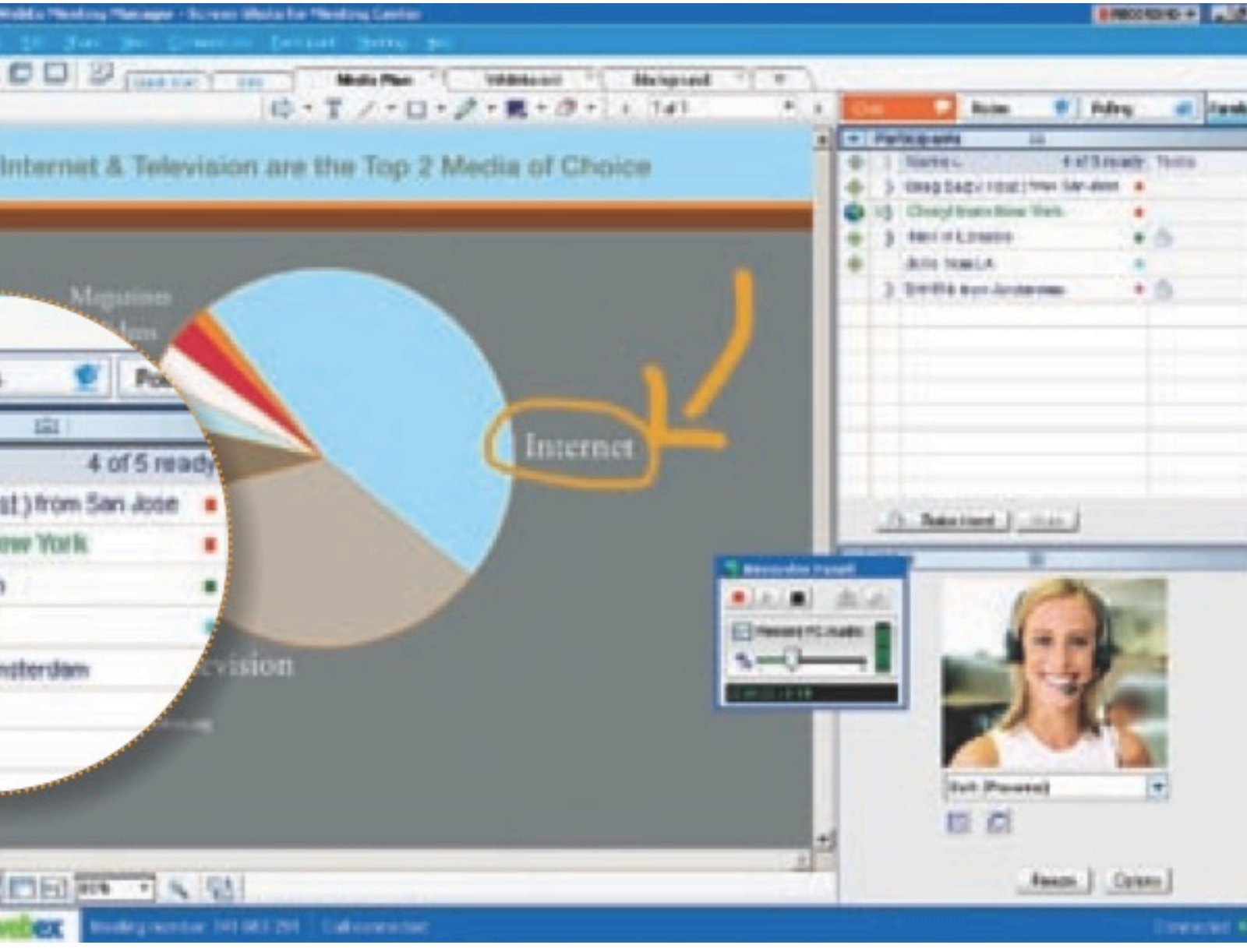

- use digital tools such as videoconferencing, shared documents, and learning management systems to get their work done.
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- use digital tools to develop animations, videos, presentations, and podcasts that supported their academic work.

Principles

- Problems worth solving
- Productive collaboration
- Self-directed research
- Good storytelling
- Tools for the task
- Curious and creative

Students learn to be curious and creative

At our model school, these are not thought of as personality traits but as habits of mind and modes of work that must be taught, practiced, and assessed in all subject areas. Without them, students are less likely to succeed in college and in work, and less likely to enjoy their lives.

So during the day in their lives, students:

- identify opportunities to extend their studies in new directions, then applied the necessary tools to get the job done.

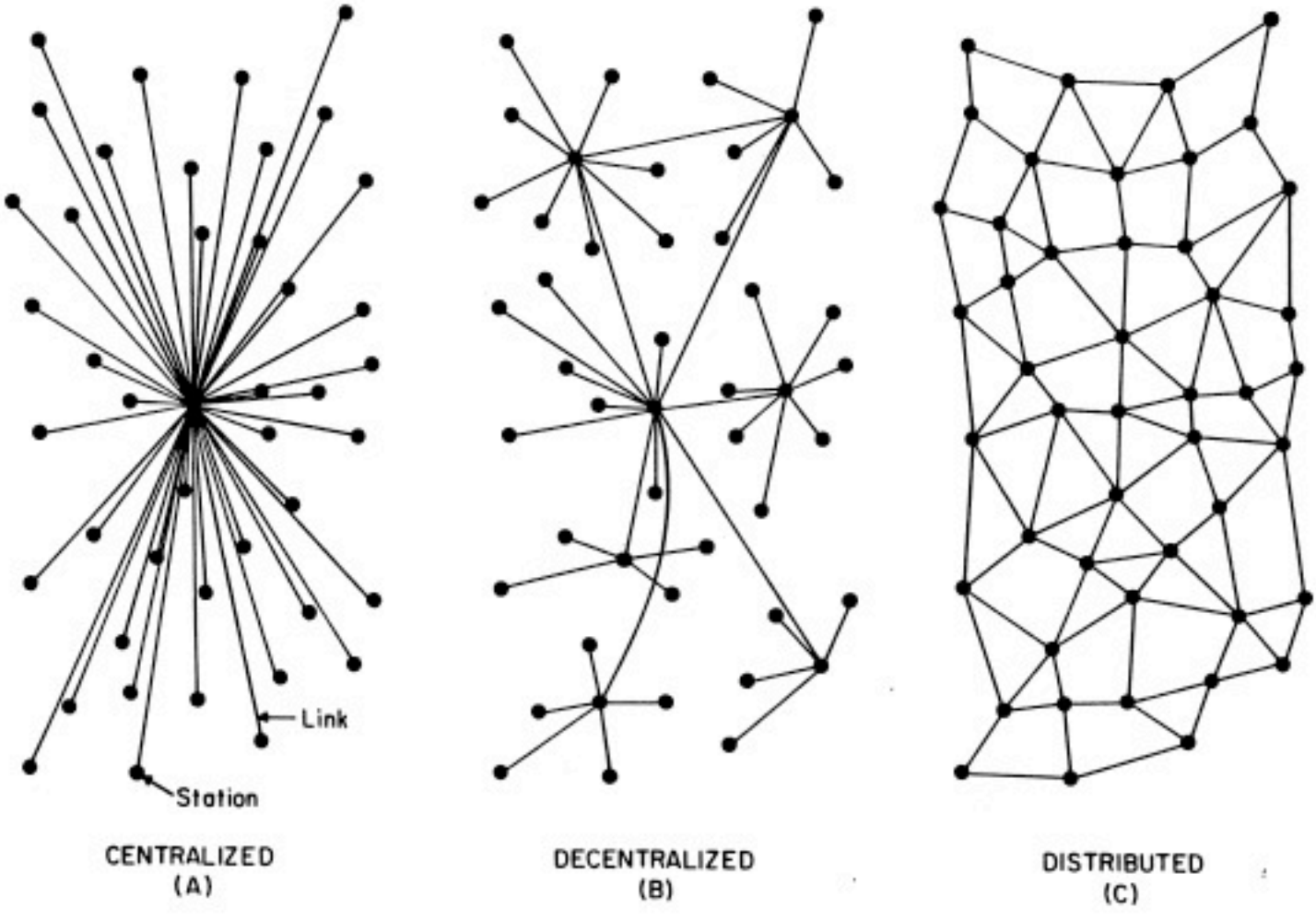

FIG. 1 — Centralized, Decentralized and Distributed Networks

are rewarded for discovering new patterns and relationships.

apply artistic appreciation, composition, and expression to their problem-solving and academic work.

are assigned tasks that expect them to seek out new approaches and design unheard-of solutions.

end the day with a sense of wonder and curiosity linked to important academic objectives.

At My School

How many of the students in your classroom did the things listed above today? In your school? In your district? What changes would have to take place to make more of this happen? What technologies would they need?

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